

International Network for Social Network Analysis Paris Sunbelt Conference 2025

Participants, Titles, and Abstracts of Sessions and Workshops 23 May 2025

This document includes all the authors, titles, and abstracts of the Paris Sunbelt 2025, as of May 23. It is meant to help participants browse through the content of the conference using keywords.

Attention: Dates and rooms below may be modified. Do not use this document as a schedule. The updated conference agenda is available on ConfTool and Whova.

The Organizing Committee

Workshops Overview

WS-M08: Introduction to inference with networks in R

Session Chair: **Tomas Diviak** Session Chair: **Robert W Krause** Session Chair: **Filip Agneessens** Session Chair: **James Hollway**

This 3-hour workshop provides an introduction to statistical methods for analyzing social networks. The focus is on nodal and dyadic level analysis. We will be using R packages migraph, sna, and xUCINET to perform these analyses. The course outline is as follows: 1) testing a network's basic properties using conditional uniform graph (CUG) test (e.g., reciprocity, homophily) 2) nodal level statistical tests 3) permutation-based comparisons between groups of nodes 4) QAP correlation and linear regression – the underlying logic of QAP, data format etc. 5) QAP GLM – logistic, poisson, cognitive-social-structures, and other types and extensions

WS-M09: Mixed methods for Social Network Analysis

Session Chair: Elisa Bellotti

The workshop focuses on the use of mixed methods research designs when studying whole and ego- centered social networks. The workshop will be conducted in two parts. The first part introduces social network qualitative research and the principles of mixed methods research designs and its contributions to the study of social networks, pointing out advantages and challenges of this approach.

Illustrations of the theoretical and methodological aspects are given by bringing examples from a variety of fields of research. The second part is devoted to the presentation of concrete procedures to apply mixed methods in network research both at the level of data collection and analysis.

This part includes an introduction of different approaches to the collection of whole and ego-centered network data, i.e. interviews, ethnographic methods, archival data, together with visual instruments.

It then moves to the analysis of the quantitative and qualitative dimensions of network relationships and structures in a mixed method perspective.

WS-M10: Discovering Blockmodeling: Hands-On Analysis with BlockmodelingGUI

Session Chair: Fabio Ashtar Telarico

This three-hour workshop provides an in-depth introduction to BlockmodelingGUI, a cutting-edge R package designed to simplify and enhance blockmodelling techniques in network analysis. Blockmodelling is a powerful method for identifying and interpreting patterns in relational data, making it invaluable in fields such as sociology, political science, and organisational studies.

By integrating an intuitive graphical interface with the robust analytical capabilities of R, BlockmodelingGUI empowers researchers to uncover structural insights without requiring extensive coding expertise. Participants will engage in a combination of conceptual discussions and hands-on exercises, exploring the theoretical underpinnings of blockmodelling and applying these methods to real-world datasets.

The workshop will cover essential workflows, from data preparation and model configuration to result interpretation and visualisation. Attendees will also discover advanced features of the package, including optimisation techniques and customisation options, enabling them to tailor analyses to their specific research questions.

This session is designed for researchers, data scientists, and professionals eager to enhance their understanding of network structures. By the end of the workshop, participants will have the practical skills to harness BlockmodelingGUI in their own projects and a deeper appreciation of how blockmodelling can illuminate hidden dynamics within complex systems.

Whether you are a seasoned network analyst or a newcomer to the field, this workshop offers valuable insights and tools to elevate your analytical capabilities. ## Detailed workplan

1. Introduction to Blockmodelling * Key concepts and applications in social network analysis. * Advantages of blockmodelling for understanding relational structures. 2. Getting Started with BlockmodelingGUI * Installing and setting up the package. * Overview of the graphical user interface. 3. Hands-On Analysis * Importing and preparing network data. * Building and customising blockmodels. * Interpreting results and generating visualisations. 4. Advanced Features * Optimisation techniques and parameter tuning. * Exporting and integrating results with other analyses. 5. Case Studies * Real-world examples demonstrating the package's capabilities. * Collaborative exercises to reinforce learning. ## Format * Duration: [Specify, e.g., Half-day or Full-day workshop] * Structure: Introduction (20%) and hands-on practice (80%). * Materials: Participants will receive datasets/preconfigured R environments. ## Requirements * Participants should bring laptops with R and RStudio pre-installed.

* The workshop organisers will provide a detailed setup guide before the even

WS-M13: Co-occurrence and Correlation Networks

Session Chair: Srebrenka Letina

The network approach is increasingly employed to explore relationships among concepts, specifically the relationships between co-occurring health conditions (e.g., binary health condition indicators from hospital episode data) and the relationships between psychological variables (continuous scales from survey data).

Given the multitude of approaches available for constructing and analyzing such networks and their application across different fields of study, determining the most appropriate methods and analyses can be challenging.

In this workshop, we will cover: Theoretical Frameworks: An overview of the theoretical basis for applying network analysis to study relationships among health conditions or individual attributes.

Methodological Approaches: An exploration of existing methodologies for constructing networks and robustness testing of their estimations.

Analytical Techniques: A comprehensive set of analyses applicable to co-occurrence or correlation networks, including basic descriptive analysis, filtering methods, community detection, centrality analysis, and network comparisons. We will offer a critical assessment of methods tailored to specific types of data and interpretations.

Practical demonstrations will cover a range of methodological options and the various R packages to conduct them.

In the final segment of the workshop, participants are encouraged to discuss the application of these methods to their specific datasets.

Names and contact information of organizers: Srebrenka Letina; Srebrenka.letina@glasgow.ac.uk Mark McCann; Mark.Mccann@glasgow.ac.uk Length of the workshop: 3 hours Maximum number of attendees: 30

WS-M14: Co-authors' spatial networks analysis with Cortext Manager and Arabesque

Session Chair: Lionel Villard

In the field of scientometrics, methods derived from Social Network analysis (SNA) and Natural language processing (NLP) are among common techniques used to analyze and visualize graphs. These methods focus on both the structural and morphological aspects of the social networks investigated, whether or not their actors are localized. SNA and NLP approaches are not specifically interested in the spatial component (i.e. localization, interactions, geovisualization) of social networks.

Their complementarity with gravitational approaches, combining analysis of actors' positions and separations (distance, proximity, neighborhood) has nevertheless been widely used in the field of spatial analysis in geography. This workshop aims to present a scientometric co-authorship' analysis on a preselected topic (e.g., low carbon initiatives, climate change, AI in transportation), using Cortext Manager [1] and Arabesque [2]: two web applications respectively mobilized to geocode authors' affiliations addresses at several geographical scales and filtering and exploration spatial networks for thematic mapping purposes.

Emphasis will be placed on examining the contributions of different countries or groups of countries to scientific advancements in the selected field and the collaboration patterns that emerge. This hands-on session will guide participants through spatial data analysis and network analysis enabling them to identify thematic and territorial patterns within scientific communities.

For doing that, participants will learn how to classify documents by lexical extraction and semantic clustering, or by tagging the textual content of scientific articles with the corresponding Sustainable Development Goals (SDG) categories. This will be followed by the geocoding of authors' affiliation addresses to pinpoint their exact geographic locations.

Next, geographic/spatial aggregation methods will be explored, preparing data at different scales, from the address scale to larger meso-level units of analysis, such as: Eurostat's NUTS3, OECD's Functional Urban Areas or NETSCITY's perimeters (most active urban areas in science production [3]).

Finally, the resulting co-author' spatial networks files will be geovisualize in Arabesque, a cartographic tool based on the paradigm of visualization cartography. Several methods of statistical filtering with options adding contextual geographic information or cartographic (re)projections will be applied to the dataset.

A particular attention will be paid to the cartographic design of actors' interrelations at different scales through arrows: to their geometry and their semantics, playing on their graphic semiology. Participants will have time to play with the datasets and tools covered in the workshop, with guidance from the trainers and access to a set of materials: a mini-website giving access to all the resources, including datasets, tutorials and examples of results. [1] https://docs.cortext.net/space/ [2] https://arabesque.univ-eiffel.fr/ [3] https://www.irit.fr/netscity/prod/public/intro/ This workshop is part of RETICULAR (RÉseaux, Territoires en Interactions et interrelations Cartographiques), a collaborative research program funded by Université Gustave Eiffel and supported by the LISIS, Aménagement Mobilités Environnement (AME-splott) and Composants et systèmes(COSYS-grettia) départements, with the collaboration of CNRS (Géographie-cités).

WS-M16: Continuous Time Network Dynamics with statnet

Session Chair: Carter Tribley Butts

Prerequisites:

Some experience with R and familiarity with descriptive network concepts and statistical methods for network analysis in the R/statnet platform is expected. This workshop also assumes familiarity with ERGMs

Synopsis:

This workshop will provide an introduction to modeling of network dynamics in continuous time using ERGM generating processes (EGPs).

The exponential family random graph models (ERGMs) are a widely used framework for describing graph distributions, allowing flexible and parsimonious specification of both inhomogeneity (i.e., some ties are more likely than others) and dependence (i.e., some ties depend on others).

EGPs complement ERGMs by providing ways of specifying continuous time dynamics whose long-run behavior recapitulates a specified ERGM distribution - thus allowing for dynamic network models that are consistent with specific cross-sectional behavior. In this session, we will begin with an overview of known classes of EGPs, with an eye to understanding the types of dynamic

behavior embodied by each (and where they might be appropriate as empirical models).

We will then discuss simulation and calibration of EGPs within the R/statnet platform, using the ergmgp package. We will show examples of the use of EGPs to generate dynamics consistent with cross-sectional network data combined with information on tie durations, including continuous time generalizations of the separable temporal ERGMs (STERGMs).

Attendees are expected to have had some prior exposure to R and statnet, and completion of the statnet ERGM workshop session is strongly suggested as preparation for this session (as we will make extensive use of the ergm package). statnet is a collection of packages for the R statistical computing system that supports the representation, manipulation, visualization, modeling, simulation, and analysis of relational data.

Statnet packages are contributed by a team of volunteer developers, and are made freely available under the GNU Public License. These packages are written for the R statistical computing environment, and can be used with any computing platform that supports R (including Windows, Linux, and Mac).

Statnet packages can be used to handle a wide range of simulation and analysis tasks, including support for large networks, statistical network models, network dynamics, and missing data.

WS-M17: Intro to Network Analysis Tools In R

Session Chair: Lorien Jasny

Session Chair: Michal Jan Bojanowski

Those wishing to use the R programming language for network analysis now have a plethora of choices when it comes to libraries. In this workshop, we survey the main packages used for network data management, analysis, and visualization.

We will cover 1) importing network data (from actual files), 2) network objects and attributes, 3) computing basic descriptives (attribute distribution, mixing matrix, density, degrees, betweenness, closeness), and 4) visualization (layouts, node aesthetics). These will be done side by side for the different packages, as well as discussion of the strengths and weaknesses of each. We conclude with time for attendees to work either on toy datasets or with their own data with help from instructors.

This workshop is a unification of workshops "Using R and 'igraph' for Social Network Analysis" and "Introduction to Social Network Analysis with R and statnet" that has been offered on Sunbelt and EUSN conferences since 2011.

It will serve as an introduction for those wishing to take "An introduction to ERGM with Statnet", or other Statnet-related workshops on the program.

WS-M18: Introduction to Core Social Network Concepts

Session Chair: Rich DeJordy

This workshop introduces the major streams of social network theory, taking a conceptual view grounded in and contrasted with the broader landscape of social theory. This is not a course on network methodology, although mathematical concepts such as centrality and structural equivalence are discussed. The workshop is intended as a survey of the major conversations network researchers from the social sciences are engaged in. It is suggested for those new to the network perspective who are interested in a map of the theoretical landscape. The workshop does not use any software or data. Network Theory -- Outcomes of network variables/mechanism Here we consider network theorizing in both the social capital literature (e.g., weak ties, structural holes, social resource theory) and the contagion literature (e.g., interpersonal influence, diffusion of innovation). We examine how concepts like centrality and core-periphery structures are interpreted in these different contexts. Topics include multiple levels of analysis, theoretical network mechanisms, and social cognition (perceived ties). Themes include the interplay of node characteristics and network structure, as well as ... Theory of Networks -- Antecedents of Network Variables This section deals with theories of tie formation, why networks have the shapes they do, and why actors occupy the network positions they do. Topics include homophily, preferential attachment, mechanisms of choice and opportunity, balance theory, etc.

WS-M19: Community Detection in Networks: An Overview

Session Chair: Guillermo Romero Moreno

This workshop will provide a comprehensive introduction to the problem of Community Detection (CD), i.e. dividing a network into groups of nodes, along with materials and code for its implementation. It will cover the main families of algorithms and the major challenges in implementation, as well as means to compare and evaluate solutions. The workshop will mostly focus on the standard problem of non-overlapping partitions on undirected, unweighted networks, although other problem and network variations will be briefly reviewed at the end. While the code and examples will be provided in python within an interactive online platform, so familiarity with the language will not be required and there is no setup needed previous to the workshop. Overview of content: - Introduction to the problem and applications - Overview of the main families of problem definitions and the most common algorithms, and their implementations - Evaluation of CD solutions - Comparing and combining multiple solutions - Quick overview of variations: overlapping CD, multiplex, temporal

WS-M20: Mapping Semantic Networks with KnowKnow

Session Chair: Alec McGail

This workshop introduces participants to constructing and analyzing term co-occurrence networks using the open-source Python package knowknow. Co-occurrence networks are particularly effective for analyzing small, linguistically diverse datasets, enabling researchers to identify features and trends that may appear in only a few documents. Participants will gain hands-on experience analyzing a curated dataset of journal articles from anthropology, economics, political science, psychology, and sociology (1970-2020), with the option to bring and work with their own datasets. The session covers techniques for building cooccurrence datasets from academic texts and preparing them for analysis; methods for identifying meaningful terms, their relationships, and the structural properties of co-occurrence networks, such as clusters, hubs, bridges, and temporal patterns; and practical guidance on sharing workflows and datasets using Harvard Dataverse and GitHub to ensure replicability and collaboration. Morning Session: Building and Visualizing Semantic Co-occurrence Networks. 1) Overview of co-occurrence networks and their application to social science research. 2) Preparing a dataset and building initial co-occurrence networks using knowknow. 3) Visualizing networks using built-in tools. 4) Exporting datasets, documenting workflows, and publishing on open platforms. Afternoon Session: Interpreting Semantic Co-occurrence Networks. 1) Temporal trends and structural features of semantic networks. 2) Formulating and answering research questions about the dynamics of the social sciences. 3) Hands-on projects. Prerequisites: Beginner-level familiarity with Python (basic scripting, running code in Jupyter Notebooks). No prior experience with knowknow is required. Participants should bring a laptop with Python pre-installed or access to an online Python environment (e.g., Google Colab).

WS-M24: Introduction to Social Network Data Collection with an Emphasis on Social Survey

Methods

Session Chair: David Benjamin Tindall

This workshop is intended for relative newcomers to social network analysis. The workshop will provide an introduction to social network data collection with an emphasis on social survey methods. The workshop will consider a variety of related methodological issues such as research design, measurement, sampling, data analysis, and ethics, as well as the linkage of these issues to data collection. Different types of data collection techniques will be illustrated such as the name generator, position generator, and name roster. The different opportunities and constraints associated with data collection for whole versus egonetworks will be considered. Some discussion of non-survey techniques may also be provided. Some attention may also be given to mixed methods.

WS-M25: SNA Toolbox – Data Collection, Visualisation, Analysis and Rapid Reporting

Session Chair: Dean Lusher

Session Chair: Peng Wang

In this 3-hour workshop, you will get hands-on experience with SNA Toolbox – web-based software for the collection, visualisation, analysis and rapid reporting of social network data. SNA Toolbox is a comprehensive all-in-one network package that allows you to collect network data and have it instantly available in network-ready form for analysis (e.g., standard network metrics, indegree, clustering, etc...), with the ability to create a pipeline for online reports for research clients/partners/customers/participant groups that are securely accessible online. Points covered include: - System overview, including features, security, and user roles - Using the survey designer to construct social network and standard attribute questions, as well as automated calculations of scale items. - Network analysis packages that immediately utilise the data collected without the need for data transformation. - Network visualisation tools, algorithms, nodal attributes, and selected node information - General data visualisation tools (e.g., charts, graphics, etc...) - Reporting: templates, pre-configurations, insights tools, and rapid reporting to clients on researcher-selected metrics. No software is required. You will be supplied with login credentials for the web-based application for the workshop and beyond.

WS-M03: Egocentric network analysis with R

Session Chair: Raffaele Vacca

This workshop offers an introduction to the R programming language and its tools to represent, manipulate, and analyze egocentric or personal network data. Topics include: introduction to ego-network research and data; data structures and network objects in R; visualizing ego-networks; calculating measures on ego-network composition and structure; converting ego-network measures to R functions; applying these functions to many ego-networks. The workshop heavily relies on R tidyverse packages for data science, showing how they can be used to easily conduct common operations in ego-network analysis and scale those operations up to large collections of networks. We'll cover specific packages for network analysis (igraph, network, egor), data management (dplyr) and programming (purrr). No previous familiarity with R is required; participants only need a laptop with R and RStudio installed. This workshop has been taught for the past several years at different international conferences, including INSNA's Sunbelt and EUSN meetings. It draws on concepts and methods presented in "Conducting personal network research: A practical guide" by Christopher McCarty, Miranda Lubbers, Raffaele Vacca and José Luis Molina (Guilford Press). More details on the workshop's materials and requirements are here: raffaelevacca.com/egonet-r.

WS-M05: The analysis of longitudinal social network data using RSiena

Session Chair: Viviana Amati

Session Chair: Marion Hoffman

This workshop offers a basic introduction to the theory and application of Stochastic Actor-oriented Models (SAOMs). SAOMs are a statistical model family developed for the analysis of social networks panel data, understood here as two or more repeated observations of a network on a given node set (usually between 20 and a few hundred nodes). The method is implemented in the RSiena, package in the R software. The first part of the workshop will focus on the intuitive understanding of the model and operation of the software. The second part will present models for the simultaneous dynamics of networks and behavior and other more advanced topics such as model specification, multivariate networks, and goodness of fit checking. Course participants should have a basic understanding of social network analysis concepts and methods and basic knowledge of the R programming language is necessary to successfully follow the workshop. Basic knowledge of multivariate statistical models (e.g. linear regression) is recommended. They should bring a laptop to the workshop with the latest versions of R, RStudio (or their preferred GUI if any) and the RSiena R package installed.

WS-M06: Introduction to social network analysis using R

Session Chair: Filip Agneessens

Session Chair: Tomas Diviak

This 6-hour workshop provides an overview of network measures, as well as a short introduction into data collection and data management. The focus is on complete networks, although some topics might also be useful for analyzing egonetwork data. The course outline is as follows: - Introduction to social networks, different types of networks (including two-mode/affiliation networks and valued networks) - Different types of datastorage: adjacency matrices, nodelists and edgelists, and incorporating attributes - Basic visualization - Centrality measures - Whole network structural measures (density, centralization) - Subgroups, such as cliques, as well as community detection

WS-M07: Social Network Theory

Session Chair: Jan Fuhse

Theory matters! It guides our attention in research, it gives us expectations for empirical analysis, and it allows us to interpret results as examples of wider significance. Traditionally, network research focuses more on methods than on theory, leading to laments about the lack of theory. Over the last 35 years, there have been important advances in this regard. Now we have a variety of theoretical approaches to networks particularly from sociology (rational choice, analytical sociology, relational sociology etc.) available, as well as a number of middle-range theoretical concepts (social capital, network mechanisms). However, often enough, researchers do not know which concepts and approaches work well with their research. The workshop gives an introduction and reflection into the general perspective of social network analysis, it offers an overview of the currently most important concepts and theoretical approaches to social networks, and provides for a forum for participants to discuss their own empirical research in relation to theory. The focus of the workshop lies on theories that give answers to the questions: What are social networks? Why, and how, do they matter for social phenomena? The following topics will be covered: - the general perspective of network research in the social sciences, with its difference to other approaches; - what is theory, and how does it matter in the research process? - networks as social capital; - two-mode networks; - varieties of relational sociology (inspired by pragmatism, symbolic interactionism, and by Harrison White); - network mechanisms (foci-of-activity, homophily, institutionalized role patterns, reciprocity, transitivity, preferential attachment, social control, brokerage, access to information), the epistemological status of network mechanisms; - methodology: which theoretical approach work with which methods? - what concepts and theoretical approaches fit the attendants' empirical research projects? Much of the workshop will be run as presentations by the lecturer, complemented by short discussions among the participants. I will also be available for one-to-one counselling. A selection of texts will be sent to the participants, in case they want to prepare for the workshop. However, reading these is not mandatory.

WS-M12: Tidy Networks: the tidyverse and tidygraph for social network analysis in R

Session Chair: Matthew Smith

Session Chair: Yasaman Sarabi

This 3-hour workshop provides an introduction to the R programming language for those without any previous or limited experience. It will introduce the tidyverse – a set of functions and packages for data processing, cleaning, and visualisation in R. In particular, we will focus on dplyr for data processing, ggplot2 for visualisation, and Rmarkdown for creating reports. We will go on to demonstrate how the tidyverse can be applied to social network analysis - more specifically through the use of the tidygraph package. The tidygraph permits you to utilise the underlying grammar structure of the tidyverse when dealing with graph objects in R. By using the tidygraph package you can manage edgelists and network attributes in a single object, along with implementing analysis on these objects. The tidyverse allows you to create tidy data frames, whilst the tidygraph allows you to create tidy graph objects – or tidy networks! Learning Outcomes: By the end of the session participants should be able to: • Use R and RStudio. • Make use of the tidyverse for data processing – more specifically preparing datasets for SNA. • Visualising networks in R using ggplot2 (part of the tidyverse) and tidygraph. • Create tidygraph objects and undertake some initial network analysis using the tidygraph package. These users will benefit from gaining an insight into how to use R for data processing and social network analysis following the tidy philosophy.

WS-M21: Creating New Effects in RSiena

Session Chair: Nynke Niezink

Stochastic actor-oriented models as implemented in the R package RSiena help researchers study social network dynamics and the co-evolution of social networks and social actors' individual behavior. While originally developed for directed networks and discrete behavior, the model now accommodates a wide range of data types as dependent variables, including undirected networks, two-mode networks, multiplex networks, and continuous behavior. Over the years, a large selection of effects has been implemented for stochastic actor-oriented models. Many of these were motivated by the diverse set of research questions network researchers have about social dynamics. Yet, you may still run into the problem of wanting to study a social mechanism for which the RSiena manual does not contain a matching effect. In this case, if you feel comfortable programming in R, you may want to implement an effect in RSiena vourself. This workshop will discuss how to create an effect in RSiena. Since the back-end of the RSiena code was implemented in C++ for computational efficiency, creating RSiena effects involves coding in both R and C++. The workshop will give a brief introduction to C++, discussing just those parts you need to be able to create your effect. We will go through the several phases of developing an RSiena effect, going from social mechanism to effect definition to implementation and testing. We will also see how implementing effects can go wrong and discuss how you can debug your work. Finally, we will discuss how you can decide per effect, depending on your coding experience, whether to implement it yourself or to ask for help. The target audience for this workshop consists of RSiena users who feel comfortable programming in R (e.g., writing a function, writing for-loops, etc). No prior experience in C++ is required. The workshop will not introduce the stochastic actor-oriented modeling framework but only focus on implementing effects. Please refer to the Sunbelt 2025 workshop list for introductory workshops on RSiena. Length: 3 hours Capacity: 30 people

WS-M22: Analysis of Multiplex Social Networks (hands-on)

Session Chair: Matteo Magnani

Session Chair: Valeria Policastro

Many real social networks contain multiple types of ties, for example representing different types of interactions or different contexts where interactions happen. Through the use of R libraries for the analysis of multiplex networks, this workshop explores the main theoretical concepts and analysis methods in a practical way. Participants will be introduced to the key principles of multilayer social network analysis, including intra-layer and inter-layer interactions, measures and community detection methods. Emphasis will be placed on understanding how multilaver structures differ from traditional single-laver networks and the unique insights they provide. Multiplex networks have been studied in different disciplines, including sociology, computer science, and physics, because of their ability to provide richer, more qualitative information than simple graphs, but still allow quantitative processing. The main topics covered are: visualization, micro-level analysis (actor centrality and role of edge types), meso-level analysis (communities), macro-level analysis (comparison of different edge-types), and integration. The practical component will focus on using two main R packages multinet and INetTool to analyze multilayer networks. With multinet participants will learn how to model multilayer networks, perform descriptive analyses, and compute multilayer metrics, while with INetTool participants will explore how to integrate networks, including merging heterogeneous datasets, and extracting insights from real-world case studies. Case studies will be drawn from diverse domains, such as social media interactions, organizational collaboration, and others, providing participants with practical examples of how to apply these tools to real-world problems. By the end of the workshop, participants will: - Understand the theory of multilayer social networks. - Gain proficiency in using multinet and INetTool for network analysis. - Be equipped to apply multilayer network analysis to their research.

WS-M23: Exponential Random Graph Models (ERGMs) using statnet

Session Chair: Michal Jan Bojanowski

Session Chair: Steven Goodreau

This workshop provides a hands-on tutorial to using exponential-family random graph models (ERGMs) for statistical analysis of social networks, using the "ergm" package in statnet. The ergm package provides tools for the specification, estimation, assessment and simulation of ERGMs that incorporate the complex dependencies within networks. Topics covered in this workshop include: * an overview of the ERGM framework; * types of terms used in ERGMs * defining and fitting models to empirical data; * interpreting model coefficients; * goodness-of-fit and model adequacy checking; * simulation of networks using fitted ERG models; * degeneracy assessment and avoidance. Workshop length: 3 hours Max attendees: 30

WS-M26: Hyperlink Prediction on Hypergraphs Using Python

Session Chair: Moses Boudourides

Hyperlink prediction, a natural extension of link prediction in graphs, focuses on inferring missing hyperlinks in hypergraphs, where a hyperlink can connect more than two nodes. This technique has diverse applications across systems such as bibliometric networks, chemical reaction networks, social communication networks, and protein-protein interaction networks (among others). In this workshop, we provide a systematic and comprehensive demonstration of hyperlink prediction using Python, primarily leveraging the PyTorch library. We will explore three structural similarity-based methods (Common Neighbors, Katz Index, and Resource Allocation), a probability-based method (Node2Vec, based on random walks), and a deep learning-based method (CHESHIRE: Chebyshev Spectral Hyperlink Predictor). To evaluate the performance of hyperlink prediction, we will use a range of metrics, including F1 scores, ROC AUC, accuracy, precision, recall, log loss, and Matthews correlation coefficient—metrics widely utilized in machine learning. Additionally, we will discuss how hyperlink prediction extends to temporal hypergraphs. To compare, benchmark, and evaluate the hyperlink prediction methods, we will use a selection of well-known or randomly generated medium-sized networks. This is a hands-on computational workshop, and participants should have some prior knowledge of Python. All computations will be performed in Jupyter Notebooks, which will be made available on GitHub before the workshop.

WS-M27: Introduction and demonstration of participatory social network mapping approaches

for health equity

Session Chair: Emily Suzanne Nelson

There have been calls for system-level interventions that target the redistribution of power within communities to achieve health equity. To develop and assess the effectiveness of these interventions, there is a need for approaches that engage multiple actors within the system to identify and evaluate who has different types of power, how power operates, and how power changes over time. Participatory social network mapping approaches can be used to map the landscape of power and social capital within communities while fostering reflections on how these dynamics shape opportunities to realize health equity. This workshop will review and provide demonstrations of two participatory social network mapping approaches applied within a community-based food systems change intervention and a coalition-based opioid fatality reduction intervention. The session will begin with an overview of the methods used to frame power dynamics within these two different interventions, including terminology applied to define different types of power influencing these two health equity interventions. Next, we will practice applying these methods using egocentric social network analysis to explore connections to different sources of power among local food justice leaders and opioid-focused coalitions. We will examine how these power networks can be understood based on their trustworthiness, collaboration, and influence and how these dimensions of power influence intervention pace, equity, and efficiency. Participants will create their own power maps and explore how these can be analyzed in R. Finally, we will explore how these methods were used to guide food system changes focused on promoting nutrition equity and to inform sustainability of opioid fatality reduction strategies within diverse community settings.

WS-M28: Introduction to Bayesian estimation of Auto-logistic actor attribute models (ALAAM) in R

Session Chair: Johan Henrik Koskinen

Auto-logistic actor attribute models (ALAAMs) are models for analysing social influence or social contagion for cross-sectional networks, when the outcome of interest is dichotomous. If no dependencies among the outcomes of the nodes are assumed, this model reduces to logistic regression. When dependencies through the network, such as social contagion, are assumed, however, the ALAAM provides testable parameters that capture these processes. The workshop will introduce the R package "balaam", which provides a range of different parameters for network dependencies and estimates the model using Bayesian inference. The package also provides goodness-of-fit analysis, model selection indices, as well as principled approaches for dealing with missing outcomes. Topics treated are: principles of Bayesian inference; model specification; MCMC estimation for the ALAAM; model selection; missing data analysis. Prerequisites The workshop is intended for participants who have working knowledge of quantitative analysis and experience in empirical network research. Fundamental social network analysis skills are assumed. Literature: Koskinen, J. and Daraganova, G. (2022) Bayesian analysis of social influence. Journal of the Royal Statistical Society Series A: Statistics in Society 185.4, pp. 1855–1881. Daraganova, G. & Robins, G. (2013) Autologistic actor attribute model. In: Lusher, D., Koskinen, J. & Robins, G. (Eds.) Exponential random graph models for social networks: theory, methods and applications. New York: Cambridge University Press. pp. 102-114. Daraganova, G. & Pattison, P. (2013) Autologistic actor attribute model analysis of unemployment: dual importance of who you know and where you live. In: Lusher, D., Koskinen, J. & Robins, G. (Eds.) Exponential random graph models for social networks: theory, methods and applications. New York: Cambridge University Press, pp. 237-247. ALAAM website: https://github.com/johankoskinen/ALAAM

WS-M29: Mediation and Moderation Analysis in ERGM using ergMargins

Session Chair: Scott Duxbury

Session Chair: Jenna Wertsching

Exponential random graph models (ERGM) are widely used in the social sciences to examine determinants of graph structure. This 3-hour workshop will introduce attendees to mediation and moderation analysis in ERGM using the ergMargins package for R. The workshop will describe why ERGM coefficients cannot be compared between models and why coefficients for interactions—including node matching, node mixing, and other common measures of homophily and heterophily—cannot be interpreted without adjustment. Topics covered will include (1) mediation analysis, (2) moderation analysis, (3) mediation analysis when the mediator is an interaction, and (4) mediation analysis when the main effect is an interaction. We will review a range of special cases, including interactions involving both continuous and discrete variables, necessary conditions for a causal interpretation, and mediation analysis involving endogenous graph statistics. Attendees will come away from the workshop with a deeper understanding of inferential difficulties in ERGM and with knowledge on how to address each issue using ergMargins.

WS-M30: Modeling Relational Event Dynamics with statnet

Session Chair: Carter Tribley Butts

Prerequisites: Some experience with R and familiarity with descriptive network concepts and statistical methods for network analysis in the R/statnet platform is expected. Synopsis: This workshop session will provide an introduction to the analysis and simulation of relational event data (i.e., actions, interactions, or other events involving multiple actors that occur over time) within the R/statnet platform. We will begin by reviewing the basics of relational event modeling, with an emphasis on models with piecewise constant hazards. We will then discuss estimation, assessment, and simulation of dyadic relational event models using the relevent package, with an emphasis on hands-on applications of the methods and interpretation to Network Analysis with R and statnet" workshop session is suggested (but not required) as preparation for this session. Familiarity with parametric statistical methods is strongly recommended, and some knowledge of hazard or survival analysis will be helpful. statnet is a collection of packages for the R statistical computing system that supports the representation, manipulation, visualization, modeling, simulation, and analysis of relational data. statnet packages are contributed by a team of volunteer developers, and are made freely available under the GNU Public License. These packages are written for the R statistical computing environment, and can be used with any computing platform that supports R (including Windows, Linux, and Mac). statnet packages can be used to handle a wide range of simulation and analysis tasks, including support for large networks, statistical network models, network dynamics, and missing data.

WS-M31: Social Network Approaches for Behavior Change

Session Chair: Thomas Valente

This workshop introduces the many ways that social networks influence individual and network-level behaviors. It also provides a brief introduction to analytic approaches for understanding network influences on behaviors; and reviews existing evidence for the utility of using social network data for behavior change in a variety of settings including health behaviors and organizational performance. A framework for using networks during program implementation is presented. The workshop also presents a typology of network interventions and reviews existing evidence on the effectiveness of network interventions. (Students familiar with the R environment may follow an R script written to demonstrate the 24 or so tactical interventions presented.) No software or computing requirements are needed. The workshop will be conducted by Tom Valente who has been developing and implementing network-based interventions for nearly 25 years.

WS-M32: The ACT (Activate, Connect, Transform) model to design social and collaborative interventions for implementation and action

Session Chair: Reza Yousefi Nooraie

The ACT (Activate, Connect, Transform) model aims to guide the design, implementation, and evaluation of social and collaborative interventions that Activate, Connect, and Transform individuals, organizations, health systems, and communities.

The ACT model responds to pressing needs in healthcare and community action: how to meaningfully engage patients in decision-making, research, and policy; how to leverage social networks for the dissemination and implementation of high-quality innovations; and how to create networks of learning and improvement in healthcare and community settings.

This is essential in our rapidly changing landscapes, where bridging formal and informal social networks and relations can enhance outcomes and quality of services and equip health and social systems to respond dynamically to emerging needs and crises.

The three pillars of ACT involve:

Activate: empowering individuals, organizations, and communities with the motivation, skills, and strategies to mobilize resources and foster relationships.

Connect: Building and nurturing supportive relationships, networks of influence and knowledge sharing, and partnerships among individuals, teams, and communities to strengthen collective capacity and achieve shared goals.

Transform: Driving improvement in behaviors, processes, and outcomes by implementing and sustaining evidence-based innovations.

The workshop Agenda: - Introduction to the three-pillar approach - Activate interventions: •"Network diagnostics"/charting at the individual or community levels to provide network actors with a bird's eye view of their existing networks and potentials for further activation.(Yousefi Nooraie, et al., 2021) •Asset mapping - Connect interventions: •Strategies to facilitate connectivity and optimize social structure, following the framework developed by Yousefi Nooraie, et al. (2021) - Transform interventions: •Strategies to enhance the dissemination and implementation of valued interventions using networking strategies, following the framework developed by Bunger and Yousefi Nooraie, et al. (2023) - Cyclic approach to intervention refinement - A quick introduction to evaluation •Approaches to assess network evolution, social activation, and resilience building, with an emphasis on mixed-methods analysis (Yousefi Nooraie et al., 2020)

With this unique three-pillar approach—Activate, Connect, and Transform—the ACT model aims to inform the design of interventions to build dynamic, resilient, and inclusive networks where individuals are engaged, networks are optimized for knowledge sharing and support, and dynamically respond to emergent needs

Workshop length: 3 hours

Maximum number of attendees: 20

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Yousefi Nooraie, R., Mohile, S. G., Yilmaz, S., Bauer, J., & Epstein, R. M. (2021). Social networks of older patients with advanced cancer: Potential contributions of an integrated mixed methods network analysis. Journal of geriatric oncology, 12(5), 855-859.

Yousefi Nooraie, R., Sale, J. E., Marin, A., & Ross, L. E. (2020). Social network analysis: An example of fusion between quantitative and qualitative methods. Journal of Mixed Methods Research, 14(1), 110-124.

Yousefi Nooraie, R., Warren, K., Juckett, L. A., Cao, Q. A., Bunger, A. C., & Patak-Pietrafesa, M. A. (2021). Individual-and grouplevel network-building interventions to address social isolation and loneliness: a scoping review with implications for COVID19. PloS one, 16(6), e0253734.

WS-M33: Walking through a Social Network Project in UCINET

Session Chair: Rich DeJordy

This workshop is focused on the practical application of one specific network analysis tool, UCINET (a Windows program, there is no Mac or Linux version) in completing the analysis for a particular study. Anonymized data from one of the instructors will be provided, and the workshop will walk the participants through a defined research project. The workshop will cover: Importing the data Data transformations Dealing with missing data Network Visualizations using NetDraw Exploring dyadic hypotheses Characterizing a node's network environment Measuring structural holes and centrality Exploring overall network structure Testing hypotheses The workshop is intended for people with a basic understanding of the network concepts covered and designed to be a hands-on supplement to the "Introduction to Core Network Concepts" workshop. Participants should bring a Windows-based laptop (or any machine with a Windows emulator). Participants do not need to own UCINET for this workshop. One to two weeks prior to the workshop, participants will be sent instructors for downloading the trial version of UCINET.

WS-T37: Addressing Unprecedented Global Challenges: How to Create Structures Through Social Network Analysis to Support Team Development and Effectiveness using the Archintor® – A Transformative Framework

Session Chair: Ellyn M. Dickmann

In today's complex and interconnected workplaces, understanding the dynamics of teams goes beyond traditional organizational charts.

Teams are influenced not only by formal hierarchies but also by the informal networks that drive collaboration, communication, and innovation.

As the world grapples with unprecedented challenges—ranging from climate change, global pandemics, and geopolitical instability to technological disruption and social inequality—effective problem-solving and collaboration have become more critical than ever.

Addressing these multifaceted issues requires interdisciplinary approaches and high-performing teams that can adapt quickly, communicate effectively, and innovate relentlessly.

This workshop introduces participants to the concept of the Archintor®, a transformative framework leveraging social network analysis to identify, analyze, and optimize team dynamics and structures to meet these demands.

The Archintor® concept (architect + instructor + facilitator) was first introduced in 2023 via a PLOS ONE publication.

It represents a paradigm shift in applied social network analysis for team building, emphasizing how expectations shape network structures.

By identifying the "ideal" network structure perhaps even before a team has formed, an Archintor® is tasked with designing and fostering expectations that drive specific interactions, ultimately reshaping team networks to enhance effectiveness and success. This workshop grounds participants in existing research and practice, drawing on findings from two recent studies to illustrate the power of social network analysis in real-world applications.

Participants will explore:

- The foundations of social network analysis and its role in identifying team types and guiding team formation and development.
- How to identify and leverage critical network types and roles such as connectors, boundary spanners, and structural holes.
- Strategies for shifting network structures to achieve desired configurations.
- The importance of communication, learning, and social connections in fostering ideal team structures.
- Best practices for designing and maintaining effective team networks.
- Tips for conducting longitudinal network analysis to monitor and refine team dynamics.

The workshop features several interactive experiences, including small group problem-solving activities and collaborative discussions.

Participants will gain hands-on practice in mapping and analyzing networks, as well as developing strategies to intentionally shift team dynamics to align with organizational goals.

By the end of this session, participants will be equipped with practical tools and actionable insights to become an effective Archintor®, capable of designing and guiding network structures that maximize team potential.

This workshop is ideal for network analysts, evaluators, organizational development specialists, and researchers interested in leveraging social network analysis to build and sustain high-performing teams that can address today's unprecedented global challenges.

3 Hours, 30 Maximum Participants

WS-T23: Modeling Relational Events in R Using goldfish

Session Chair: Alvaro Uzaheta Session Chair: Maria Eugenia Gil Pallares Session Chair: Marion Hoffman Session Chair: James Hollway

The goldfish package offers tools for applying statistical models to relational event data.

The study of relational events is growing in social network research, driven by the increasing availability of data.

For example, data collected from digital traces of individuals' interactions —such as communication exchanges, transactions, and collaboration— provide in-depth details regarding the timing or sequence of relational actions between actors.

The workshop provides an introductory theoretical overview from a social science perspective, complemented by a hands-on tutorial (as time permits) on the different models implemented in the package:

* Dynamic Network Actor Models (DyNAM): Investigate relational event models as an actor-oriented decision process. - rate: Actors compete to create the next relational event (Hollway, 2020). - choice: The active actor chooses the receiver of the event from among the same (Stadtfeld and Block, 2017) or a different set of nodes (Haunss and Hollway, 2023). choice_coordination: The creation of coordination ties as a two-sided process (Stadtfeld, Hollway, and Block, 2017a), as in studies analyzing agreements between countries.

* Dynamic Network Actor Models for interactions (DyNAMi): Investigate dynamics of conversation groups and interpersonal interaction in different social contexts from an actor-oriented perspective (Hoffman et al., 2020), as in studies using social sensors. - rate: Actors compete to join or leave groups. - choice: The active actor chooses the group to join.

* Relational Event Models (REM): Investigate relational event models as a tie-oriented process (Butts, 2008), taking into account right-censoring (Stadtfeld, Hollway, and Block, 2017b).

Prerequisites: Participants should be familiar with R and model-based statistical inference (such as logistic regression).

Please bring a laptop with the R software environment, the goldfish package installed, and its dependencies.

More information about the package and installation is available at: https://github.com/stocnet/goldfish

References:

Butts, Carter. 2008. "A Relational Event Framework for Social Action. "Sociological Methodology 38 (1): 155–200.

Haunss, Sebastian, and James Hollway. 2023. "Multimodal Mechanisms of Political Discourse Dynamics and the Case of Germany's Nuclear Energy Phase-Out." Network Science 11 (2): 205–23. <u>https://doi.org/10.1017/nws.2022.31</u>.

Hoffman, Marion, Per Block, Timon Elmer, and Christoph Stadtfeld. 2020. "A Model for the Dynamics of Face-to-Face Interactions in Social Groups." Network Science 8 (S1): S4–25. <u>https://doi.org/10.1017/nws.2020.3</u>.

Hollway, James. 2020. "Network Embeddedness and the Rate of Water Cooperation and Conflict." In Networks in Water Governance, edited by Manuel Fischer and Karin Ingold, 87–113. Cham: Palgrave MacMillan. <u>https://doi.org/10.1007/978-3-030-46769-2_4</u>.

Stadtfeld, Christoph, and Per Block. 2017. "Interactions, Actors, and Time: Dynamic Network Actor Models for Relational Events." Sociological Science 4 (14): 318–52. <u>https://doi.org/10.15195/v4.a14</u>.

Stadtfeld, Christoph, James Hollway, and Per Block. 2017a. "Dynamic Network Actor Models: Investigating Coordination Ties Through Time." Sociological Methodology 47 (1): 1–40. <u>https://doi.org/10.1177/0081175017709295</u>.

_____. 2017b. "Rejoinder: DyNAMs and the Grounds for Actor-oriented Network Event Models." Sociological Methodology 47 (1): 56–67. <u>https://doi.org/10.1177/0081175017733457</u>.

Length: 3 hours Participants: 30

WS-T28: Temporal Exponential Random Graph Models (TERGMs) for dynamic networks

Session Chair: Steven Goodreau

This workshop provides a hands-on introduction to working with temporal network data in statnet, from exploratory data analysis and visualization to statistical modeling with Temporal Exponential-Family Random Graph Models (TERGMs). TERGMs are a broad, flexible class of models for representing the structure and dynamics observed in temporal networks. They can be used for both estimation from and simulation of dynamic network data. The topics covered in this workshop include: - A brief overview of exploratory data analysis with temporal network data (using the statnet packages 'tsna' for descriptive statistics and 'ndtv' to create network movies), - different types of dynamic network data (network panel data, a single cross-sectional network with link duration information, and cross-sectional, egocentrically sampled network data) - statistical model elements and specification using the statnet package tergm - model estimation tools for each type of data in tergm - model diagnostics in tergm, and - Simulating dynamic networks from fitted models with tergm.

WS-T30: Advanced Exponential-Family Random Graph Modelling with Statnet

Session Chair: Pavel Nikolai Krivitsky

This workshop will provide a tutorial of advanced usage of 'ergm' and extension packages, focusing on binary networks. Topics include specifying complex structural constraints, estimation tuning, use of term operators, and observational (e.g., missing data) structure. Also included is using the new 'ergm.multi' package for modelling multilayer and multimode networks, as well as joint models of ensembles of networks. Prerequisites: Familiarity with R and 'ergm' required. If you are new to ERGMs, the introductory workshop on ERGMs using Statnet is strongly suggested.

WS-T31: Understanding social-ecological systems as multilevel social-ecological networks Session Chair: Manuel Fischer

Schedule: 3 hours Limited to 30 seats In this workshop we will elaborate on how coupled social-ecological systems (or coupled natural and human systems) have been described and analyzed as multilevel networks and the research questions that have been addressed. Further, they will take stock in recent research that has identified different possibilities and barriers for further developments of this line of research. Critical issues such as what are nodes and links in a social-ecological system and how to accomplish some level of comparability across different study contexts will be addressed. They will also discuss the range of problems (design, data collection, methodological) that many have encountered when doing this kind of synthetic research. In addition, there will be practical hands-on exercises on how conduct and understand analytical results deriving from multilevel network analyses. The analyses will be utilizing the MPNet software (http://www.melnet.org.au/pnet), which should be downloaded and installed prior to the workshop. Since MPnet require Windows, an alternative software is Statnet (https://statnet.org/), although using Statnet, not all of the multilevel analyses will be possible to conduct. All exercises and examples will be based on real data, and both patterns of social relations among actors as well as environmental interactions among biophysical components will be examined. The workshop includes the following elements: 1. Why a social-ecological network approach? What are the presumed benefits? 2. What is a node, and what is a link in a complex social-ecological system? 3. How to move beyond just describing a social-ecological system as a multilevel network to actually ask some challenging questions, and perhaps even get some answers? 4. Investigate how patterns of social- and social-ecological relations among resource users can be related to social- and environmental outcomes. 5. Gain exposure to commonly used software for studying multilevel social-ecological networks, i.e. multilevel ERGMs implemented in MPnet. Prerequisites Familiarity with the concept of networks (i.e. nodes and ties) as well as some experiences of network-centric analyses. Previous exposure to ERGM is valuable.

WS-T32: Fluctuating Opinions in Social Networks: A Tutorial in Bayesian Learning Methods

Session Chair: Yutong Bu

Session Chair: Jarra Reynolds Horstman

Theoretical studies of opinion formation and evolution in social networks often focus on convergence to a set of steady-state opinions, namely asymptotic learning (with or without consensus).

This is often motivated by the desire to seek an 'equilibrium' according to various definitions from statistical physics, control engineering, or economics.

In many real social settings, however, it is observed empirically that opinions do not converge to a steady state; instead, they fluctuate indefinitely.

This interdisciplinary workshop has three goals: (i) to introduce attendees to fundamental theoretical tools based on Bayesian inference that are suitable for modelling opinions and their evolution; (ii) to highlight some counter-intuitive yet realistic social phenomena that emerge when applying these tools; and (iii) to bring together practitioners from different knowledge domains (e.g. media studies, political science, education, artificial intelligence, social sciences, complex systems, and network sciences), who aspire to apply the tools to real-life systems.

Specifically, we begin with an introduction to Bayesian statistics and belief propagation over networks.

This enables us to learn the underlying tools required for modelling and analysis of opinion evolution across social networks.

At this stage, we will also review some results on asymptotic learning on social networks facilitated by Bayesian inference.

We then delve into a new model of opinion formation and evolution by enmeshing Bayesian learning and peer interactions.

As an illustrative example, we consider a scenario where networked agents form beliefs about the political bias of a media organisation through consumption of media products, and peer pressure from political allies and opponents.

To capture the multi-modal nature of opinions (individuals can hold contradictory beliefs with different levels of certainty), we model the agents' beliefs as probability distribution functions.

In certain network structures, numerical simulations reveal counter-intuitive predictions, such as wrong conclusions being reached quicker with more certainty, turbulent non-convergence (some agents cannot "make up their mind" and vacillate in their beliefs), and intermittency (agents' beliefs flip between stable eras, where their beliefs do not vary over many time steps, and turbulent eras, where their beliefs fluctuate from one time step to the next).

We will also consider belief disruption by partisans, i.e. stubborn agents who do not change their beliefs.

If time permits, attendees will receive practical, hands-on instruction in coding the methods covered during the workshop. Workshop

Length: 3 hours. Maximum Attendees: 30.

WS-T33: Multiplex social network analysis with multip2

Session Chair: Anni Hong

Session Chair: Nynke Niezink

Social actors are often embedded in multiple social networks, and there is a growing interest in studying social systems from a multiplex network perspective. Consequently, there is a growing demand for analytical methods and tools for these network structures. This workshop offers a practical introduction to the multip2 R package for analyzing multiplex network data. Participants will learn the essentials of our Bayesian multiplex mixed-effects network model in the p2 (van Duijn et al., 2004) modeling framework and gain hands-on experience with the entire workflow, from data wrangling to model interpretation and assessment through a data example. The workshop will enable participants to model cross-layer dyadic dependencies as fixed effects and actor-specific dependencies as random effects, while also considering the influence of covariates in the analysis of cross-sectional, directed binary multiplex network data. topics includes: – Introduction to the multiplex p2 modeling framework – a brief introduction to Bayesian analysis – Overview of the R package multiP2 and the underlying estimation procedure in stan – Data preparation – Picking priors via prior predictive checks – Model fitting and convergence diagnostics – Interpretation of model coefficients – Goodness-of-fit assessment via simulations and plotting Note: participants are expected to have a basic familiarity with R for the practical segment of the workshop and some understanding of statistical inference for the conceptual portion. Expected length: 3 hr, Max attendance: 20

WS-T34: Bringing Social Network Analysis into Practice: An Introduction to Using PARTNERTM CPRM for Network Data Collection and Analysis

Session Chair: Jennifer Lawlor

In this accessible workshop, we will provide an introduction to using the PARTNERTM CPRM (Community Partner Relationship Manager) software to collect and analyze social network data for continuous network monitoring and improvement in community settings. This platform reduces the complexity of network data collection, provides automated analysis and visualizations, and creates opportunities for community ownership and public-facing data sharing. We will highlight the key components of capturing data with PARTNERTM CPRM, including: > Member Management: Participants will learn how to populate a PARTNERTM CPRM ecosystem with a list of network members, assign attributes to those members, and include them in a data capture. We will also discuss how to build on existing approaches community networks and organizations may be using to track their members (e.g., via spreadsheet or database). > Question Design & Data Collection: Participants will learn about how to use the standard survey questions included in the PARTNERTM CPRM platform as well as how to design their own. They will also learn about how to schedule in-platform email recruitment and track responses as they come in. We will also demonstrate ways to track networks as they develop over time and to capture data about "networks of networks" using the tool. > Analysis & Dissemination: All participants will have a chance to explore the analysis tools on the platform, including network visualization, key metrics, GIS mapping, and chart/table development. Participants will also learn how to disseminate results through the platform using member profiles (individualized profiles for each member of the network) and dashboards (which can track whole network data as it comes in). Participants will leave the session with improved capacity for using PARTNERTM CPRM to: (1) design and implement community-engaged social network analysis projects, (2) track community networks over time, and (3) disseminate results of network analyses in practical contexts. Participants should bring their own computer to access workshop resources and follow along with tutorials to use the software.

WS-T35: Family violence in network research Session Chair: Tatjana Fabricius

WS-T38: Navigating social capital theory and literature

Session Chair: Tristan Claridge

A brief description of your workshop (max. 500 words) This workshop provides a roadmap for understanding the concept of social capital with practical tools to help organize and understand the different conceptual and theoretical approaches. It is designed to rapidly introduce the concept and its use in research, helping avoid weeks or even months of reading. It will help you quickly navigate the different meanings and conceptual approaches, directing you to the best approach for your research or interest and giving you reference lists and readings. Social capital is a complex concept with many different meanings and conceptual approaches that can be difficult and complicated to understand and apply. The literature on the topic is incredibly broad and diverse, presenting an ongoing challenge for anyone interested in using the concept in research or practice. The concept has numerous theoretical foundations, making reading the literature challenging, even for experienced scholars. Most people reading the literature report feeling confused and uncertain, and everyone can benefit from a deeper understanding of the theories of social capital. Over the last 20 years of working on the concept of social capital, Tristan Claridge, the facilitator of this workshop, has developed numerous typologies for understanding the concept. His work has sought to identify the differences and similarities of different approaches to social capital, and he has constantly asked difficult questions to explore the deeper meanings and theoretical foundations. There are no "silver bullets" and no quick simple solutions that are appropriate for every discipline and every application. But this workshop guides and directs you. Ultimately, the goal of this workshop is to help you understand the concept better, apply it more effectively, and save you time in doing so. You will come away with a deeper understanding of the concept of social capital and how to apply it in research or practice. Names and contact information of all organizers Tristan Claridge Director, Institute for Social Capital President, International Social Capital Association Email tristan@socialcapitalresearch.com Phone +61 (0)493 175 542 Length of the workshop (3 or 6 hours) 3 hours Maximum number of attendees 50

WS-T21: Agent-Based Modelling for Social Good: Concepts, Tools, and Applications

Session Chair: Guillermo Romero Moreno

This workshop will explore the potential of agent-based modelling (ABM) to address complex social challenges. Through a combination of theoretical foundations and hands-on exercises, participants will develop practical skills in designing, implementing, and analysing ABMs across various domains of social impact. ## Morning Session (3 hours) Foundations (1.5 hours) x ABM fundamentals and integration with social network analysis x Key concepts: emergence, interaction networks, behavioural rules x Case studies: public health interventions, educational outcomes, environmental behaviour change Tools and Implementation (1.5 hours) x Introduction to NetLogo and Python's Mesa framework x Setting up simulation environments x Basic model development ## Afternoon Session (3 hours) Applications and Practice (2 hours) x Hands-on exercises with real-world scenarios x Model building in small groups x Implementation strategies and best practices Validation and Analysis (1 hour) x Model validation techniques x Results interpretation x Documentation and sharing x Resources for advanced modelling

WS-T22: Advanced RSiena workshop

Session Chair: Tom A.B. Snijders

This workshop is intended for participants who have experience in working with RSiena. Topics treated will be the following – all in the framework of modelling network panel data using the RSiena package 1. Parameter interpretation: semi-standardized parameters; entropy-based approach to explained variation. 2. Score-type tests. 3. Problems with convergence: various kinds. 4. Elementary effects and contextual effects. 5. Multivariate networks: cross-network effects; with attention to the associated hierarchy requirements. 6. Two-mode networks, and their co-evolution with one-mode networks. 7. Some effects that are little known, but which may be useful for analyzing two-mode networks. 8. If time allows: Non-directed networks. 9. If time allows: Valued networks (two kinds: networks with weak and strong ties; signed networks). SIENA website: http://www.stats.ox.ac.uk/~snijders/siena

WS-T24: Analysing Mobility Networks with MoNAn

Session Chair: Per Block

This workshop is about analysing mobility networks, that is, networks in which nodes represent locations and ties are individuals that are mobile between these locations. Examples of mobility networks include migration of individuals between countries and mobility of workers between organisations. Mobility networks as understood here are directed and weighted. The workshop teaches a statistical method to analyze such data, which is introduced in "Block, P., Stadtfeld, C., & Robins, G. (2022). A statistical model for the analysis of mobility tables as weighted networks with an application to faculty hiring networks. Social Networks, 68, 264-278.". The method is implemented in MoNAn, a package of the statistical system R. The workshop will demonstrate the basics of using MoNAn. Attention will be paid to the underlying statistical methodology, to examples, and to the use of the software. The goal of this method is to model endogenous (network) patterns in mobility networks, such as concentration, reciprocation, and triadic clustering. The prevalence of these endogenous structure can be modelled alongside classical predictors of mobility that concern attributes of individuals and locations (i.e., "controlling for" these predictors). As such, it is in the spirit of ERGMs but applies to mobility data. Technically, the presented model represents an extension of classical log-linear models applied to mobility tables. The first part of the workshop will focus on the intuitive understanding of the model and operation of the software. The second part will present a deeper treatment of the statistical model and detailed introduction into some advanced features of the software, for example, goodness of fit, or advanced model specification. A basic introduction of the software and pointers to further material is provided on the MoNAn github page (github.com/stocnet/MoNAn). Prerequisites: Course participants should have a basic understanding of model-based statistical inference (say, logistic regression), some prior knowledge of social networks, and should have had some basic exposure to the R statistical software environment. They are expected to bring their own laptop to the course (Windows, Mac or Linux), with the R statistical software environment and the MoNAn package pre-installed. Participants for whom R is new are requested to learn the basics of R before the workshop: how to run R and how to give basic R commands. This is to reduce the amount of new material to digest at the workshop itself. Further instructions will be given before the conference starts. Organiser: Per Block, University of Zurich, Department of Sociology. email: per.block@uzh.ch Workshop length: 6 hours. Max Participants: 30

WS-T25: Analysis of weighted networks

Session Chair: Vladimir Batagelj

The structure of the network N=(V, L, W, P) is determined by the graph G=(V, L), where V is the set of nodes and L is the set of links. In addition, additional data about links (weights from W) and nodes (properties from P) are often known. The network N is weighted if its set of weights is nonempty. The weights can be either measured (such as trade networks - BACI/CEPII https://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=37) or computed (for example a projection of a two-mode network). The workshop will cover the following topics: - examples and sources of weighted networks, - transformations of weighted networks (dealing with large ranges of values of weight, making nodes comparable, Balassa index), - visualization of weighted networks (graph drawing, monotonic recoding, matrix representation, ordering of nodes), - clustering and blockmodeling. - important nodes - hubs and authorities, - skeletons - important parts of the network: cuts, k-neighbors, Pathfinder, cores, trusses, backbone, islands, - temporal weighted networks. Most of the topics are discussed in the book Batagelj, Doreian, Ferligoj, Kejžar (2014) Understanding Large Temporal Networks and Spatial Networks. The workshop is based on the programming system R https://cran.r-project.org/. The network data and additional R code will be available on GitHub https://github.com/bavla/Nets/tree/master/ws .

WS-T26: Extending the relational event model

Session Chair: Ernst Wit

Session Chair: Juergen Lerner

Session Chair: Martina Boschi

Session Chair: Melania Lembo

Advances in information technology have increased the availability of time-stamped relational data such as those produced by email exchanges or interaction through social media.

Whereas the associated information flows could be aggregated into cross-sectional panels, the temporal ordering of the interactions frequently contains information that requires new ideas for the analysis of continuous-time interactions, subject to both endogenous and exogenous influences.

The Relational Event Model (REM) has turned out to be a versatile framework that has allowed further methodological extensions to address a multitude of applied demands: how to deal with non-linear and time-varying effects, how to account for network heterogeneity, how to analyze relational hypergraphs, how to address goodness-of-fit.

In this short course, we introduce the REM, define its core properties, and discuss why and how it has been considered useful in empirical research.

Then we will focus on how new applications have pushed the development of relational event modelling forward.

1. Introduction to REMs

If a process consists of a sequence of temporally ordered events involving a sender and a receiver, such as email communication or bank transactions, the REM can be used to identify drivers of this process. It is based on event history modelling, in particular the Cox model, which allows for convenient and efficient estimation.

2. Mixed effect additive REMs

We show how to extend REM formulations with non-linear specifications of endogenous effects, as well as time-varying influence of covariates on the event rate. We explain how the incorporation of random effects can uncover latent heterogeneity associated with individual actors or groups of them. Furthermore, we will describe a general method to assess the goodness-of-fit of such models.

3. Modelling relational hyperevents

We will discuss "polyadic" social interaction processes in which events can connect varying and potentially large numbers of nodes simultaneously. Examples of such polyadic events (or "hyperevents") include meeting events or social gatherings, multicast (i.e., "one-to-many") communication events such as emails in which one actor sends the same message to several receivers, co-offending, or scientific collaboration (e.g. co-authoring and citation networks).

The workshop will feature a mix short explanatory sessions with hands-on computer practicals.

Participants are encouraged to bring their own laptop with Rstudio pre-installed.

The workshop is targeted at participants interested in statistical modelling of networks based on relational event data, with a specific focus on non-linear, time-varying and random effects, and polyadic interaction events.

The software eventnet together with R-package mgcv will be explained and used in the context of this tutorial.

Additional reading material will be made available to the participants beforehand.

WS-T27: The origins and history of the social network's perspective

Session Chair: Alejandro Espinosa-Rada

The development of the social network perspective has progressed rapidly, evolving from " random pieces sitting out in the midst of the desert (forest?)" (Mullins & Mullins, 1973, p. 264) to a field of study that is " Finally, there is reason to be hopeful since the field of social network analysis is currently very "hot," growing at an amazing rate." (Freeman, 2004, p. 167). Much has changed since these early observations, as we will see through recent bibliometric studies (e.g., Espinosa-Rada & Ortiz, 2022; Maltseva & Batagelj, 2020, 2021, 2022, 2024). The history of social network analysis reveals key groups and institutional milestones that have driven its development and consolidation, including events like the Sunbelt conferences, the establishment of INSNA, and the launch of network-focused journals (Freeman, 2004; Scott, 2011). The field of network science (Brandes et al., 2013) has also significantly influenced this trajectory. Furthermore, we aim to contextualize phenomena such as the "physicist invasion" and the more recent "data scientist invasion," as well as the emergence of advanced statistical models in social network research to identify the contribution of modern interdisciplinary trends. The field continues to be shaped by a vibrant community of practitioners, as illustrated in resources like the Knitting Networks podcast. By revisiting the history of the social network perspective, participants will gain insight into the origins of key concepts such as homophily, structural balance, cliques, or roles. They will also explore how different research groups have used social network approaches to address core questions in the social sciences. By understanding the field's evolution, participants can more fully appreciate the opportunities and challenges the social network perspective faces today, leveraging historical insights to shape future research.

WS-T39: SBS BI: Mastering the Analysis of Words and Networks

Session Chair: Andrea Fronzetti Colladon

Leveraging the power of big data represents an opportunity for researchers and managers to reveal patterns and trends in social and organizational behaviors. This workshop demonstrates how to successfully integrate Text Mining with Social Network Analysis for business and research applications. It introduces the Semantic Brand Score (SBS) and other advanced methods and tools for analyzing semantic networks, assessing brand/semantic importance, and performing complex NLP tasks. Participants will also learn about network topic models and methods for measuring language novelty and impact, among other key techniques. The workshop highlights the functionalities of the SBS Business Intelligence App (SBS BI), which is designed to produce a wide range of analytics and mine textual data. Through several case studies, we show how these methods have been used, for example, to predict tourism trends, select advertising campaign testimonials, and make economic, financial, and political forecasts. SBS BI's analytical power extends beyond "brands", with applications that include: commercial brands (e.g., Pepsi vs. Coke); products (e.g., pasta vs. pizza); personal brands (e.g., the name and image of political candidates); and concepts related to societal trends (e.g., terms used in media communication that shape public perceptions of the economy). By combining text analysis with network science, the workshop equips participants with tools that can transform decision-making and organizational management in the era of big data. More info and materials are available at: https://learn.semanticbrandscore.com

ON-01: Education, academia, science and technology transfer I

The Social Structure of Academic Ties: Approaching Learning and Friendship as Distinct Networks

Anthony Paik, Alexander Karl

University of Massachusetts, Amherst, United States of America

How do law school students differentiate friends from study partners from among their classmates? We compare the formation of two overlapping social networks occurring in educational spaces: friendship networks and academic learning networks. Drawing on the theory of social capital, each network is formed with particular relational expectations and purposes in mind: learning ties being centered around academic and information-sharing purposes, and friendship ties having primarily social and emotional purposes. Using data collected as part of the Student Experience in Law School Study (SELSS), a novel study of three cohorts of American law school students and their networked connections, we use ERGMs to analyze the network structure of both types of ties. We find that friendship and learning ties have distinct network patterns, supporting the contention that the structure of learning networks are more consistent with information transfer and bridging social capital across relatively weaker ties. While both friendship and learning ties are shaped by homophily, this tendency is stronger among friendship ties, with learning ties in contrast being shaped more by organizational forces like sharing class sections. Further, we found considerable evidence of an increased tendency of categorical closure among actors with shared attributes,

particularly among friendship networks. This study contributes to higher education literature by examining student network homophily in the context of a range of factors, including gender, academic performance, and nationality as well as endogenous network measures such as reciprocity and transitivity.

From Homophily to Innovation: The Evolution of Cultured Meat Technology

Chong Yu

Kwansei Gakuin University, Japan

This study investigates the evolution of cultured meat technology, an emerging technology with the potential to address the global food crisis and mitigate environmental issues posed by traditional agriculture. Specifically, this study explores the dynamic consequences of homophily in knowledge networks over time, as well as the specific roles of key technologies in this process. Using U.S. patent data from 1997 to 2022, the findings indicate that most knowledge flows occur within the same technology field over all observation periods, although technology convergence happened in each period. And convergence across different technologies is facilitated by biotechnology, which serves as a technological brokerage. Furthermore, the dominant design of cultured meat technology has emerged within biotechnology. This study employs a perspective of network homophily to the dynamic process analysis of technology evolution. It combines social network analysis and patent co-classification analysis to fill the gap in the development process of cultured meat technology.

Spatiotemporal evolution and determinants of interprovincial green technology transfer network

Hechang Cai^{1,2}

¹Nanjing University of Aeronautics and Astronautics, China, People's Republic of; ²Royal Holloway University of London

Through channels like green technology transfer, provinces can share their technological innovation resources and thus enhance their green innovation capabilities. By using China's inter-provincial green technology transfer data, we construct China's inter-provincial green technology transfer network. The results indicate that green technology transfer has taken place in most provinces. Over time, network edges, density, and cluster coefficient have shown an increasing trend, indicating green technology transfer is on the rise. It is evident that there are significant asymmetry and biases in the spatial distribution of the degree of inter-provincial green technology transfer. The network is structured as a core-edge structure, and provinces play a heterogeneous role in green technology transfer. There are close technological ties between core provinces, while many provinces play a marginal role. Different types of environmental regulation have heterogeneous effects on network formation and persistence, as shown by the separable temporal exponential random graph model regression results. If market-based environmental regulation interacts with command-and-control environmental regulation, network evolution is positively affected.

les réseaux d'acteur de l'éducation inclusive, de l'établissement aux territoires apprenants

Abdoulaye GADIAGA

Université de Rouen, France

Ce projet de thèse a pour objet principal est d'étudier le dynamisme et les interactions en réseau des acteurs de l'éducation inclusive dans les territoires d'étude du PIA 3 100% IDT ; des territoires académiques à des territoires apprenants. Il participe des travaux des observatoires des territoires inclusifs de l'action 1 du PIA 3 100% IDT, dont l'objectif est de décrire et suivre de manière longitudinale notamment les dispositifs structurels et/ou organisationnels pour une inclusion pour tous dans les différents territoires (ville, REP+, péri urbain, rural en ce qui concerne plus particulièrement cette approche).

Cet article cherche plus précisément à identifier et à cartographier les différents réseaux d'acteurs des territoires apprenants depuis les établissements éducatifs (collèges, IME etc.) pour comprendre et analyser leurs relations structurelles. Une analyse préalable de l'interaction des structures institutionnelles (Education Nationale, médico-social et éducation populaire) est engagée dans la mesure où le fonctionnement de chaque organisation est lié au fonctionnement des autres ; d'où une approche qui s'appuie sur l'interactionnisme structural. Cette thèse a aussi pour objectif d'inscrire les relations entre acteurs dans des dynamiques territoriales pour envisager comment les territoires les affectent mais aussi comment elles font territoire voire territoire-apprenant. Les questionnements sur les stratégies territoriales et la fragmentation des territoires apprenants sont au cœur du questionnement.

Cet article recherche ainsi une analyse critique des organisations structurelles des acteurs de l'inclusion au prisme de leurs pratiques effectives et territorialisées. Elle vise à mettre au jour les dynamiques territoriales spécifiques des différents acteurs et institutions dans la poursuite d'une structuration et du renforcement de l'éducation inclusive des enfants en âge de scolarisation au collège. Il convient pour cela de décrire les dynamismes des réseaux d'acteurs inscrits dans les territoires d'étude depuis les établissements scolaires de référence, lieu où se retrouvent tous les enfants de cette classe d'âge.

Social capital in the age of AI: Does current pedagogy help students build real connections in a virtual world?

Sidney Philip Peimer^{1,2}

¹Red and Yellow Creative School of Business, South Africa (Tenured lecturer); ²Cape Peninsula University of Technology (Doctoral student)

This presentation explores a bolstered role for tertiary pedagogy in the accrual of students' social capital (SC) in today's digital world. This talk underscores the importance of a fresh pedagogical lens to support the development of valuable SC accrual for the next generation of leaders. Based on Lin's Network Theory of Social Capital, the roles of bridging and bonding ties are reassessed for students' needs, as well as the many alternatives available to teachers, ensuring pedagogy that supports both the academic and future societal needs of students. With SC considered to be the resources and benefits available to the ego, students need to be primed in terms of recognising potential resources and exhibiting the necessary agency to acquire them. This emphasises the crucial role that SC plays in providing access to resources and opportunities, as well as building the required resilience and collaborative traits required. Not all student needs are alike - for those students who intend to 'strike out on their own', the entrepreneurial orientation construct is important, encompassing the three traits of: an appetite for risk, innovation, and proactivity. These are also all tied to SC.

The outcome of this talk is to provide a framework for tertiary educators to adapt and explore alternative teaching methods, including virtual mentorship, flipped classrooms, reflective journals, as well as guided and forced engagement. In addition to these documented and published methods, the speaker will share emerging methods that have emanated from Africa's highest ranked creative business school, where he is tenured.

Attendees will gain a fresh nuanced understanding of the interconnectivity of education, technology, and SC, leaving them with implementable methodologies for better student futures.

Topic: An exploratory review of how tertiary pedagogy can be adapted to enable students to build meaningful social capital for their present and future needs.

I would like my presentation to be included in the Social Capital themed session chaired by Heather McGregor of the International Social Capital Association.

ON-02: Health & Safety I

Logique systémique et sociométrique du réseau social de connaissance dans le parcours thérapeutique traditionnel du diabétique à Korhogo (Côte d'Ivoire)

Kabran Aristide DJANE¹, Marie-Audrey Angela FADEGNON²

¹Université Peleforo Gon Coulibaly de Korhogo, Côte d'Ivoire; ²Université Peleforo Gon Coulibaly de Korhogo, Côte d'Ivoire

Ce travail traite du réseau social de connaissance des personnes diabétiques et de leurs proches en rapport à l'utilisation des plantes médicinales, dans la localité de Korhogo. Il est question d'analyser le système de transmission des connaissances thérapeutiques traditionnelles du diabète. Ainsi, nous nous sommes proposés d'exposer la perception du malade et de son réseau quant à l'utilisation des plantes, d'identifier l'accessibilité de ces plantes et les méthodes utilisées dans le traitement traditionnel du diabète et enfin de décrire le mode de transmission de ces connaissances thérapeutiques traditionnelles utilisées dans le traitement du diabète. C'est par une approche mixte que nous avons vérifié ces hypothèses. Au terme de cette étude, il ressort que le système de transmission des connaissances thérapeutiques traditionnelles à Korhogo est fonction d'un réseau social qui influence les perceptions des malades quant à l'utilisation des plantes, et ce à travers un mode de transmission informel et pourtant impactant.

Rising Network Efficiency in the Aftermath of Widespread Mortality

<u>Shao-Tzu Yu</u>¹, Sanyu A Mojola¹, Dickman Gareta², Guy Harling³ ¹Princeton University, United States of America; ²Africa Health Research Institute; ³University College London

From foraging societies to online communities, human social networks exhibit striking structural regularities, characterized by densely connected local communities linked by bridging ties. However, it remains in question how these small-world patterns emerge alongside demographic processes and changes. Here, we provide a baseline investigation into the dynamics of both kin and non-kin social systems in response to the AIDS epidemic in a poorer, rural South African region. We combine multiple datasets to construct population-scale inter-household social networks from 2000 to 2016. Leveraging a quasi-experimental approach, we find that families are more likely to form distant, potentially non-kin ties following a mortality event. Coupled with increases in both network clustering and efficiency among close kin and distant ties, our findings suggest that the observed small-worldness in contemporary societies may be closely tied to the diversity of social connectivity in the wake of key demographic events.

Distortion and Integration of Community Health Training Networks by Central Training Institutions

Ezra Belfiore Wright

University of Illinois Chicago, United States of America

Purpose: Assess how central community health worker (CHW) training institutions in Illinois facilitate access to standardized training opportunities and associated benefits or obscure persistent marginality in training practices.

Methods: A statewide survey asked CHWs (n=450) to name organizations where they received training and questions about their work per national efforts to standardize CHW training. A projected CHW network, with edges inferred from shared trainings, was analyzed for centrality metrics, core-periphery, and community structure. Further analyses removed high degree training institutions prior to projection of the network. Removal of the single highest degree institution resulted in a 72% decrease in network density but a 67% increase in average betweenness. Emergent analyses will use geographic networks to identify spatial clustering and bottlenecks in transportation infrastructure affecting CHWs and compare networks to non-network core-periphery characteristics using survey data.

Contributions: Community health workers are non-clinical agents of health equity, facilitating access to care, navigation of insurance, and addressing social determinants of health in vulnerable communities. Initial findings indicate that structural support of a few highly central training institutions may have generated an artificially large and dense core of CHWs in Illinois, while obscuring functional training communities and gatekeepers. Ongoing analyses will contribute to social network literature by validating or contraindicating the use of unipartite projections of training networks to represent access to core trainings and associated benefits and support training interventions themselves by assessing if and how amplification of core training institutions serves to standardize and unify CHW skills and opportunities across the state.

From Periphery to Center? Marijuana's Changing Role in the Substance Use Network

Francisco Cardozo¹, Orlando Scoppetta², Catalina Cañizares³

¹University of Miami, United States of America; ²Corporación Nuevos Rumbos, Colombia; ³New York University, United States of America

The rising use of marijuana among young adults has drawn increasing attention from researchers, leading to a surge in studies examining its effects, risks, and patterns of consumption. However, much of this research focuses on marijuana in isolation, overlooking its role within the broader network of substance use. A key question remains unanswered: Is marijuana replacing other drugs, strengthening connections between substances, or creating a more distinct pattern of use? Understanding these shifts is crucial, as substance use rarely occurs in isolation but rather within an interconnected system. Traditional analyses fail to capture these dynamics, highlighting the need for a network-based approach to better inform intervention strategies.

In this study, we used repeated national cross-sectional surveys of university students to examine the evolving structure of drug use networks. Using mixed graphical models, we constructed substance use networks at each time point, analyzing global metrics, such as density, average path length, clustering coefficient, and modularity, to assess shifts in connectivity and community structure. Additionally, we explored node-level measures, including weighted degree, betweenness, closeness, and eigenvector centrality, to determine how patterns of co-use have changed over time. Our primary aim was to assess whether marijuana use has not only increased but also whether its position in the substance use network has shifted, indicating changes in its role within polysubstance patterns.

We used repeated cross-sectional survey data from Colombian university students (2009: n = 7,803; 2012: n = 9,876; 2016: n = 9,805; 2023: n = 11,065), collected by the Colombian government. Mixed Graphical Models were used to estimate conditional dependencies between substances at each time point. Global network metrics (density, average path length, clustering coefficient, modularity) were computed to assess overall connectivity and community structure, while node-level measures (weighted degree, betweenness, closeness, eigenvector centrality) were used to examine marijuana's changing role within the network. Networks were visualized using ggraph in R.

Descriptive results indicate a decline in lifetime prevalence of alcohol and tobacco use, while the use of ecstasy, tranquilizers, and marijuana has increased. Network analyses reveal that overall connectivity has remained high (density = 0.86–0.89), while the network has become more compact over time, as indicated by a decreasing average path length (from 0.53 in 2009 to 0.36 in 2023). At the substance level, partial correlations indicate that marijuana's connections with other drugs have strengthened in recent years, reflecting its increasing prevalence. Centrality measures further highlight marijuana's growing role within the network, even as alcohol and tobacco continue to serve as foundational substances in polysubstance use.

These findings suggest that while the overall substance use network remains highly interconnected, marijuana has become a more integral component of polysubstance patterns. This shift underscores the need for prevention and intervention strategies that account for marijuana's evolving role in the broader drug use landscape.

ON-03: Organizational networks I

Session Chair: Spyros Angelopoulos Session Chair: Francesca Pallotti Session Chair: Olaf Rank Session Chair: Paola Zappa

The Costs of Organizational Network Interfaces: Women Loan Officers and Loan Defaults Revisited

<u>Olga Novoselova</u> emlyon business school, France

The paper introduces the concept of organizational network interface-an individual who belongs to the intraorganizational network and at the same time connects to outside economic actors on behalf of this organization. We apply this concept-that incorporates both the function in the network and the features of individuals performing the function-to consider the costs that organizational network interfaces can present to the organization, focusing on the costs related to how information is transferred through the organizational network interface due to the characteristics of the interface. We categorize the potential mechanisms through which employees acting as interfaces can impact organization-level outcomes into six classes and take one mechanism representative of each class in the setting of microfinance organizations. We consider the six mechanisms jointly to verify whether previously reported association between women loan officers and higher rates of loan defaults in a single bank can be observed at the organizational level in a broad sample across forty-eight countries and to test which of the mechanisms are driving it. The results show that an average microfinance organization indeed experiences a higher rate of loan defaults when the percentage of women loan officers is higher but find no support for the mechanism of borrowers' gender bias suggested by previous research. Instead, the effect is driven by the mechanisms of the educational disparity between men and women, overcorrection by women towards risk-taking in professional environments, and likely amplification of the latter effect through the interaction of women loan officers and women managers.

Mapping Inter-Agency Collaboration for Sustainable Development: A Network Analysis of UN Agencies and SDGs

Xinyue Wen, Murphy Philip

Middlebury Institute of International Studies, United States of America

The United Nations' commitment to Sustainable Development Goals (SDGs) will likely involve extensive inter-agency collaboration. However, understanding the role of SDGs in driving inter-agency interactions within the UN remains a critical research gap. Exploring the cooperation relationships and influence patterns between UN agencies and SDGs provides insight into the current drivers of inter-agency collaboration and suggestions for the future of UN governance strategies.

Using publicly available UN collaboration data, we construct a two-mode network of UN agencies and SDGs and analyze key structural properties to identify influential actors and cooperation patterns. Community detection and

influence index analysis further reveal inter-agency dynamics and the disparities in support between green status and non-green status SDGs. These efforts inform a two-mode ERGM to consider these findings in a multivariate model.

Our initial results identify SDG 13 (Climate Action) and SDG 6 (Clean Water and Sanitation) as central nodes, with SDG 13 playing a critical bridge role in cross-sectoral cooperation. Agencies such as UNEP and UNICEF demonstrate high collaboration intensity, advancing multiple SDGs, including SDG 13 (Climate Action) and SDG 4 (Quality Education). The influence analysis highlights that high organizational influence correlates with broader SDG support, as seen with UNEP's engagement across green SDGs. In contrast, high policy influence, as demonstrated by WHO, aligns with focused advancement of specific goals. While green SDGs benefit from strong agency support, non-green SDGs, such as SDG 1 (No Poverty), face systemic challenges and require enhanced resource allocation and cross-agency coordination to address complex global issues effectively.

By leveraging network analysis, this study provides actionable insights into optimizing inter-agency collaboration and strengthening the governance system to accelerate SDG implementation.

The agential network analysis - Materials and their contribution to the network building

Tabea Alexandra Bongert

RWTH Aachen University, Germany

Sustainable products are becoming increasingly important in the transformation of the construction industry towards a circular economy. They are at the heart of both product development and internal organisational processes (business models, cultural shift). Network research is particularly suitable for capturing transformation processes. However, the inclusion of materialities is still underrepresented. Initial approaches show a rough direction, but an intensive theoretical and methodological examination has yet to materialise. However, in order to be able to comprehensively map the transformation, the action potential of the materials must be included. The dissertation combines White's concepts with Barad's approaches to sociomateriality and creates the concept of agential network analysis. Thanks to White's freedom of scale and Barad's new way of thinking, new insights into the establishment of relationships were gained. This concept could also be applied in practice as part of the research programme Verbund.NRW II by the practice partner Lindner SE through participation in a construction process. The result: materials have just as great influence on the creation of types of tie by blocking or promoting actions or by acting as brokers. This research is intended to provide an impetus to give materialities more space in network research, which is still socially dominated.

Topics for my submission:

White

Sustainability

Network Analysis of a Mobility Ecosystem in Detroit, MI Over 2 Years

Michaela Bonnett¹, Jasmine Fernandez¹, Meaghan Kennedy¹, Teri Garstka²

10range Sparkle Ball, United States of America; 2Social Innovation Labs, University of Kansas, United States of America

Background

Two years after the launch of the Global Epicenter of Mobility (GEM) initiative, organizations across sectors in Detroit, MI, and surrounding counties continue to collaborate to transform the local mobility industry into an inclusive, advanced mobility cluster. In partnership with the Detroit Regional Partnership, we conducted longitudinal network analysis each year to assess changes in the coalition's structure and relationships over time. This allowed us to compare updated network data to prior analyses and track the network's evolution over time.

Methods

Data collection occurred from September to November 2024 through surveys completed by coalition organizations. Participants identified their relationships with other members using a 1-5 scale adapted from the Levels of Collaboration Scale (Frey et al., 2006). Data were analyzed in R to produce organization-level and network-wide metrics, including betweenness, degree, and eigenvector centrality.

Findings

At 2 years, the analysis revealed a more diffuse and less centralized ecosystem, fostering diverse, decentralized collaboration. The updated coalition included 184 nodes and 7800 connections, with 2408 (46.33%) reflecting a connection strength of \geq 3 (an active working relationship). There was a significant decrease in average eigenvector score (p<0.001) among organizations present in both rounds, with a strong correlation between change in eigenvector score and degree (r=0.81) and an inverse correlation with average connection strength (r=-0.73).

These findings suggest the GEM initiative is facilitating a broader distribution of influence and engagement across the mobility ecosystem. This decentralized structure presents new opportunities for innovation and highlights areas for continued strategic intervention to support network growth and collaboration.

LGBTQIA+ Rights Movements in South Africa: International Treaties and Norms as Tools San Lee

University of Connecticut, United States of America

How do LGBTQIA+ activists use international human rights instruments to advance their rights? This research explores how LGBTQIA+ activists use international human rights instruments to advance their rights, with a focus on South Africa as a unique case to understand the legalization of same-sex marriage. In this regard, I pose a hypothesis that South Africa's anti- and post-apartheid movements, along with international human rights advocacy and women's movements, played a key role in advancing LGBTQIA+ rights. Specifically, I focus on the causal process observations, starting with queer rights movements aligning with anti-apartheid and women's rights movements under international human rights pressure. This coalition then became involved in post-apartheid reconstruction efforts and was critical in driving the legalization of same-sex marriage through engagement with international human rights norms and transnational actors in the 1990s. The research is divided into two periods: (1) anti-apartheid movements before 1994 and (2) the push for same-sex marriage between 1994 and 2006. This division highlights the evolution of activism and the changing landscape of rights advocacy. The study focuses on how activists leveraged CEDAW reports, non-U.N. international LGBTQIA+ instruments, and regional documents from the African Commission on Human and Peoples' Rights (ACHPR) and the African Charter on Human and Peoples' Rights. Ultimately, this research is expected to contribute to the fields of international relations and social movements by examining how international law is used both in theory and practice to internalize human rights norms at the domestic level

ON-04: Networks and Culture 1

Session Chair: Christian Stegbauer Session Chair: Shan Shi Session Chair: Iris Clemens

Conflict or coexistence: esotericism frames in Russian orthodox media

<u>Maria Zharakhovich</u> Higher School of Economics, Russian Federation

This study explores how Russian Orthodox media frame esotericism in their publications. Recent increases in esoteric-related content—ranging from tarot readings on YouTube to discussions on emerging spiritualities—reflect wider transformations in religious consciousness and a noted decline in institutional authority.

The study employs semantic network analysis to map key concepts and reveal patterns of association in more than 3500 relevant media publications. This process involves constructing concept clusters and analyzing how Orthodox media reference esoteric topics, capturing which terms frequently co-occur and which narratives repeatedly surface.

To complement these findings, a smaller random subsample of texts is subjected to qualitative content analysis, allowing for a more nuanced exploration of the tone, context, and complexity behind each reference to esoteric beliefs. By synthesizing both approaches, the research uncovers how Russian Orthodox media distinguish between mainstream religious teachings and alternative spiritualities, highlighting points of tension or acceptance.

Ultimately, the study aims to clarify whether the Russian Orthodox Church's portrayal of esotericism promotes rigid opposition, cautious engagement, or subtle forms of negotiation. In doing so, it underscores how religious institutions adapt—or resist adaptation—to evolving spiritual landscapes in contemporary society.

Aryuna Kim

Higher school of Economics, Kazakhstan

After the events of February 24, 2022, many Russians left the country. Although there are no exact statistics, according to demographers, it is possible to estimate the scale of relaxation in the range from 550 to 800 thousand people . The relocation of Russians after February 24, 2022 is a controversial topic both in the media and on the academic agenda. This work reveals the study of transit to parenthood in the conditions of relocation. The term "relocation" (unlike "emigration") denotes an ambiguous status of stay in a new country, i.e. those who have moved do not give an unambiguous decision in which country they would like to live, whether they will return back and how long they plan to live in the host country. Those who have moved identify themselves as relocators, emphasizing possible alternatives to moving to other countries or returning to their homeland. This object is interesting in two aspects: from the point of view of the current agenda, the relocates' connections and relationships change during the period of adaptation to a new place, as well as in connection with the first experience of parenthood, interactions also acquire a new focus, and from the point of view of methodology, qualitative network analysis allows us to identify social circles of relations, new meanings of these relations and a strategy for adapting to a new life in parenthood and relocation. Qualitative social network analysis as method is able to identify the perception of network relationships among relocates and characterize new values of relationships due to changes in the social circle before and after the birth of a child and relocation. Data collection took place using a semi-formalized interview, in which network data was collected to build network maps.

Discourse Network Analysis of Climate Change Communication in Film

<u>Yasmin Koop-Monteiro</u>¹, Sylvia Hayes², Brenda McNally³, Tristan Cann², Josh Ettinger⁴, Paul Lachapelle⁵, Caio Santos⁶

¹University of British Columbia, Canada; ²University of Exeter; ³University of Galway; ⁴George Mason University; ⁵Montana State University; ⁶Universidade Federal de Minas Gerais

This presentation introduces the methodological approach for a discourse network analysis (DNA) project focused on climate change communication in fictional films and nonfictional documentaries, specifically through the analysis of their trailers. With this study, we will investigate both the visual and discursive elements of trailers to identify prominent themes and gaps in climate communication. By examining trailers, which are freely accessible and more widely viewed, the study captures how climate-related messages are communicated to a broader audience. Analyzing trailers also allows for a larger sample size, facilitating a more comprehensive analysis of climate communication trends. This project will contribute to understanding of how climate issues are framed in popular media, and the potential implications for public engagement. This project is in its early stages, and we look forward to feedback from the audience.

Gender and Success in Getting "Heard": How Orchestral Programming Choices Promote Women Composers

Ju Hyun Park¹, Laura E.A. Braden²

¹Emory University, United States of America; ²Erasmus University Rotterdam, the Netherlands

Women composers are significantly underrepresented in the field of classical music. Recent demands for improved representation highlight this disparity; however, symphony-orchestras face the challenge of balancing the performance of historically celebrated, predominately male composers from the traditional classical canon with the promotion of gender diversity and modern innovation. This research examines how the grouping of composers in symphony orchestra performances can influence the recognition of women composers in classical music. Our results indicate gender significantly impacts a composer's recognition, but the introduction of network variables provides different gender-based advantages. Specifically, gender-homophilous ties benefit men composers but not women composers, whereas prestigious connections significantly aid women composers. Our findings suggest a mixed repertoire, featuring women composers alongside prestigious male composers, could be particularly effective for symphony-orchestras aiming to support more women composers without sacrificing canonical repertoires.

Urban-Rural Dialogues and Interpersonal Relationships: Using Hoff's Dynamic AME Model

<u>Yuqing Liu</u>, Michael Kaplowitz, Faith Rodriguez, Jacob Dembski, Kaylah Higbee, Charles Liu Michigan State University, United States of America Urban-Rural Dialogues (URD) employs dialogic methods and small groups to facilitate conversations across social identities to advance shared understanding and improve intergroup relationships. The URD curriculum builds on successful intergroup dialogues on race, adding new urban-rural content (50%). This novel study centers on urban-rural identities and uses network data to empirically test URD impacts on interpersonal relationships. Longitudinal relational data about working with and making friends with fellow participants enables us to test homophily effects— whether participants of shared identities (urban-rural, race, gender, SES) are more willing to establish a work relationship and/or a friendship, whether URD reduces homophily, and whether URD increases desired relationships.

Using Hoff's (2018) dynamic additive and multiplicative effect (AME) model, we modeled the desired work relationship and desired friendship of participants over a six-week URD. Groups ranged in size eight to 18, totaling 81 people including co-facilitators across six groups.

Results show the probability of forming a work relationship and a friendship increases over time. Our findings also show urban-rural identity and race play no role in work relationship and friendship formation initially. Homophily in gender was observed initially in work relationship and friendship, which continued to predict friendship across six sessions. A positive interaction effect between time and shared urban-rural identity was found, showing further development and salience of participants' urban-rural identity. In other words, participants sharing urban-rural identities wanted to be friends and work together at the end of the dialogue.

ON-07: Education, academia, science and technology transfer II

Does adolescent conflict occur between friends or best friends?

Chang-Yi Lin

University of South Carolina, United States of America

Research on adolescents has shown that friends are more likely to conflict than strangers, but are best friends more likely to conflict than strangers and friends? Peer conflict is part of adolescent interactions. Therefore, ordinary friends who spend a long time together are more likely to have conflicts than strangers with whom they have little interaction. However, adolescents' definition of friendship includes mutual liking and expectations of behavioral norms. Therefore, friends with higher tie strength would theoretically have more reciprocal and consistent behaviors and less likelihood of conflict. To test this research question, the present study uses data from "Changing Climates of Conflict: A Social Network Experiment in 56 Schools, New Jersey, 2012-2013." It includes 56 distinct social networks among 5th to 8th-grade students with two waves of information about friendship networks, best friend networks, and conflict networks. Therefore, the temporal exponential random graph model (TERGM) alongside meta-analysis techniques is used to see adolescent conflict dynamics. The major contribution of this study is to identify the influence of tie strength on adolescent conflict.

Unraveling Spillover Effects: How Smoking Interventions Spread Through Adolescent Social Networks Using Stochastic Agent-Oriented Models

Cheng Wang¹, Carter T. Butts², John R. Hipp², Cynthia M. Lakon²

¹Wayne State University, United States of America; ²University of California Irvine, United States of America

While numerous interventions have been implemented to curb adolescent smoking, most existing research primarily focuses on their direct effects on targeted individuals. However, little is known about the extent and mechanisms of spillover effects that extend beyond the targeted individuals to their friends, friends' friends, and even friends' friends' friends. Understanding these extended spillover effects is essential for optimizing public health strategies, as indirect benefits can amplify the overall impact of interventions. This study employs simulations based on Stochastic Agent-Oriented Models (SAOMs) to provide a novel perspective on how behavioral interventions diffuse through complex social networks.

Using longitudinal data from two high schools in the Add Health study, this research simulates a smoking intervention that targets between 10% and 100% of heavy smokers. Three selection strategies are examined: random selection, in-degree centrality, and eigenvector centrality. The findings indicate that increasing the proportion of targeted heavy smokers enhances both direct and spillover effects. However, these benefits diminish beyond a 40%-50% threshold, signaling network saturation. Centrality-based selection strategies yield stronger effects at lower targeting proportions but lose their advantage over random selection as the intervention expands.

This study advances the understanding of network interventions by demonstrating how social structures influence the spread of behavioral change. The SAOM-based simulations allow for a detailed analysis of the cascading effects

of interventions across multiple degrees of social separation. These findings provide practical guidance for designing more effective public health strategies that strategically leverage social networks to maximize intervention reach and impact.

Formation and Evolution of Elementary School Social Networks Based on Gender Differences

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This study examines the formation and evolution of elementary school social networks with a focus on gender differences, exploring the dynamic mechanisms through which these networks develop. We collected data from 96 fifth-grade students across four classes from a school in Gyeonggi Province, Republic of Korea over a two-year period, with 12 data collection waves. We employ the Stochastic Actor-Oriented Model (SAOM) to analyze the processes driving student interactions within both friendship and help networks. Specifically, the research addresses three primary questions: (1) How do gender differences influence the density, reciprocity, and overall structure of friendship networks among elementary students? (2) In what ways do help networks demonstrate centralization around key individuals, and how does this pattern vary by gender? (3) What variations in endogenous, selection, and influence effects can be observed between male and female students during network evolution?

Results are anticipated to show that friendship networks exhibit high density and strong reciprocity, reflecting robust and stable interpersonal relationships among students. In contrast, help networks are anticipated to display a centralized structure concentrated around certain individuals, indicating an uneven distribution of social support. Gender-specific patterns are expected, with female students forming reciprocal relationships based on emotional connection and cooperation, while male students are more likely to develop activity-oriented and asymmetric interactions.

The findings of this study are expected to provide valuable insights for the development of gender-sensitive educational interventions and support strategies in elementary school settings, ultimately contributing to a more tailored approach in fostering social development among students.

Network change and loneliness during the transition into university

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Beginning university represents a period of great transition, often marked by significant changes in students' social networks and available support systems. This study employed a longitudinal ego-network approach to identify patterns in relationship change and loneliness among 1st year university students in the UK. A sample of 90 students reported on their social networks during the summer before university and about halfway through their first year. Using descriptive analyses and statistical tests, we examined overall network churn and differences between pre-university and university networks, including changes in alter attributes, dyadic connections, and structural features of egonets. We then conducted a series of linear regressions to test the effect of network change on students' loneliness. Our findings provide novel insights into how shifts in social networks shape students' experiences of loneliness, highlighting the need for socially inclusive induction events and support initiatives to foster connection and belonging during this critical transition.

ON-08: Health & Safety II

The market as a field: a multidimensional approach to market dynamics and its transformation in the health sector in Chile

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Economic sociology identifies four key dimensions for analyzing economic phenomena: cognitive frameworks, culture, institutions, and social networks. These dimensions do not operate in isolation but are deeply interconnected, shaping the ways in which markets emerge, stabilize, and transform over time. This paper develops an integrated framework that synthesizes these perspectives, drawing particularly on the concept of fields and the theory of embeddedness to analyze the social organization of markets and their evolution.

A central argument of the paper is that markets should not be understood merely as arenas for economic exchange but as relational spaces where organizational and individual actors construct meanings, navigate institutional constraints, and leverage social ties. By emphasizing the role of organizational networks, we explore how firms, regulatory bodies, and professional associations interact, shaping market structures and governance. The paper also examines the dynamic interplay between micro-level cognitive schemas, meso-level organizational networks, and macro-level institutional arrangements and culture, highlighting how these forces co-evolve and reinforce each other.

Empirically, the paper applies this framework to the Chilean health insurance market, an arena characterized by regulatory tensions, firm-state interactions, and shifting consumer preferences. This case illustrates how market actors—firms, regulators, and consumers—mobilize social networks and institutional resources to shape the market field, influence policy decisions, and respond to systemic shocks. By doing so, the paper contributes to ongoing debates on the role of organizational networks in market evolution, offering insights into the mechanisms through which economic coordination, competition, and institutional adaptation unfold over time.

Mapping Online Mental Health Support Networks in Hong Kong: Community Structures, Disclosure Dynamics, and Support Patterns

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Mental health issues in Hong Kong have worsened due to prolonged socio-political unrest and the COVID-19 pandemic, yet barriers to disclosure continue to limit access to support. Online platforms have become essential spaces for mental health discussions, but the structure and dynamics of these digital communities remain unclear. This study examines how supporters and disclosers form online communities, the types of support exchanged, and the characteristics of key participants. Using mental health disclosure posts from Hong Kong's major online forums (HKDiscuss, and HKGolden), we construct a social support network, where users (nodes) are linked through supportproviding comments (edges). Network analysis evaluates whether support interactions are one-directional or sustained, while degree centrality identifies heavily-supportive users (frequent supporters) and attractive disclosers (highly engaged recipients). Deep-learning models (BERT) classify support as informational or emotional, examining how hub users differ from typical users in the type of support they provide or receive. To analyze content dynamics, TF-IDF similarity measures assess disclosure and response patterns, identifying linguistic trends among key users. Louvain's method detects how supporters and disclosers cluster into online communities, while topic modeling (STM) uncovers key discussion themes in high-engagement groups. This study provides network-based insights into the structure and function of online mental health support in Hong Kong. Findings will inform digital mental health interventions, strengthen peer support systems, and enhance strategies for building more interactive and effective support communities.

Preliminary Insights: An Innovative Network Study among US Women with Need for HIV Prevention

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Background:

Despite declines in HIV, progress has stalled for women in the U.S., with ~7,000 diagnoses in 2022. The AWARE network study focuses on how women's social and sexual connections impact health behaviors and need for HIV prevention. Network dynamics of women have not been previously documented.

Methods:

The AWARE study is a national cohort of 1,673 women aged 14-64 years old, living in the US, English or Spanishspeaking, who self-reported unprotected vaginal/anal sex with a male plus another behavioral risk factor in the past 6-months. From the cohort, 200 index participants and up to 5 network connections per participant will be enrolled in a network study. Participants complete a network survey and provide STI/HIV biospecimens at baseline and 6-months.

Results:

To date, 25 of 200 index participants have enrolled, with 6 total network referrals. Among them, 60% are White, 32% Black, and 24% Asian or American-Indian, with a mean age of 31.2-years. Eighty-eight percent report drug/alcohol

use within their networks. Sixteen percent report 6+ sex partners in the past 6-months, 8% have network connections with shared sex partners, and 4% have an HIV+ partner. Barriers to network referrals include privacy concerns, HIV-related stigma, unknown contact for casual partners and potential impact on earnings from sex work.

Conclusion:

To improve referrals, qualitative interviews with index participants will provide insight into barriers, informing protocol modifications like alternative outreach methods. The network study aims to successfully engage participants to understand how the composition of social and sexual networks informs effective HIV prevention strategies.

ON-09: Environment, resilience, agriculture, rural II

Social network motifs linked to agroforestry adoption in Uganda

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Agroforestry is a regenerative farming practice which can improve ecosystem health, soil productivity, and the socioeconomic well-being of smallholder farmers facing growing pressures from climate change effects. Many studies explore factors associated with agroforestry adoption, but how to successfully increase adoption rates remains less understood. Encouraging and enabling farmers to plant more trees or more farmers to start planting is linked to both physical context and social networks. Using a rich dataset of over 50,000 members of the International Small Group and Tree Planting Program (TIST) in Uganda, we undertake a novel tripartite network analysis with farmers, planting locations and farmer groups as nodes to develop an understanding of what relational patterns influence agroforestry adoption and adoption rates.

Learning Center effect in the case of Northeast Thailand rice farmer sustainability and innovation social networks

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The study compares two rice farmer social networks in Northeast Thailand (Isan province). The first rice farmer network is in Ban Phai District, with 39 interviewees, many of whom are active members of Learning Center. The second network, in Mueang Khon Kaen District, has 46 interviewees, all of whom are not active members of Learning Center. Ban Phai network has a greater network density than Mueang network does, due to two high centrality nodes that show high degree and betweenness density in both sustainability and innovation networks. Two high centrality nodes in Ban Phai network are connected through strong, lasting links. Mueang network, on the other hand, has less dense and fragmented sustainability and innovation networks. Learning Center provides its members group documentation sessions and greater connections with government officers to help organic rice program participation. Learning Center members tend to explain their decisions related to their rice farming activities through themes and narratives of extension officers, while non-Learning Center members are less likely to do so. Learning Center members also more tend to utilize Learning Center's innovative methods or machines without recognizing them as new or innovative. Social links generated by Learning Center help farmers to continue organic rice farming despite of the lack of irrigation, fiscal restraints, or a change of farmer's attitude toward the program. Extension officers of both network mention limited funding as a limiting factor of Learning Center expansion. This result suggests that funding Learning Centers could help Thailand's agrarian transformation program to be successful.

Building Resilient Networks for Emergency Preparedness: Utilizing Social Ties for Natural Hazard and Disaster Communication Among People Experiencing Homelessness

Ihsan Kahveci, Emma Spiro, Amy Hagopian, Zack Almquist

University of Washington, United States of America

Natural hazards and disasters pose significant threats to public health, particularly for vulnerable groups like the unhoused population. These individuals may not only require special resources (e.g., cooling stations in extreme heat situations) but are often not reachable by standard broadcast methods (e.g., TV or radio). Research suggests that during an emergency, multiple networks (satellite, cellphone, etc.) should be used to complement each other to

facilitate robust and resilient communication. This study explores the potential of leveraging existing social ties within homeless communities, both physical and virtual, for effective emergency and protective action communication through SMS or other cellular methods. Given that not all individuals experiencing homelessness are equally connected to phones, we investigate the feasibility of reaching the entire social network within a specific geographic area (e.g., county) by activating the connected nodes. Consider, for example, a hypothetical scenario in which public health authorities in Seattle anticipate a heatwave. By utilizing text messaging, they could inform unsheltered individuals about the impending heatwave and the locations of nearby cooling stations more effectively, potentially mitigating the health risks posed by extreme weather events. To empirically test this solution, we used data from two large-scale representative surveys based on network data collection. The surveys employed respondent-driven sampling (RDS), which requires providing an incentive for referring someone in the target population. These RDS surveys used SMS messages to deliver these incentives. This realized data on the network of people experiencing homelessness provides key metrics for testing the reliability of diffusion over a network of unhoused people. Based on the literature, we fit Exponential Random Graph Modes (ERGM) to the resulting network data from the RDS surveys. We then simulate a complete network of relations between people experiencing homelessness in King County, WA. This is followed up with a simulation of the diffusion process over the network to examine the efficacy of emergency preparedness and response communication plans (e.g., SMS messaging outreach). By simulating similar scenarios within our constructed social network, we aim to quantify the extent of interconnectedness needed to spread information effectively and efficiently (we aim for 90% reach) and identify key factors that influence the reach within these networks along known equity issues such as gender or race/ethnicity. We will conclude with policy and future recommendations for improving the communication pathways for safety and responsiveness to natural hazards and disasters in the context of people experiencing homelessness.

ON-10: Organizational Networks II Session Chair: Spyros Angelopoulos Session Chair: Francesca Pallotti Session Chair: Olaf Rank Session Chair: Paola Zappa

Multiscale spatial propinquity and social structure in higher education institution organizational networks

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Tie formation is known to depend on spatial propinquity, or physical distance between individuals in organizations. Spatial propinquity has been studied extensively at many scales and shown to have a strong effect on tie formation, but measured effects are typically related to an individual spatial scale of analysis. Organizations are often interested in spatial reorganization of individuals to affect the connections between their employees. However, organizations are often able to change the spatial location of individual contributors at multiple scales. For organizations to achieve effective reorganization of contributors, the relative importance of multiple spatial scales must be considered. In this work, spatial propinquity effects are measured at a desk and office level with a novel higher education institution (HEI) dataset to determine the relative importance of office layout and distance between offices on organizational social structure. In this dataset, changes in social structure are observed before and after directed spatial reorganization at the desk and office level. Through analysis of the changing sociometric network measures, we develop insights that HEI leaders can use to encourage collaboration through targeted spatial reorganization.

Dynamic Evolution of Formal and Informal Leadership in Cross-Functional Teams: A Predictive Modeling Approach with Machine Learning

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This study investigates the dynamic evolution of formal and informal leadership in cross-functional teams by leveraging machine learning to build predictive models. Utilizing longitudinal data from 2,845 employees at a major Chinese high-tech firm (2014–2017), the research examines how leadership roles shift over time in response to organizational and relational factors. The authors construct annual collaboration networks and categorize leadership changes into promotion, demotion, or stability across three time periods. Five machine learning algorithms—logistic regression, random forest, gradient boosting, support vector machines, and k-nearest neighbors—were tested for predictive performance, with the random forest model emerging as the most accurate (Accuracy = 0.839, F1-score = 0.865).

To interpret the models, SHAP (Shapley Additive Explanations) analysis was employed, revealing that the most influential predictor of leadership change was an individual's relationship with formal leaders. Strong relationships with formal leaders increased promotion likelihood, while high intra-departmental mobility was associated with demotion. The study highlights that relationships with formal leaders encompass trust, authority, and mutual obligations, which shape performance expectations and influence the likelihood of leadership role changes. These social dynamics, often overlooked in traditional leadership theories, prove essential in predicting leadership trajectories.

By integrating predictive modeling with explainability, this research advances understanding of leadership dynamics beyond static hierarchies, emphasizing the interplay between formal authority and informal influence. The findings offer theoretical insights into leadership evolution in complex, cross-functional environments and practical implications for leadership development and talent management in rapidly changing organizations. This approach highlights the potential of machine learning to inform and optimize leadership strategies in contemporary teams.

Collaboration Diversity and Paper Success: Network Analysis of Co-authorship in a Major Machine Learning Conference

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Recently, platforms like OpenReview have emerged as widely used open peer-review systems in computing fields. Using OpenReview data from the International Conference on Learning Representations (ICLR) in 2018 and 2019, this study examines the prevalence and structure of academic collaboration within the Machine Learning (ML) community. The goal is to understand how collaboration networks among researchers evolve, and whether diversity relates to paper acceptance or rejection outcomes.

We constructed collaboration networks where nodes represent authors and edges represent co-authorship of submitted papers. Our analysis addresses three questions: (1) What is the prevalence and structure of collaboration in the ICLR community? (2) Does diversity in collaboration (international, interdisciplinary, inter-institutional) associate with paper acceptance? (3) How do collaboration characteristics differ between accepted and rejected submissions?

To answer these questions, we first assess the network structure by analyzing degree distributions and centrality measures, and by applying community detection to identify groups within the network. Next, we conduct temporal analyses to study changes in co-authorship and determine whether collaborations remain stable or fluctuate over time. We also examine the influence of key institutions on network formation. Finally, we compare accepted and rejected papers to investigate how factors such as international and interdisciplinary collaborations may relate to acceptance outcomes.

This study contributes to understanding how collaboration diversity may influence academic success, highlighting potential barriers or biases that impact researchers, particularly those from underrepresented backgrounds or institutions. The findings aim to encourage broader, more inclusive networks that share knowledge and enhance innovation in ML.

Understanding Knowledge Mobilization in a Patient-Oriented Research Network: A Social Network Analysis of CHILD-BRIGHT

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Introduction. The CHILD-BRIGHT Network is a national, patient-oriented research network dedicated to child health, involving researchers, clinicians, decision-makers, and partners with lived/living experience. Five service programs and a central office support twelve funded research project teams in integrating implementation science, equity, diversity, inclusion, decolonization and Indigenization, partner engagement, capacity building and knowledge mobilization (KM) into their work. The purpose of this work is to establish a baseline quantification of the network's social structure with respect to KM, mapping connections among members and their ties to external organizations.

Methods. We conducted a cross-sectional, mixed-methods social network analysis (SNA) case study. We collected demographic, relational and attribute data through remote meetings and online surveys. Network properties and visualizations were generated using UCINet and NetDraw softwares. Results. With 97 participants, representing a 45% response rate, findings indicated a core-periphery structure with an average path length of 2.2. Eight key actors reached over 97% of the network, highlighting the importance of highly connected individuals in facilitating KM. Participants reported over 400 external institutional or organizational ties nationally and internationally, but these were not leveraged to support KM or other network mandates/goals. This finding suggests that individuals embedded in multiple groups within the network and connected externally can act as knowledge brokers, enhancing knowledge exchange, uptake, and collaboration. Conclusion. Leveraging strategic connections through key actors and external ties can enhance the CHILD-BRIGHT network's impact for children and their families nationwide. Future evaluations will assess network evolution and the effectiveness of national KM strategies.

ON-11: Networks and Culture 2

Session Chair: Shan Shi Session Chair: Christian Stegbauer Session Chair: Iris Clemens

Integrating Projects Working Around An Open Database Of Published Music Recordings

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Outside the immediate purview of the expansive WikiProject Music on Wikipedia, there are at least three other projects relating to capturing structured data about published music recordings through Wikidata, Wikibase, and other Wikimedia platforms. One is the AfroSounds project, led by Oreoluwa (Wikimedia User:ReoMartins) from Nigeria since 2022. Another is the proposal by Daniel Antal (presented at the 2024 CEE Meeting) to build a music data sharing space with Wikibase starting with music published in Slovakia, inspired by the Luxembourg Shared Authority File project. And the third is the work of the Malta Music Memory Project, developed by the author with the M3P Foundation since 2009, using a MediaWiki site and Wikidata. The author extends an open-ended invitation to academic researchers to collaborate on the development of an integrated data structure and workflow model – including possibilities for automation through bots – for published music recordings that is applicable to Wikidata. The aim is to enable systematic data gathering on a global level, building on existing datasets currently held by music publishing platforms and organisations who seek to make it more findable. Considerations for restrictive database rights that sometimes preclude integration into Wikimedia's open knowledge ecosystem, may require staging via Wikibase, rather than Wikidata, in the first instance.

Understanding the Role of Sociodemographic Variables in Patient-sharing Provider Networks: A Social Network Analysis Approach

<u>Shakir Karim</u>, Dr. Jin Xue, Dr. Hoonyong Lee University of Sydney, Australia

Effective collaboration among healthcare providers is essential for delivering high-quality healthcare services and improving patient outcomes. Synergies from interdisciplinary efforts yield more significant benefits than individual efforts alone. However, ineffective collaboration, poor communication, and inadequate care coordination often result in poor efficiency, such as misdiagnoses, poor patient engagement, and suboptimal treatment management. Understanding the structural dynamics of patient-sharing provider networks (PSNs) is vital for evaluating healthcare service efficiency. This study employs a social network analysis (SNA)-based approach to construct PSNs and evaluate how PSN structures and patient sociodemographic factors influence healthcare operations and service delivery. It uses administrative claims data collected from the Macarthur and Parramatta-Hills district regions of New South Wales (NSW), Australia. The analysis compares two regions and explores socio-demographic attributesgender, age, education, and income-examining their influence on healthcare accessibility. Findings indicate that Macarthur has lower graph density than Parramatta-Hills, reflecting weaker provider connections. Macarthur's higher clustering coefficient indicates strong local coordination, with providers frequently sharing patients within small groups. Degree centralisation is lower in Macarthur, while closeness centralisation is higher, demonstrating greater provider accessibility. The results highlight key areas for improving healthcare coordination and efficiency by analysing provider relationships. In addition, the findings suggest that comprehensive network analysis provides critical insights into the structure and effectiveness of healthcare systems. Finally, this research offers a networkbased perspective on healthcare collaboration, presenting valuable recommendations for policymakers and healthcare stakeholders to improve providers' service quality and optimise resource allocation in Australia's healthcare system.

Keywords

Administrative claim data, Macarthur and Parramatta-Hills district region-NSW, Patient-sharing provider network (PSN), Social network analysis (SNA), and socio-demographic variables.

Social Capital Impact on Free Riding Behavior in Padang's Self-Guards Managed Railway Crossing

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An unguarded railway level crossing in Padang, Indonesia, presents a critical safety risk. This study investigates how social capital's community group size, and duration of residence in the neighborhood interact to influence collective action for shared safety. The collective action is in the form of conscious participation in an initiative to finance railway crossing guards provided from, by and for the community. Using two-stage probit regression, the analysis uses duration of residence in the neighborhood as an instrumental variable for social capital to address potential endogeneity. Not necessarily, the longer residents live in the neighborhood generates the willingness to participate. It is possible that living longer in an area leads to a decline in social capital due to economic stagnation and social fragmentation. Especially in disadvantaged neighborhoods. These dynamics illustrate the complex interactions between duration of residence, group size and social capital. These interactions will lead to a wide variety of responses in maintaining grassroots safety efforts.

Social Networks in Post-Memorandum Greece: Two Comparative Case Studies of Social Reflexes

Maria Georgia Antonopoulou

University of Athens, Greece

Greece faced bankruptcy in the 2010s, leading to three economic adjustment memoranda that lasted over eight years. These memoranda caused a collapse in GDP, a significant decrease in workers' purchasing power, and a dramatic rise in unemployment, culminating in a social crisis that remains latent to this day.

This article examines two distinct yet significant cases of social mobilization through social media and networking. The first case study focuses on the Efood cancellation incident in the fall of 2021. Through social media, particularly Facebook, a movement emerged advocating for delivery workers and their protection from the termination of their employment contracts by the Efood platform. We explore how the movement began, its rapid expansion throughout the day, the factors that influenced significant mobilization via social media, and the subsequent demobilization following the positive reaction of the employer to the workers' demands.

The second case we investigate is Stefanos Kasselakis's election as leader of the Syriza party within less than a month. Kasselakis launched a campaign primarily through Facebook and TikTok, aimed at engaging Meso-level networking and fostering a sense of identity and change within the Syriza party's network. This paper examines his influence on social networking platforms and the measurable quantitative data from the subgroups that formed almost spontaneously to support his candidacy in September 2023.

Finally, we compare the social reflexes activated in both cases to gain a deeper understanding of the social and institutional crisis resulting from Greece's ongoing polycrisis.

ON-12: Varia 1 (Religious Networks, Online Beliefs)

Beyond the Ideological Echo Chambers: Exploring the Dynamics of Diversity, and Demography in Digital Information Ecosystem

Burak Ozturan

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The literature on whether the internet functions more as an echo chamber, reinforcing users' pre-existing views, or as a diverse forum presenting a multitude of perspectives is ongoing and marked by varied research outcomes. Some studies have identified a tendency for online spaces to foster ideological segregation, suggesting that digital platforms might indeed serve as echo chambers. Conversely, other research indicates that social media platforms,
such as Twitter, could offer users exposure to a wider range of news sources and viewpoints than initially thought, challenging the notion of the internet solely as a space of ideological confinement.

Our research aims to deepen the understanding of echo chambers on Twitter/X, addressing gaps in prior studies that have primarily focused on the impact of ideology on information diversity while often overlooking crucial sociodemographic factors. Recognizing that many individuals do not engage deeply with political content, we emphasize the need to expand our inquiry beyond ideological divides. To this end, we employ a representative panel of 1.6 million Twitter/X accounts linked to voter files over four years (building on the approach proposed by Grinberg et al. 2019) and multiple waves of a large national survey (www.covidstates.org). This approach facilitates a comprehensive examination of information consumption and engagement patterns, highlighting the influence of gender, race, and rural living on public discourse and the variety of information accessed. Our objective is to move past the simplistic binary of ideological echo chambers, exploring a broader spectrum of user interactions.

We investigate three key aspects of information consumption on Twitter/X: the diversity of news consumption, the social network dynamics of news sharing, and the structure of user clusters around news sources. By examining whether users are exposed to diverse viewpoints or remain confined to echo chambers that reinforce existing beliefs, we seek to gauge the extent of diverse perspective encounters. Additionally, our analysis of how users cluster around certain news sources and how these clusters vary demographically is pivotal for determining whether Twitter/X serves as a platform for diverse idea exchange or as segmented spaces catering to specific group preferences.

This multifaceted investigation enables us to dissect the complex dynamics of echo chambers on Twitter/X, evaluating the platform's role in either facilitating a broad discourse or contributing to ideological segmentation. Our findings aim to illuminate the role of social media platforms in public discourse, opinion formation, and the vitality of democratic societies, highlighting Twitter's broader implications for societal dialogue and democracy.

The non-dual vision of reality. Example: Looking at the Buddhist Social World

Jose A. Rodriguez

Universitat de Barcelona, Spain

In this paper I intend to understand Buddhism and the visions and practices of Buddhists (in new lands) using central aspects of Buddhism: non-self (non-duality) and dependent origination and interdependence

Relational sociology and "Social Network Analysis" offer us a new perspective where meaning is acquired in relationships, structures and systems of relationships. It is a vision closer to Buddhism: not-self, interdependence and causal interrelation, emptiness. Nothing makes sense on its own.

Relational sociology and "Social Network Analysis" take for granted the interaction, linkage, between everything that exists (such as Buddhism, and even quantum theories). It goes from the autonomous individual conceptual level to a higher level in abstraction with a meaning different from its components in interrelation. It is something new, socially, conceptually different. It is a new, different product and it is also changing.

Everything acquires meaning in interaction: different interactions imply/result in different meanings. Focusing on cooccurrences, coincidences, links or relationships allows us to approach relational systems and structures and to map/draw maps and social paths.

In this paper I apply the theoretical and technical approach of Social Network Analysis to understand the visions, values and practices of Buddhists as systems of interaction, breaking with duality. I use data from the first international survey of the Buddhist population in Spanish-speaking countries: "Following the Buddhist Path: Our Values, Religiosity, Spirituality" conducted in 2022.

The goal is to understand and visualize the complex system of interrelationships and interdependencies that shape our lives and the social and its meanings. To make Social Maps emerge along with the paths and connections between visions, meanings, actions and practices that make up the social map of a specific or global social space.

ON-13: Economic and policy networks

International trade in small post-Soviet countries: which factors determine it?

Daniil Mikhailenko, <u>Nataliya Matveeva</u> HSE University, Russian Federation There are many studies exploring the factors that determine trade between countries. However, little is known about small countries, where the size of the country, as well as geographical and socio-economic specifics, may significantly influence the principles of collaboration. In our work, we examine the features and patterns of collaboration among small post-Soviet countries. Using the BACI-CEPII dataset from 2021, we analyze the trade value of these countries, their trade specialization, and the factors that may determine it. Trade specialization is assessed using the UNCTAD methodology, which distinguishes between primary sector goods and manufactured products. To identify the specific factors influencing trade, we construct a weighted directed network of their trade relationships. We apply Generalized Exponential Random Graph Modeling (GERGM) to uncover the factors determining this trade. We investigate the following factors: geographical proximity, WTO membership, differences in trade specialization structures, and GDP per capita. Our findings reveal that trade among post-Soviet countries, both within the group and with other nations, differs significantly. These differences are evident in trade intensity and specialization. Our preliminary results suggest that geographical proximity and economic characteristics are significant determinants of trade. Our results contribute to a deeper understanding of the unique interactions between small post-Soviet states and explore whether differences exist in their cooperation compared to the rest of the world.

Targeting Power: The Role of Elite Networks in the Effectiveness of Individual Sanctions

Cecilia Natalie Strom

University Konstanz, Germany

Sanctions have long been an essential foreign policy tool, used by governments, international and regional organizations to signal discontent, enforce international norms or pressure actors into changing their behavior. Over time, the debate around their use and effectiveness has evolved considerably, reflecting shifts in international dynamics and the discussion around the grave humanitarian impacts of sanctions. To counter or pressure the actions of autocratic regimes, the USA and EU use a set of different sanction measures aimed at limiting the support for the regime and its capacity to repress. Targeted sanctions against individuals aim to restrict the actions of those directly accountable, thereby reducing the risk of collateral damage. Despite the depth of the existing literature, little is known about their micro-level impact on individual actors and their social networks. This paper addresses this gap by employing undirected Stochastic Actor-Oriented Models (SAOM) to analyze how targeted sanctions affect individual positions within dynamic political and economic networks. Using a new, high-resolution dataset that captures monthly sanction interventions by the USA and EU against individuals, the paper explores whether sanctioning actors effectively disrupts their network structures or merely triggers adaptation mechanisms. The paper hypothesizes that sanctioned individuals operate in resilient, highly structured networks where strategic ties allow them to circumvent restrictions and maintain influence despite external pressure. By leveraging SAOM, the paper examines the longitudinal evolution of individual actor behaviors within these networks, identifying how sanctioned actors adjust their alliances, centrality, and relational choices over time while also disentangling the processes of tie formation and dissolution, shedding light on whether sanctions result in meaningful fragmentation or simply a reconfiguration of network ties. This integration of SOAM for undirected networks with empirical sanction data provides a more nuanced understanding of how external interventions shape social structures over time. The analysis will help policymakers assess the efficiency and potential outcomes of sanctions, making it easier to determine when and how they can be most effectively applied to achieve desired political goals.

Multi-level Administrative Boundaries in Dynamic Network Analysis: Modeling Berlin's Public Transportation System (1945-1989)

Noah Jefferson Baumann

Humboldt University of Berlin, Germany

This presentation introduces a novel approach to analyzing transportation networks by incorporating multiple levels of changing administrative boundaries. Using Berlin's transportation system (1945-1989) as a case study, we demonstrate how this method enables analysis of network evolution in relation to demographic changes at different administrative scales.

Drawing on historical timetables (Fahrplanbücher) and administrative records, we construct detailed network snapshots that capture the full public transportation system, including subway, rail, tram, and bus services. A key challenge addressed is the dynamic nature of Berlin's administrative boundaries during this period, requiring a model that can track both network evolution and territorial reorganization. We implement this as a multilayer network in Neo4j, allowing us to model and query complex relationships between different types of nodes (stations, administrative units, temporal markers) as they change over time.

Our methodological contribution is threefold. First, we present a data model that maintains relationships between transportation nodes (stations) and multiple, temporally-aware administrative boundaries (districts, neighborhoods, and postal codes). Second, we introduce techniques for analyzing network metrics aggregated at different administrative levels, allowing integration with historical demographic data. Third, we demonstrate visualization methods developed for a web application that enables interactive exploration of how transportation infrastructure evolved within these changing administrative contexts.

This approach reveals new insights into the relationship between transportation infrastructure development and population dynamics at the district level, while accounting for Berlin's unique historical context as a divided city. Our methodology is particularly valuable for researchers studying how transportation networks evolve within changing administrative frameworks, offering tools for both analysis and visualization of complex spatial-temporal relationships.

The Structure of Environment and Energy Co-sponsorship Networks in the House of Representatives of Japan, 2021 to 2024

Junku Lee

Toyo Gakuen University, Japan

The discourse surrounding environmental and climate change has evolved significantly in the political sphere, recognizing climate change as a pressing political issue that transcends partisanship. This is marked by a growing consensus on its urgency.

In Japan, the Kishida Cabinet (2021 - 2024) has continued the climate policies of its predecessors, maintaining ambitious targets for reducing greenhouse gas emissions and achieving carbon neutrality. Their hybrid strategy incorporates both traditional and emerging energy sources alongside a reevaluation of nuclear power and proposals for advanced reactors with the initiatives aiming at public and private investments. However, the cabinet has faced criticism for its reliance on prospective future technologies, which diverts focus from immediate climate action. Additionally, the goals and policies of the cabinet are perceived as lacking in detail and accountability. The technocratic methods adopted by ministries, along with Japan's traditional central governance structure, present further challenges to practical implementation.

This research delves into the legislative cosponsorship networks within the environmental and energy sectors in the House of Representatives during the Kishida cabinet's tenure. It analyzes the dynamics among legislators influenced by political parties, factions, regions, areas of expertise, and the roles of various councils and committees. Utilizing descriptive and statistical approaches within specific timeframes, the study considers the impact of the cabinet on policy direction and bill sponsorship. Preliminary findings reveal that both homophily and heterophily significantly influence the legislative cosponsorship networks in Japan, with various factors shaping these dynamics in the policymaking process.

ON-14: Varia 2 (Criminal Networks)

Hubs and brokers involved in synthetic drug production and trafficking in Belgium

Sophia Anna Marie De Seranno

Ghent University, Belgium

This work examines organised crime groups in Belgium involved in synthetic drug production and trafficking, ie. XTC and (meth)amphetamine. Belgium is a key European hub for large-scale production, with drugs trafficked globally. Organised crime groups largely control this market; however, limited knowledge exists about their structure and actors. Adopting a network perspective, this study uses Social Network Analysis (SNA) to identify key actors, or hubs and brokers, based on high centrality scores or social capital. Through a case file study in Flanders, the research reveals that high-social-capital actors were predominantly Belgian and Dutch males, many holding managerial roles in legal companies to launder profits. Hubs and brokers were closely connected, with brokers strategically positioned to link them. Disruption strategies targeting hubs and brokers yielded limited effects on this robust, scale-free network with small-world properties.

Kerlly Barbara Mariano dos Santos

Civil Police of Sao Paulo, Brazil

The purpose of the presented research is, through a case study of Operation Ethos, which directly impacted the First Command of the Capital - PCC, to demonstrate the need for a new look at criminal investigation, directing efforts to achieve with greater power and severity criminal agents that are defined as Topological High Return Targets. With the application of the Social Network Analysis, certain targets of greater influence and level of specialization within the criminal group would be subjected to more onerous sanctions – in particular with regard to the regime of serving sentences – as a means of discouraging (general and individual) and retribution for the gravity of its social impact. In the analysis presented, it was found that of the 54 (fifty-four) targets of Operation Ethos, three of them had a greater impact when removed from the structure of the criminal network, and, therefore, were the Targets of High Topological Return of that criminal cell. In this way, as they are the targets of greatest interest, they could also have been subjected to a differentiated sentence regime – a measure that is necessary in order to effectively impact organized crime.

ON-15: Varia 3 (Methodology)

The Reliability of Items and Measures for Aggregate Relational Data

DERICK DA SILVA BAUM

Brown University, United States of America

Aggregate relational data (ARD) on relationships between individuals and groups in a population can shed light on acquaintanceship network size, the level of segregation in contact with subpopulations, and the size of unlisted groups. Despite their wide range of applications, ARD questions can be cognitively demanding for respondents, as they require reporting the number of acquaintances in various subpopulations within the constrained time frames of typical survey settings. However, research on the susceptibility of ARD instruments to measurement error remains scarce. This study leverages the panel design of the Chilean Longitudinal Social Survey (ELSOC) to examine the reliability of individual ARD items and the network size measure obtained by combining them. To estimate reliability, I employ structural equation and multilevel modeling approaches commonly used in survey methodology research, adapting them to accommodate the unique structure of ARD. Individual items have reliability scores ranging from 0.41 to 0.51, depending on the reliability assessment method used. The reliability of the log-transformed network size is 0.59, indicating that combining the items reduces measurement error. Nevertheless, the reliability estimates of both individual items and the composite measure fall short of the commonly accepted 0.70 reliability threshold, raising concerns about bias and precision in ARD-based estimates of network size, segregation, and unlisted group sizes. These findings highlight the need for methodological refinements to improve the quality of ARD-derived data.

Determining The Distribution of Visibility of Group Members From A Population Survey

Scott Feld

Purdue University

Feld and McGail (2020) explain how social networks distort perceptions of the social world. Highly connected individuals (high-degree nodes) are overrepresented in personal networks, leading to misperceptions where their traits are seen as more typical than is actually the case (Feld, 1991). The extent of this distortion depends on variation in individuals' visibility, or indegree, which is difficult to assess when indegrees are unknown.

We propose a method using population surveys to estimate target indegree variance by counting how often the same targets are named by multiple informants. A high number of repeated mentions indicates high variation. We show how the ratio of repeated mentions to the square of total mentions provides a quantitative measure of the distorted experience of these targets.

We illustrate our method in academic citation networks, where readers may get inflated impressions of the value of academic articles in a journal, because the papers they find through citations are more highly cited than average for that journal. We measure this distortion in each journal by counting repeat citations in a sample of papers.

High variation in visibility among stigmatized individuals could lead to public perception being shaped by a few highly visible extroverts, while most others remain overlooked. Our method quantifies this variation in visibility. We illustrate its application and recognize challenges in implementation, addressing potential limitations.

This paper highlights the importance of measuring indegree variation to better understand distorted perceptions and provides a practical method for assessing distortions in many situations.

ON-2: Environment, resilience, agriculture, rural I

Participatory Network Modelling at the Intersection of Social and Natural Sciences: Exploring Social-Ecological Futures in Coastal Peru

Michael Kriegl¹, Ben Nagel¹, Achim Schlüter^{1,2}

¹Leibniz Centre for Tropical Marine Research (ZMT), Germany; ²University of Bremen

Tropical coastal systems are characterized by complex interactions between ecological processes and human activities. Effectively managing these systems requires holistic approaches that integrate scientific insights with local knowledge.

In this work, we developed a qualitative social-ecological network model to investigate the dynamics of the coastal resource use sector in Sechura Bay, Peru. By collaborating with local stakeholders from diverse backgrounds and experts from the social and natural sciences, we identified and mapped key system components and their interactions. This process integrated ecological expertise with social perspectives, resulting in a comprehensive model that captures the essential dynamics of the local social-ecological system.

We then applied dynamic network analysis and qualitative mathematical modelling to ask "What if ...?" questions and explore the outcomes of potential future scenarios. This approach provides deeper insights into the direct and indirect effects of management strategies, societal dynamics and environmental changes on both coastal communities and ecosystems, allowing stakeholders to anticipate future challenges, evaluate the sustainability of interventions, and better adapt to changing conditions.

Our goal is to develop an accessible and versatile decision-support tool that can be easily applied in data-limited settings in tropical regions around the world. By combining participatory methods with network modelling tools, the presented approach fosters interdisciplinary collaboration and supports inclusive and informed decision-making for effective resource management in tropical coastal systems.

Multiplex Network Analysis of Peer Motivation among Farmers for Productivity

PATIENCE Pokuaa Gambrah¹, Roger Mugabe², Louis Ndinyun Tawam³, Arnold Larbi⁴

¹Kumasi Technical University, Ghana; ²Kigali Independent University, Rwanda; ³University of Ghana, Accra, Ghana; ⁴Kings World Company Limited, Ghana

Studies have shown that motivation is key to productivity. As such motivating farmers is an essential tool to enhance their productivity. This study analyzed four motivation types among farmers, and proposed methods for enhancing motivation to improve performance and productivity. We asked 65 farmers about their relationships with their peers to gain insight into the types of relationships they engage in, which could help motivate them to enhance their performance. We used four-layered motivation types, which were analyzed via multiplex network analysis. The results showed that the edges of all layers were statistically significant indicating farmers willingness to engage in motivation ties hook ups. But reciprocity was not significant for all four layer which show competition in the network thereby helping farmers to look out for avenues to be more productive. We also found out that, all four layers had different number of communities indicating that the links formed in different layers are different; hence, each motivation type attracts a different link source. Thus, we discovered that each farmer prefers a different motivation type and are not influenced by their peers' choices. Also we found few farmers as authorities indicating the presents of hierarchy. Accordingly, their opinions regarding the importance of motivation differ, which is consistent with the expectation that individuals need different motivations to improve productivity and performance. Therefore, identifying the motivation types preferred by farmers is critical for increasing their productivity.

Rural development and the social network analysis: a binary social complex system

<u>Juan-Felipe Nuñez-Espinoza</u> Colegio de Postgraduados, Mexico Social network (ARS) complex systems approach is each time covering new research social areas. One of these is related with the rural development area mainly because implied by itself the construction of complex social systems around a central resilient element to the current societes: the food production. And in times of climate changes, the societes going to be much more worry about such system , specially in their sustainability degree and the assessment of this latest. This will be a confluence break point between different evaluation tools to analyzed this sustainability degree particularly around a central research question: the organization patterns in the social system responsible to: a) give training to a wide horizont of social actors: from peasants, original groups, administratives and guvernamental employeers, college students, among others, and b) responsible to stablish: norms, rules, concepts, schools, books, manuscripts, etc.. We are referring to the social research systems involved in the next research areas: hydric resource, agriculture, swine production and botanic, agroecology, rural transfer technology, rural enterprises, etc. We found that each social research subsystem es very different but all of them confluence in particular characteristics some of them are so problematic in climate change time. so it will be necesary begin to implement deep changes in systems that are not maded it to get fast movements.

The Role of Social Capital in Addressing Seed Access Constraints and Adoption Intensity: Evidence from Arsi Highland, Oromia Region, Ethiopia

Bedilu Demissie Zeleke¹, Adem Kedir Geleto², Hussien Hamda Komicha³, Sisay Asefa Asefa⁴

¹Arsi University, Ethiopia; ²Arsi University, Ethiopia; ³University of Winnipeg, Canada; ⁴Western Michigan University, USA

In Ethiopia, limited empirical studies exist on how seed supply access constraints condition adoption intensity (demand). Hence, this research employs the augmented Double hurdle model to incorporate the effect of seed access (local supply) constraints in conditioning demand. Moreover, nine factors were constructed of twenty-eight indicators using Principal Components Analysis to resolve which cognitive and structural indicators drive social capital at the farm household level. The Double hurdle result reveals that social capital indeed determines wheat varieties access; besides, different forms of social capital have dissimilar effects on varieties demand. In addition to social capital variables (such as getting well with other farmers, generalized trust, and trust in agricultural institutions), information on seed access, training on varieties selection, and education have significant positive effects on relaxing seed access constraints and demand. Hence, the result suggests that agricultural policy and extension efforts should consider not only human, and physical capital, but also social capital in relaxing seed access constraints and demand. Furthermore, the government of Ethiopia should develop strong regulatory mechanisms to reduce corruption in the seed supply system.

Social-Ecological Networks and Risk: How Is Perceived Social and Ecological Risk Associated with Network Structure?

Laura Roldan¹, Stephen Alexander², Michele Barnes³, Angela Guerrero⁴, Lorien Jasny¹, Pavel Krivitsky⁵ ¹University of Exeter; ²University of Waterloo; ³University of Sidney; ⁴Queensland University of Technology; ⁵University of New South Wales

The sustainability of socio-ecological systems has been shown to depend highly on social structure; factors such as levels of trust and cooperation have an impact on environmental management decisions. In turn, social structure is influenced by factors that favour or hinder tie formation such as the perception of risk. The perception of social and ecological risks can limit or enable the formation of communication ties among people which ultimately will have an impact on resource access. This study examines how perceived social and ecological risk influences social structure among small-scale fishers in Jamaica, Kenya, and Papua New Guinea. Using Exponential Random Graph Models (ERGM), and data on information exchange and fishing practices (e.g., type of fishing gear used), we explore how the fishers' perception of social risk (e.g., non-compliance with regulations) and ecological risk (e.g., fish stock change) affects the social structure. We test node-level effects, hypothesizing that fishers who perceive higher social or ecological risk will tend to communicate with more people, regardless of their own risk perception. We also examine dyadic homophily, expecting that fishers who perceive higher social or ecological risk will prefer to communicate with others who share their perception of risk. Additionally, we model structural network effects, including triadic closure (the tendency for communication ties to form in closed triads), the effect of organizational membership, and external factors such as whether using the same fishing gear type increases the likelihood of communication.

WS-T36: Bayesian exponential random graphs with Bergm

Session Chair: Alberto Caimo

INSTRUCTOR: Alberto Caimo, University College Dublin, Ireland CRAN: https://CRAN.R-project.org/package=Bergm WEBSITE: http://acaimo.github.io/Bergm SUMMARY: Bayesian analysis is a promising approach to social network analysis because it yields a rich fully probabilistic picture of uncertainty which is essential when dealing with relational data. Using a Bayesian framework for exponential random graph models (ERGMs) leads directly to the inclusion of prior information about the network effects and provides access to the uncertainties by evaluating the posterior distribution of the parameters. The growing interest in Bayesian ERGMs can be attributed to the development of very efficient computational tools developed over the last decade. This hands-on workshop will provide participants with the opportunity to acquire essential knowledge of the main characteristics of Bayesian ERGMs using the Bergm package for R. TOPICS: – Brief overview of ERGMs; – Intro to Bayesian analysis; – Prior specification; – Model fitting and model selection; – Interpretation of model and parameter posterior estimates; – Model assessment via goodness-of-fit procedures. The workshop will have a strong focus on the practical implementation features of the software that will be described by the analysis of real network data. Interactive material will support the acquisition of concepts and understanding of the tutorial through code, scripts, and documentation. PREREQUISITES: Basic knowledge of social network analysis and R. Participants are recommended to bring a laptop with R/RStudio, and Bergm installed. REFERENCES: Caimo, A., Bouranis, L., Krause, R., and Friel, N. (2022) "Statistical Network Analysis with Bergm." Journal of Statistical Software, 104(1), 1–23.

WS-T40: Visualizing networks from the comfort of Jupyter notebooks with ipysigma

Session Chair: Guillaume PLIQUE

People tend to use a variety of desktop or web tools such as Gephi to practice visual network analysis. Unfortunately, It often means being forced to work on the graph's data in separate tools, such as spreadsheets or processing them using programming languages. This makes the feedback loop between data wrangling and visualisation a bit tedious. On the other hand, the scientific community now has access to fantastic tools such as Jupyter notebooks, able to mix interactive programming and visualizations seamlessly. So why not use this new medium to also perform visual network analysis? This is exactly what the "ipysigma" Jupyter widget, developed at SciencesPo médialab, intend to do. ipysigma is a powerful tool that renders an interactive view of a graph directly in a notebook cell. It lets you zoom and pan the graph to explore it fully. You can also search & filter nodes, node categories and edges, apply a real-time animated 2d layout algorithm, all while remaining able to customize a large variety of the graph's visual variables: node and edge sizes, color, borders, halos, being just the most basic examples. It is notably relying on the sigma.js library, using WebGL, to make sure it can display large graphs in a web browser, which is not the case with most other graph rendering engines. In this workshop, participants will learn how to leverage the widget to perform their visual network analysis, through typical use-cases ranging from lexicometry to webmining, all while being able to process the graph data itself in python, using a graph processing library such as networks or igraph. Participants are therefore expected to have some basic knowledge of python and Jupyter notebooks.

WS-T41: Valued Tie Network Modelling with Statnet

Session Chair: Pavel Nikolai Krivitsky

Session Chair: Carter Tribley Butts

This workshop provides instruction on how to model social networks with ties that have weights (e.g., counts of interactions) or are ranks (i.e., each actor ranks the others according to some criterion). We will cover the use of latent space models and exponential-family random graph models (ERGMs) generalised to valued ties, emphasising a hands-on approach to fitting these models to empirical data using the 'ergm' and 'latentnet' packages in Statnet. Statnet is an open source collection of integrated packages for the R statistical computing environment that support the representation, manipulation, visualisation, modelling, simulation, and analysis of network data. Prerequisites: Familiarity with R and 'ergm' required. If you are new to ERGMs, the introductory workshop on ERGMs using Statnet is strongly suggested.

WS-T42: Understanding Diffusion with netdiffuseR

Session Chair: George G Vega Yon

Session Chair: Thomas Valente

Session Chair: Aníbal Luciano Olivera Morales

The netdiffuseR package provides tools for analyzing and simulating diffusion of innovations and contagion processes on networks. In this workshop, we demonstrate the package's features by analyzing empirical and simulated data on the diffusion of innovations. The session will include examples of using netdiffuseR jointly with other network analysis packages such as RSiena, statnet, and igraph. NetdiffuseR's main features are computing network exposure models based on weight matrices (direct ties, structural equivalence, attribute-weighted, etc.), thresholds, infectiousness and susceptibility. The package works with both static and dynamic networks. Some other capabilities include handling relatively large graphs, simulating networks and diffusion of innovation processes, and visualizing the diffusion of innovations. While there are no prerequisites, it is suggested that you have a working knowledge of the R programming language. We will use the latest version of the netdiffuseR R package, which can be found on GitHub here: https://github.com/USCCANA/netdiffuseR. During the workshop day, we will provide access to a cloud version of RStudio with the latest version of netdiffuseR, so do not worry if you cannot install the package before the workshop. Duration: 3 hours Max participants: 30

WS-T43: Advanced Modeling of Relational Events in R Using goldfish.latent

Session Chair: Alvaro Uzaheta

This workshop provides an advanced introduction to `goldfish.latent`, an R package that extends relational event modeling by incorporating latent variable models. Participants will learn to model actor heterogeneity through the package's implementation of random effects powered by Stan. Practical examples and hands-on exercises will guide attendees through model specification, estimation, and interpretation, enabling them to apply these advanced methods to their relational event data. A particular focus will be given to analyzing multiple sequences as a case study for using random effects, highlighting the package's flexibility in handling complex relational event structures. Prerequisites: Participants should be familiar with R and the `goldfish` package. Those new to goldfish are encouraged to attend the introductory "Modeling Relational Events in R Using goldfish" workshop. What to Bring: • A laptop with the following installed: o R statistical computing system o Stan (via `cmdstanr` or `rstan`) o `goldfish.latent o Stan: https://mc-stan.org/cmdstanr/ References: • Stadtfeld, Christoph, and Per Block. 2017. "Interactions, Actors, and Time: Dynamic Network Actor Models for Relational Events." Sociological Science 4 (14): 318–52. https://doi.org/10.15195/v4.a14. • Uzaheta, Alvaro, Viviana Amati, and Christoph Stadtfeld. 2023. "Random Effects in Dynamic Network Actor Models." Network Science 11(2): 249-266. https://doi.org/10.1017/nws.2022.37. Length: 3 hours Participants: 30

WS-T44: Mapping and Geovisualization with Social Networks

Session Chair: Clio Andris

The goal of this workshop is to lower the barriers of using geographic information systems (GIS) and geospatial mapping in social network analysis, and to explain what is possible with GIS and mapping in SNA. Participants will learn to put social networks on maps and answer basic questions such as: Do nodes with high closeness centrality cluster together? Do different communities overlap in geographic space? Which places have mostly local or distant ties? Which nodes have the closest or most distant connections? How many nodes are in a certain part of the study area? Which nodes are spatial outliers? Which nodes are nearby but very disconnected? Which edges cross administrative units or natural features? We will use a free, open-source, web-based tool called the Social Network Mapping Analysis (SNoMaN) for exploratory spatial data visualization (ESDA) in research and classroom use. Participants will explore case studies of a networks of social impact organizations, GitHub collaborations, a U.S. Congressional network of vote agreements, spatial actor-movie networks, examples in published literature, and other examples of geographic node-edge structures. They will learn to plot nodes and edges on a map, filter by geographic selection, and stylize the map based on factors of interest such as node degree, edge distance, node type, cluster, etc. They will learn how to use cutting-edge visualization methods such as cluster-cluster plots, centrality-centrality plots, route factor diagrams, and perform a spatial cluster detection of network communities. They will also explore newly published optimization-based statistics such as k-fulfillment, and local and global network flattening ratios, as well as geo-based methods such as average nearest neighbor (ANN) clustering and spatial modularity detection analysis. Participants will interactively compute and visualize spatial social network metrics, describe spatial distributions, explore associations, and learn to detect anomalies. SECTIONS OF THE WORKSHOP Introduction and demonstration: We will introduce basic concepts behind mapping a social network (e.g., how to pin your nodes to a location). Then we will do a demonstration/tutorial on the Social Network Mapping Analysis (SNoMaN) software and its functionality. Hands-on guided session: This will be a hands-on guided analysis with directions, where participants can navigate the software to generate insights. We will encourage participants to pair up or work in small groups. The leader will assist participants and encourage interaction between pairs of participants. Open exploration: Participants will get help formatting and exploring their own social network data, or use a built in dataset, with the SNoMaN tool. Open mic session: During this session, participants will be invited to show the insights they derived about their own spatial social network data or their own exploration. Closing thoughts: Participants can share thoughts or ideas with the group and how they may incorporate geographic space and GIS into their social network analysis in the future. No experience or preparation necessary. This workshop is suitable for geobeginners. We encourage participants to bring a laptop to this workshop to get the most out of the hands-on activities.

WS-T46: Simulating Complex Agent-Based Models with epiworldR: A fast and flexible ABM framework

Session Chair: Andrew David Pulsipher Session Chair: George G Vega Yon

This workshop introduces epiworldR, an R package with a fast (C++ backend) and highly customizable framework for building network-based transmission/diffusion agent-based models (ABM). These models provide valuable information that may aid in performing complex simulation studies and make informed, evidence-based policy decisions for the general population. epiworldR is a flexible tool that can capture the complexity of transmission/diffusion dynamics resulting from agents' heterogeneity, network structure, transmission dynamics, environmental factors (e.g., policies), and many other elements. Some key features of epiworldR are the ability to construct multi-disease models (e.g., models of competing multi-pathogens/multi-rumor), design mutating pathogens, architect population-level interventions, and build models with an arbitrary number of compartments/states (beyond SIR/SEIR). Moreover, epiworldR is really fast. For example, simulating a SIR model with 100,000 agents for 100 days takes less than ½ of a second (about three times faster than most popular packages). The workshop will be 100% hands-on. It will feature examples of simulating multi-disease/rumor models, policy intervention models, and mutating variants. You can learn more about what to expect by visiting https://uofuepibio.github.io/epiworldR-workshop/. Participants should have a working knowledge of R (e.g., some experience

with statnet). We will be using the latest version of epiworldR and will also provide a cloud environment with all the required components for the workshop. Duration: 3 hours Maximum number of attendees: 30

WS-T47: Introduction to the analysis of multilevel network dynamics using multiSiena

Session Chair: Johan Henrik Koskinen

Stochastic Actor-oriented Models (SAOMs), as implemented in RSiena, are statistical models for analysing network dynamics. SAOMs assume that you have observed the network at at least two points in time. These models have been extended to handle many forms of longitudinal networks and could be said to collectively be regarded as the gold standard methods for such data. Having observations on multiple networks, multilevel networks, is becoming increasingly common. This workshop deals with longitudinal analysis of such multilevel models, in particular the random coefficient multilevel longitudinal network analysis implemented in the function sienaBayes which is part of multiSiena, the sister package of RSiena. This method is based on the Stochastic Actor-oriented Model (SAOM). The basic idea of this random coefficient model will be presented, with the approach taken by the analysis using sienaBayes. The use of this function will be explained, and guidance will be given for parameter interpretation. Topics treated are: principles of Bayesian inference; the random coefficient multilevel version of the SAOM (ML-SAOM); MCMC estimation of the ML-SAOM; operation of sienaBayes; parameter interpretation. Prerequisites The workshop is intended for participants who know about the Stochastic Actor-oriented Model, and have practical experience in working with RSiena. Literature: Ripley, Ruth M., Tom A.B. Snijders, Zsofia Boda, Andras Voros, and Paulina Preciado (2023). Manual for RSiena. URL:

https://www.stats.ox.ac.uk/~snijders/siena/RSiena_Manual.pdf Koskinen, Johan H. and Tom A.B. Snijders (2023). Multilevel longitudinal analysis of social networks. Journal of the Royal Statistical Society, Series A. DOI:

https://doi.org/10.1093/jrsssa/qnac009 SIENA website: http://www.stats.ox.ac.uk/~snijders/siena Maximum number of participants 30.

WS-T48: Network Canvas: An introduction to the design, administration, and management of in-person and remote personal network studies.

Session Chair: Michelle Birkett

The goal of this workshop is to provide participants an orientation to conducting personal networks research within Network Canvas and the opportunity to master the skills necessary to apply these tools within their specific domain of interest. Network Canvas (http://www.networkcanvas.com) is a free and open-source software suite that facilitates the collection of self-reported social network data, comprised of applications to support both in-person interviewer-assisted environments as well as remote self-administered studies. In this workshop, we will provide an overview of Architect, the Network Canvas visual survey builder, as well as Interviewer, the Network Canvas app used to collect data directly from participants within an in-person research design. We will also provide an overview of Fresco, the newest Network Canvas tool designed for remote network surveying. Finally, we will explore data export in Interviewer and Fresco, and a brief orientation to analysis. Expect the opportunity to engage in hands-on exercises during the session with assistance from our team. When completed, you will acquire the skills to: Design an egocentric or whole network survey Deploy and manage a study, whether in-person or remote Obtain study data in Interviewer and Fresco, and export it for analysis

WS-T49: Next-generation ERGMs: Scaling Up

Session Chair: Michael Schweinberger

In large networks with thousands or millions of actors, the interactions among actors are not affected by the interactions among all other actors, because many social networks are more local than global in nature; Indeed, actors may not even know most other actors, and therefore cannot be influenced by them. A simple class of models that respects the local nature of many social networks assumes that actors are divided into communities and that actors are affected by other actors of the same community, but are not affected by actors outside of the community. The communities may be known or unknown. If the communities are unknown, one can infer the unobserved communities from the observed social network along with the social forces that govern interactions among actors within and between communities. The proposed workshop focuses on next-generation ERGMs for large networks implemented in R package bigergm, which is an evolution of R packages hergm and lighthergm. The workshop will introduce the basic ideas of next-generation ERGMs and will demonstrate them by examples. Participants will be provided with sample R scripts. Software: Fritz, Schweinberger, Komatsu, Dahbura, Nishida, and Mele (2024). R package bigergm. https://cran.r-project.org/web/packages/bigergm/index.html Literature: The basic idea is introduced in Schweinberger and Handcock (2015). Local dependence in random graph models: Characterization, properties and statistical inference. Journal of the Royal Statistical Society, Series B, 77, 647-676. An application to systemic risk in social networks can be found in Fritz, Georg, Mele and Schweinberger (2024). Vulnerability webs: Systemic risk in software networks. Computational details are provided in Babkin, Stewart, Long, and Schweinberger (2020). Large-scale estimation of random graph models with local dependence. Computational Statistics & Data Analysis, 152, 1-19.

WS-T50: Epidemic modeling on networks using EpiModel

Session Chair: Steven Goodreau

Modeling the dynamics of infectious diseases on networks has a long history, and has become more prominent in recent years. This workshop provides a hands-on tutorial for the use of the R package EpiModel for network modeling of epidemics. EpiModel builds on the statnet suite of packages, especially tergm and other packages for temporal network modeling. Thus, familiarity with the concepts and methods of tergms, especially model terms, is important, although we will provide a rapid refresher. Familiarity with the basic concepts of epidemic modeling is also helpful. Familiarity with R is essential. We will cover: - An overview of the EpiModel framework - A rapid refresher on ergms and tergms - A rapid overview of epidemic modeling concepts - Specification and parametrization of models from egocentric network data - Specification and parametrization of network and epidemic outcomes - Hands-on examples for basic models - Introduction to the EpiModel API to expand models beyond the basics - Pointers to research-level models with published EpiModel code

WS-T51: SOCITS: Integrating Social Network Analysis in Mental Health Research through Qualitative, Quantitative, Simulation, and Systems Thinking Methods

Session Chair: Nolwazi Nadia Ncube

A significant proportion of the population enters adulthood having already faced mental health challenges. These issues during adolescence have enduring effects on health, education, and socio-economic outcomes throughout life. Current approaches to adolescent mental health often fail to capture the intricate social and emotional contexts of young people. Traditional methods tend to focus on individuals in isolation, neglecting the broader social networks that play a crucial role in mental health. Unsituated social network analysis may fail to account for how relationships vary across time and space within social settings. This workshop will introduce the SOCially sITuated Systems (SOCITS) approach to measuring and modelling adolescent mental health. The methodology was developed with a focus on stress and loneliness in schools, but the approach can be applied to other constructs, behaviours and social settings, SOCITS integrates gualitative, systems thinking workshops. Agent Based Modelling and quantitative survey data: taking a co-production approach with young people and school staff. Qualitative and workshop data are used to inform the development of rules for an Agent Based Model, and also to develop situated survey items that are tailored to the places, interactions, and social situations that are relevant to specific schools and the topic of interest. The workshop will introduce participants to the conceptual integration of complexity theory and situated cognition theory; outline approaches for study design; and provide an overview of the range of analytical options, R packages, tutorial datasets and scripts available when analysing situated cognition and situated network data. Workshop learning objectives: 1. Introduce participants to relevant concepts and theories underpinning the SOCITS approach. 2. Explore qualitative methods that can be employed in identifying stressful situations in schools and ways that these can be improved. 3. Demonstrate how workshop methods can be applied to co-produce situated assessment and social network survey items. 4. Apply agent-based models to model social and spatial dynamics influencing wellbeing in schools.

WS-T52: Net-Map workshop: Increasing Social Network Knowledge through participatory

mapping

Session Chair: Ana Elia Ramon Hidalgo

Net-Map is an interview-based mapping tool that helps people understand, visualize, discuss, and improve situations in which many different actors influence outcomes. It is an innovative, analogue and accessible approach to achieving results in complex projects where many different interests influence the result. By creating Influence Network Maps, individuals and groups can clarify their own view of a situation, foster discussion, and develop a strategic approach to their networking activities Social and organizational change often involves diverse actors outside a single hierarchy, making it challenging to coordinate actions through mandates alone. Quantitative Social Network Analysis (SNA) has been widely applied to explore these dynamics, yet Net-Map is a mixed-methods approach that enables participative collection of both qualitative and quantitative data. Net-Map moves beyond understanding network structure to reveal the "how" and "why" behind relationships and engages participants in mapping their networks, discussing opportunities and challenges, and working toward a shared vision. Net-Map has increasingly been adopted by practitioners in action research, communication strategy, advocacy, political networks, social movements, program implementation, personal development, project management, organization learning, and change management. For instance, it has been employed for strategizing government reforms in Zimbabwe, improving business relationships between fortune 500 companies, supporting personal transformation through network coaching or empowering grassroots political change movements. • A hands-on workshop: During the workshop, participants will be introduced to the Net-Map process and will practice drawing a multiplex network while also identifying perceived levels of influence of actors. Participants will indicate the actors' goals and have an in-depth discussion about the situation. This workshop will help users to answer questions such as: Do you need to strengthen the links to an influential potential supporter (high influence, same goals)? Do you have to be aware of an influential actor who doesn't share your goals? Can increased networking help empower your dis-empowered beneficiaries? By creating Influence Network Maps, individuals and groups can clarify their own view of a situation, foster discussion, and develop a strategic approach to their networking activities. More specifically, Net-Map will help participants to determine : - what actors are involved in a given network, - how they are linked, - how influential they are, and - what their goals are You can learn more about the technique here - http://netmap.wordpress.com/about/ • Workshop format This is a 3-hour workshop; the maximum number of attendees is 20. After a brief introduction to the approach, the participants will map actual or potential cases to experience the use of Net- Map. We will discuss these cases identifying benefits and limitations, feasibility and requirements of this approach. Instructors Amitaksha Nag - As a systems change expert focused on facilitating collective learning in complex systems, he utilizes participatory and group modeling approaches to drive impactful outcomes. He developed the Datamuse Network Analysis tool, which has advanced the online application of Net-Map for network analysis and visualization. Ana Elia Ramon Hidalgo - Certified Net-Map trainer and currently works as an independent consultant in organizational development. She holds a PhD in Social Networks in Community- Based Natural Resources Management.

WS-T53: Many metrics and models for network diffusion and learning Session Chair: James Hollway

From infectious diseases to innovations, from policies to norms, networks often influence how outcomes are distributed. This workshop introduces the many analytic and visualisation tools available in the 'manynet', 'migraph' and associated packages in R for studying network diffusion, contagion, or learning. First, we look at the tools available for simulating various contagion processes, including simple and complex diffusion. We extend these models to a range of different compartment models, e.g. SEIRS, that can better represent more varied processes, and suggest how to evaluate the fit of these simulations with observed diffusions. Second, we look at tools for measuring, describing, or inferring aspects of these processes, from hazard rates to thresholds. We show how they can be used on observed diffusions too, so please bring data from any salient projects you are working on. Lastly, we will explore how, with the rest of the tools available in 'manynet' and 'migraph', we can identify points of intervention to accelerate or obstruct diffusion. Because these procedures are based on 'manynet', they work with many different network formats and types, including 'igraph' and 'network' classes, as well as directed, multimodal, signed and multiplex data. Familiarity with R and RStudio is recommended.

OS-104: Words and Networks

Location: Room 105 Session Chair: Andrea Fronzetti Colladon Session Chair: Roberto Vestrelli

From social networks to datafied selves. The socio-economic impact of short video platforms and generative AI

<u>Valeria Donato¹, Roberto Urbani²</u>

¹University of Urbino, Italy; ²Luiss Guido Carli, Rome Italy

This study examines the evolution of socio-economic relationships in response to the algorithmic transformations of digital platforms, with a particular focus on TikTok and ChatGPT. The objective is to analyze the extent to which the algorithmic structures of these platforms influence user interactions, access to information, and consumption behaviors. Building upon established theoretical frameworks, it has been observed that the transition from traditional social networks to the algorithmic selves characteristic of TikTok (Bhandari & Bimo, 2022; Boccia Artieri & Donato, 2024) has evolved into a more individualized and mechanized dynamic in platforms such as ChatGPT (Gutiérrez, 2023), ultimately materializing the concept of self-datafication (Couldry, 2020). Within this framework, the study critically investigates how these socio-political transformations have redefined economic structures, not only shaping new consumption practices but also constraining the agency and relational dynamics of traditional economic actors.

The research is structured into two methodological phases. The first phase entails a platform ethnography of TikTok and ChatGPT, aimed at examining their technical and structural configurations as well as the social and cultural practices they foster. The second phase consists of a more extensive empirical investigation, conducted through the administration of semi-structured questionnaires to a sample of 110 Italian participants, to assess the impact of algorithmic mediation on consumer behavior.

The anticipated findings seek to illustrate that the technological transformations of digital platforms are not merely advancements in computational design but manifestations of broader political and cultural shifts with profound implications for economic dynamics, decision-making processes, and spending patterns.

A Hybrid Analytical Framework for Studying Network Mechanisms: Combining Mediation and Network Analysis to Examine How Design and Content Attributes Influence Discussion Structure

Avner Kantor

University of Haifa, Israel

This research proposes a hybrid analytical framework for examining how design and content attributes shape discussion network structures. The framework integrates quantitative and qualitative content analysis, social network analysis, and path modeling, providing a structured approach to uncovering how these attributes interact and influence discussion dynamics.

The framework employs path analysis using Hayes' (2022) PROCESS macros, enabling a detailed examination of mediation effects. Within this analysis, we assign attributes as mediators, while network measures serve as the dependent variables. This approach allows us to assess the existence of different causal paths and, together, illustrate an underlying mechanism.

The framework is demonstrated through a case study of discussion networks derived from online news comments. These networks function as deliberative spaces and are structured as reply networks, where a directed and weighted tie is formed whenever a commenter responds to another comment, linking the responding commenter-node to the top commenter-node. Each news story generates a distinct discussion network.

In this study, network structures are calculated for each story and incorporated into a model alongside its measured attributes. The model also includes control variables such as news story length, topic, and publishing year to account for potential confounding factors. This approach allows us to trace the path between online environment design, content features, and discussion structure The analysis results provide new findings that address a long-standing knowledge gap regarding audience engagement with data journalism, propose underlying causal mechanisms, and contribute empirical insights into deliberation theory.

A multilevel approach to city power: literature review and research directions Mikhail Rogov, Céline Rozenblat

University of Lausanne, Switzerland

Power is everywhere: social reality is based on power relationship whether formal or informal. A city does not have a power per se but concentrates people with power relations. Despite numerous studies of city power, there is a research gap on multilevel city power, and on the link between the power of individuals that transforms into power of cities in global economic networks.

We can wonder how micro-level processes such as human interactions shape the power of cities on global scale? This concerns a question of trust and power in social networks (Castells, 2013), in particular, the networks of those who take key decisions in cities, but also those who take decisions concerning places of the world outside the city (like headquarters). Are these two kinds of networks linked to each other like it is suggested in "Local buzz, global pipelines" (Bathelt et al., 2004)? These networks of decision makers create power asymmetries in cities, control urban governance structures and globalize cities from top-down and bottom-up, thus reinforcing the influence of a city on a world scale.

We conduct a literature review based on the topic modeling method, to underline the main associations between different scales and concepts. Using Google Scholar, we construct several corpuses of literature. Analyzing the networks of terms and highlighting words' associations allows us to determine the common points and differences between diverse power discourses, and to identify the key elements one can use to define a multilevel/multiscale city power.

References:

Bathelt, H., Malmberg, A., & Maskell, P. (2004). Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation. Progress in human geography, 28(1), 31-56.

Castells, M. (2013). Communication power. Oxford University Press, USA.

Discourse On Crisis: Causal Narrative Networks of Public Official Communications During the COVID-19 Pandemic

Sabrina Mai¹, Scott Leo Renshaw², Jeannette Sutton³, Carter Butts¹

¹University of California - Irvine; ²Carnegie Mellon University; ³University at Albany, SUNY

During periods of threat, such as with the COVID-19 pandemic, the public looks to officials to understand the situation, its causes, and its ramifications. Among the communication strategies employed by public entities is the use of causal narratives, a highly condensed, structured method of imparting information that describes events in terms of the conjunction of a cause and an effect. As narratives with particular structures have the potential to relay essential, clarifying, and possibly life-saving information to a lay audience, understanding narrative structure is important for developing an evidence base to inform future crisis response. However, an individual's conception of a situation is rarely informed by a single speakers' narratives but rather by a welter of messages from different agencies that may be imperfectly remembered and lumped together into an aggregate narrative. Thus, there is a need to examine the broader discourse constructed by articulated causal narratives by responding agencies to the public.

In this study, we reconstruct the semantic network of causal narratives utilized by organizations in public communications during the COVID-19 pandemic, characterizing the underlying structure of the discourse, and assessing the degree to which officials en masse provided clear, consistent, and actionable information on the evolving crisis. A key feature of our work is our evaluation of large language models (LLMs) for extracting complex semantic network features from massive corpuses of heterogeneous text. In addition to comparing the efficacy of LLMs to human performance, we also experiment with both novel and known methods for improving LLM accuracy.

Entropy-Based Quantities on Semantic Networks as Measures of Linguistic Structuredness, Uniqueness and Creativity in Academic Literature

Şiir Çınar Uysal

University of Bielefeld, Germany

We present a methodology to analyze semantic (co-occurrence) networks of academic papers in a given subfield with complementary and different entropy-based measures to obtain a rigorous and quantitative assessment of unique language usage at concept-level and text-level.

After cleaning each text through tokenization, stop-word removal, and lemmatization, and by following the semantic network creation procedure, we create an adjacency matrix representing co-occurrences between words appearing in

the same sentence, conducted by AutoMap (Carley et al., 2013) and ORA (Carley et al., 2014). Each word will then have an associated probability distribution over its neighbors, allowing us to compute its Shannon entropy H(w) and reinterpret it as a quantitative reserve for entropy-based calculations.

We focus on three entropy-based measures. After the implementation of respective normalization steps at each measure, first, each node w has a word-level entropy H(w) reflecting the unpredictability of its immediate neighbors. Second, a local excess entropy Elocal(w) subtracts H(w) from log2(|N(w)|), where |N(w)| is the number of neighbors for node w, thus comparing the observed entropy to a uniform distribution among those neighbors. Third, a global excess entropy Eglobal(w) subtracts H(w) from log2(|V|), taking the entire vocabulary into account for its maximum entropy baseline. Finally, by averaging these word-based excess entropies across all nodes, we obtain a single text-level aggregate measure of structural predictability for each text. These complementary entropy-guided quantities provide concept-based and text-based systematic comparisons of linguistic and conceptual structuredness, uniqueness, and comparative basis for texts and concepts that characterize a given academic subfield.

OS-35: Mixed methods for social network analysis

Location: Room 106 Session Chair: Francisca Ortiz Ruiz Session Chair: Nuria Targarona Rifa Session Chair: Miranda Jessica Lubbers

Analysis of Personal Network Interview Transcripts using Text Analysis and AI

Christopher McCarty¹, Allison Hopkins², Naveem Sidiqui³

¹University of Florida, United States of America; ²Texas A&M University, United States of America; ³University of Florida

Network analysts have long used personal network visualizations to conduct qualitative interviews with respondents about the impact of their social context on outcome variables. This network ethnographic approach is often combined with quantitative analyses across respondents to generate a more complete and nuanced understanding of ways social context may be used as an intervention. Since the expansion of AI in 2022 there are now many tools for easily translating interview recordings to text for systematically analyzing the transcripts. We use a manual text analysis approach combined with generative AI to analyze 60 personal network interviews of former smokers regarding their efforts to stay quit, and to assist those in their networks to also quit smoking. We compare the concepts generated through manual text analysis versus using AI tools, and demonstrate findings from the interviews that would be difficult or impossible to discover using only network models of quantitative data.

Qualitative Methods to Measure the Impacts of Networks

Filip Zielinski

Heidelberg University, Germany

The paper and presentation will discuss a new qualitative method to measure and evaluate the impacts of "impact networks" (D. Ehrlichman). How can we create useful and reliable evidence of the actual positive, negative, intended and unintended changes caused by networks of individuals or organizations?

Impact evaluation research and practice offer quantitative experimental and quasi-experimental methods to measure attributable treatment effects, on the one hand, as well as many approaches that focus on theory-building, participation of respondents and the use of qualitative data, on the other hand. The Qualitative Impact Assessment Protocol (QuIP) developed by the University of Bath attempts to bring together the strengths of the latter type of evaluation methods and offers a much-needed level of standardization. It has been utilized in numerous evaluations in diverse fields such as development, education or social services, sometimes to complement experimental designs, and has much potential for measuring network impacts in the future as well.

The presentation will discuss the author's ongoing work with QuIP and the Causal Map App to analyze and visualize the causal statements gathered in interviews with network members based on two completed evaluations of networks of organizations. It will focus on methodological aspects such as the role of blindfolding, inter-coder reliability, transparency and representativity. Current attempts to utilize AI for coding and conducting interviews will also be

discussed. In all, the presentation will aim to offer valuable insights and inspire discussion of the strengths and limitations of qualitative methods to evaluate and research networks.

A Deep Dive into Water Networks: Integrating Social Network Analysis and Ethnographic Methods Oswaldo Medina-Ramírez¹, Amber Wutich¹, Carolina Jordão¹, Cara Jacob¹, Lucero Radonic², Megan Carney³

¹Arizona State University; ²Northern Arizona University; ³University of Arizona Participatory water governance involves collaboration among government agencies, non-governmental organizations,

water users, and academic institutions to address water-related issues. This collaboration may manifest in various forms, such as conducting research, managing water resources, and formulating policy. Effective stakeholder coordination and cooperation are typically operationalized through participatory structures, including water research/practice networks. The Arizona Water for All (AW4A) initiative aims to establish a multistakeholder network in the format of a Community of Practice-a group of individuals who share common interests, face similar challenges or are passionate about water security-to support water-insecure communities and facilitate participatory water research and decision-making throughout Arizona. This study introduces a mixed-methods framework for developing participatory initiatives and evaluating the enhancement of linkages (such as network ties) among various stakeholders across different regions-south, central, and north Arizona-within the AW4A Network initiative. We integrated Social Network Analysis (SNA) with ethnographic research methodologies to develop this comprehensive framework. Ethnography, which involves in-depth immersion in the context being studied, provided important insights into the complexity of social interactions that SNA techniques captured. By employing this combined approach, we were able to provide a more nuanced interpretation of the network data by validating the patterns and results obtained through SNA against the insider knowledge gathered from ethnographic interviews. We contributed to the research and methodological design of mixed-methods studies to explore the formation and dynamics of collaborative water networks.

A mixed methods network analysis to understand intra-group relationships shaping a common narrative

Larissa Koch, Philipp Gorris Universität Osnabrück, Germany

We present an application of a mixed methods social network study in the field of collaborative environmental management. Effective environmental management generally requires coordination and collaboration between diverse heterogenous actors. However, communication and working together towards a common objective are often difficult in these settings. Actors involved need to overcome tacit boundaries and reconcile different viewpoints to reach a shared understanding on the environmental problem and envisioned solution(s). Thus, based on the notion that meaning and structure in social networks are co-produced, we assume that a common narrative can serve as a base for a shared understanding and ask the question what types of relationships influence the emergence of a common narrative. This presentation will showcase a mixed methods network study and underlying conceptual ideas and empirical implementation. We apply the idea of narrative congruence, which relates to the similarity of narrations that actors tell, to investigate the effects of the types of relationships between two actors as well as specific leadership roles using an Exponential Random Graph Model. Furthermore, we highlight how we combined qualitative and quantitative data meaningfully and what findings we got from this approach. Lastly, we would like to reflect on our taken mixed methods approach highlighting opportunities and challenges from which others could learn for the future.

Key words: collaboration, narratives, leadership, ERGM

From ethnography to social network analysis. For a better understanding of cowpea exchange in Senegal

<u>Justine Stutz</u>¹, Vanesse Labeyrie¹, Adeline Barnaud², Frédérique Jankowski¹, Ndèye Fatou Mané³ ¹CIRAD ES - UMR SENS - France; ²IRD - UMR DIADE - France; ³ISRA BAME - Senegal

Scientific literature shows that in Africa, women mostly exchange seeds between themselves. However, few studies have examined these inter-female exchanges and how relationships between women influence them. Yet, these practices play a central role for women, engaging social, economic and food dynamics. To shed light on the dynamics of cowpea circulation and exchange in Senegal, we propose to combine the ethnographic method with social network analysis (SNA).

Our fieldwork was based on ethnography over two cultural seasons, combining semi-structured interviews and participant observation. This approach helps to highlight peripheral exchange dynamics among women during the harvest, practices that are difficult to reveal by conventional quantitative survey methods. At the same time, SNA provides a quantitative perspective by mapping relationships and interactions, making visible the dynamics of reciprocity and centrality in these exchanges. Combined with the ethnographic approach, it is also a level of abstraction that allows for a deeper understanding of how kinship, alliance, residence, but also domestic cycles participate to organizing these exchanges.

The objective of this study is twofold. First, it seeks to highlight the complexity of social dynamics, power relations, and inequalities involved in the circulation of cowpeas, which are often obscured by gender disparities through a male-female opposition. Second, it offers a deeper reflection on the methodological hybridization between ethnography and network analysis as a tool for analyzing female moral economies in an agricultural context.

OS-57: Opinion dynamics : from data to models and back

Location: Room 107 Session Chair: David Chavalarias Session Chair: Chiara Giaguinta

A model for French voters

Antoine Vendeville^{1,2,3}

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Models of opinion dynamics describe how opinions are shaped in various environments. While these models are able to replicate macroscopical opinion distributions observed in real-world scenarios, their capacity to align with data at the microscopical level remains mostly untested. We evaluate the capacity of the celebrated Voter Model to capture individual opinions in online social networks. We leverage a directed, weighted network of retweets between Twitter (now X) users, collected during the campaign of the 2017 French Presidential Elections. We uncover a strong correspondence between individual opinions in the equilibrium state of the model, and ground-truth party affiliations explicitly stated by the users in their publications and self-descriptions. Users are well separated along party lines in the opinion space of the model, and the model correctly identifies ground-truth party affiliations in 92.5% of cases. We also show that discord probabilities allow us to deduce with high accuracy whether or not two users support the same party. Neither the undirected or unweighted counterparts of the retweet network, nor the follow and mention networks produce comparable results. Our findings highlight the necessity for a fine-grained modelling approach, and contribute to the growing literature on the empirical validity of opinion dynamics models.

A social media analysis of the political interactions during the French 2022 presidential election

Ixandra Achitouv

CNRS, France

On the last French presidential 2022 elections, we collected daily twitters messages on key topics posted by political candidates and their close network. Performing a data driven analysis, we study how political parties interact with one another, measuring key topics on which the candidate had influence over the others.

Beyond the Ideological Echo Chambers: Exploring the Dynamics of Diversity, and Demography in Digital Information Ecosystem

Burak Ozturan

Northeastern University, United States of America

The literature on whether the internet functions more as an echo chamber, reinforcing users' pre-existing views, or as a diverse forum presenting a multitude of perspectives is ongoing and marked by varied research outcomes. Some studies have identified a tendency for online spaces to foster ideological segregation, suggesting that digital platforms might indeed serve as echo chambers. Conversely, other research indicates that social media platforms, such as Twitter, could offer users exposure to a wider range of news sources and viewpoints than initially thought, challenging the notion of the internet solely as a space of ideological confinement.

Our research aims to deepen the understanding of echo chambers on Twitter/X, addressing gaps in prior studies that have primarily focused on the impact of ideology on information diversity while often overlooking crucial sociodemographic factors. Recognizing that many individuals do not engage deeply with political content, we emphasize the need to expand our inquiry beyond ideological divides. To this end, we employ a representative panel of 1.6 million Twitter/X accounts linked to voter files over four years (building on the approach proposed by Grinberg et al. 2019) and multiple waves of a large national survey (www.covidstates.org). This approach facilitates a comprehensive examination of information consumption and engagement patterns, highlighting the influence of gender, race, and rural living on public discourse and the variety of information accessed. Our objective is to move past the simplistic binary of ideological echo chambers, exploring a broader spectrum of user interactions.

We investigate three key aspects of information consumption on Twitter/X: the diversity of news consumption, the social network dynamics of news sharing, and the structure of user clusters around news sources. By examining whether users are exposed to diverse viewpoints or remain confined to echo chambers that reinforce existing beliefs, we seek to gauge the extent of diverse perspective encounters. Additionally, our analysis of how users cluster around certain news sources and how these clusters vary demographically is pivotal for determining whether Twitter/X serves as a platform for diverse idea exchange or as segmented spaces catering to specific group preferences.

This multifaceted investigation enables us to dissect the complex dynamics of echo chambers on Twitter/X, evaluating the platform's role in either facilitating a broad discourse or contributing to ideological segmentation. Our findings aim to illuminate the role of social media platforms in public discourse, opinion formation, and the vitality of democratic societies, highlighting Twitter's broader implications for societal dialogue and democracy.

Coevolutionary Axelrod Model with Weighted Overlap and Features Competition

Chiara Giaquinta^{1,2}, Laura Hernandez², David Chavalarias^{1,3}

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As it is well known [1], the influence of media on social opinion does not come from the fact that they succeed in telling people what to think of a given subject but from their success in imposing what people should think about; a situation known as the Agenda Setting Problem. In this way, topics discussed in the public arena are in competition to attract limited people's attention. In order to model this problem one needs to study two coupled dynamical processes that have comparable time-scales: the evolution of the opinion of the actors, and that of the attention got by the different topics under discussion. Here we propose a multi-dimensional opinion dynamics model inspired by the Axelrod model [2], where each dimension corresponds to a given topic under discussion. Unlike the original model, the contribution of the topics to the overlap that rules social influence among the agents, is neither uniform nor constant. Instead, their relative importance is dynamical, modulated by the attention they attract. The overlap is weighted based on topic popularity, therefore coupled to a process where topics gain or lose attention over time.

We tested the model on stylized networks (Barabási-Albert and Erdős-Rényi) and also on real-world retweet networks of comparable sizes, for various values of the number of features F (here representing the number of topics under discussion), and the number of traits for each feature q (the number of different options the agents can choose for each topic). Preliminary results reveal that the size of the largest opinion cluster and convergence times heavily depend on the choice of the parameters F and q, with lower q and higher F promoting consensus, aligning with previous findings [3].

Competition among topics intensifies with increasing F, making dominance less likely. Moreover, consensus often forms on key features while persistent disagreements on others slow the dynamics. Finally we observe that the network structure significantly impacts the dynamics, leading to distinct outcomes in stylized random and community-structured networks. This work constitutes a new step towards the possibility of comparing theoretical models with empirical studies where the evolution of the attention given to different topics has been measured [4,5].

Ideological bias and information cascades on Twitter: evidence from French politicians

Shaden Shabayek¹, Margherita Comola^{2,3}

¹SciencesPo, France; ²University Paris-Saclay; ³Paris School of Economics

This paper studies how ideological bias affects the transmission of information on social media. We exploit a novel database combining administrative and Twitter data from a population of French politicians over a two-year period, and study how messages diffuse (i.e. get re-posted and liked) within the sample. Our data show that the network is

divided into five distinct communities (`blocks') with internally homogeneous political ideology. We aim at quantifying two ideological biases which may affect information cascades: the `identity' bias against messages originating from different political blocks, and the `topic' bias related to the message content. Our preliminary findings suggest that identity and topic bias are strong yet heterogeneous across political blocks, and that information cascades are based on ideological affinity and topic partisanship.

OS-59: Organizational Networks

Location: Room 108 Session Chair: Spyros Angelopoulos Session Chair: Francesca Pallotti Session Chair: Olaf Rank Session Chair: Paola Zappa

Effects of Communication Modalities on Recall Schema

Gage Austin Pierce University of South Carolina, United States of America

"Research in the field of social cognition found that humans use schema for the storage and processing of network information. Schema use differs by gender and power, in theory because individuals differ in the schemas that apply to the network structures they are involved with. I analyze a survey dataset collected during the COVID-19 pandemic that asked respondents about how often they interacted with people, and organizations, as well as what forms of communication they used. In addition, a network recall survey experiment was conducted to measure their network recall accuracy. If schema are learned cognitive rules the brain uses to process information, then how an individual recalls a network should be shaped by ongoing opportunities to practice schemata. This effect should be moderated by the respondent's level of social poverty with higher levels of social poverty (i.e., inadequate social integration) being associated with poorer recall accuracy. Results will uncover more about the role that practice plays in the formation of social schemata and will shape future understanding of the differences in individual network recall ability across categories. Furthermore, it will contribute to efforts to design more efficient, and effective, organizations."

Institution Change, Corporate Ownership and Director Network Breaking

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¹School of Managment, Xi'an Jiaotong University, China; ²School of Humans and Social Science, Xi'an Jiaotong University, China

Traditional social network research primarily focuses on network structure, content, and dynamic evolution, assuming the external institutional environment as a static factor. However, in practice, there is a close co-evolutionary relationship between institutional changes and organizational networks. Particularly within the dynamic regulatory environment of China, institutional changes tend to have a stronger influence on the dissolution of relationships than on their formation. To bridge this gap, this study explores the impact of institutional changes on organizational networks, with a particular focus on their vulnerability to shocks and the dissolution of various attributes of ties. Utilizing the China Ministry of Education policy in 2015 that limited the concurrent appointments of university-affiliated independent board directors as a policy shock, we examine how institutional changes affect the disruption of corporate independent director networks. Our findings indicate that firms with a higher proportion of state-owned shares experience more pronounced network disruptions, particularly in the reduction of network ties and structural hole positions. Additionally, we observe that the geographical distance of a firm from the policy epicenter inversely correlates with the strength of ownership-related effects on network disruption. While institutional isomorphism explains the general trend of tie dissolution, heterogeneity persists due to varying legitimacy pressures and differences in policy enforcement across organizations. This study also proposes an analytical framework to understand the effects of institutional changes on network disruption, where the formation, severance, and reconstruction of relationships represent a complete cycle of organizational network evolution, capturing the dynamic process from disembedding to re-embedding.

A Relational Perspective of Neighborhood Status Processes: The Case of Name-Dropping Networks Among Airbnb Hosts <u>Hesu Yoon¹</u>, Megan Evans² ¹ENSAE Paris, France; ²Max Planck Institute for Demographic Research, Max Planck - University of Helsinki Center for Social Inequalities in Population Health

Research on status processes, which examines how social hierarchy is created and maintained based on uneven distributions of respect and esteem, often considers the role of interactional networks and affiliations in identifying and measuring status based on accumulated acts of deference. By focusing on deference relationships, a network analysis enables us to study status as a relational construct. However, urban sociologists have rarely engaged with these insights, despite the long-standing tradition that conceptualizes place as a social construct co-constituted through material and symbolic processes. We advance scholarship on neighborhood hierarchy by applying a network framework to conceptualize and quantify neighborhood status as accumulated acts of deference. To investigate neighborhood status through acts of deference, we draw on the case of Airbnb hosts and their use of neighborhood names to market their properties. Specifically, we analyze how Airbnb hosts use other neighborhood names in their listing descriptions - name-dropping - as an act of deference. We aggregate name-dropping behavior to the neighborhood level and create a valued name-dropping network for Chicago, Manhattan, and San Francisco. We argue that a neighborhood's position in the name-dropping network will represent its symbolic status from accumulated acts of deference, reflecting prestige in the context of the rental housing and tourism market. Our innovative methodological approach demonstrates that neighborhood status is not solely determined by aggregated demographic indicators, such as class and race, but also consists of intersubjective recognition, which aligns with the relational nature of status.

Behind the Leadership Curtain: How Social Networks Shape CEO Succession in Australian Sport

Lloyd Rothwell¹, Simon Darcy¹, Tracy Taylor²

¹University of Technology Sydney, Australia; ²RMIT University

This research examines the leadership succession of chief executive officers (CEO's) in sport organisations through an application of social network theory. An extensive social network analysis of CEOs (n=13) was undertaken with Australian CEOs. Findings demonstrate both intraorganisational and interorganisational networks are valuable for potential CEO successors. Networks are perceived to be of benefit in the selection process while also helping CEOs perform effectively once in the role. Notably, the research found major differences in CEO networks are by gender, insider / outsider status, and type of national sport organisation (NSO) (professional or Olympic sport) they lead. This study demonstrated a connection between social networks and executive leadership career progression in sport management. Furthermore, this research makes a novel contribution by analysing personal networks data provided directly from CEOs and not from assumed affiliation networks.

Beyond Distance: The Impact of Hybrid Work on International Employees' Relationships and Well-Being

Valentina Rillo¹, Cinzia Dal Zotto¹, Luca Carollo²

¹University of Neuchâtel, Switzerland; ²University of Bergamo, Italy

By blending remote and in-office arrangements, hybrid work offers flexibility and autonomy but creates at the same time unique challenges for international employees, impacting on their social and psychological well-being. Through the lenses of Job Demand-Resource Theory and Paradox Theory, this study explores the paradoxical tensions faced by international creative professionals in hybrid work environments, as well as how these tensions can affect social relationships and organizational networks.

Our qualitative study draws on semi-structured interviews with 40 international academics in Swiss universities, a context characterized by employees' high mobility and cultural diversity. Preliminary findings reveal challenges in building social resources, due to difficulties in maintaining relationships and integrating into host countries' professional and cultural environments while working both at home and in the office. Participants report tensions, including valuing the flexibility of remote work while struggling with isolation and limited peer support, essential for creative performance and career growth.

This research helps to understand the nuanced impact of hybrid work on globally mobile creative professionals. It highlights the critical role of social networks in mitigating resource loss and addressing paradoxical tensions inherent to hybrid arrangements. By unpacking these tensions and identifying balanced approaches to employees' flexibility, productivity, and integration, this study offers insights for organizations to support and value international creative employees in hybrid work settings. The findings further underscore the need for more structured, inclusive practices fostering meaningful connections and enhancing well-being among diverse, hybrid workforces.

OS-9: Beyond detection: disinformation and the amplification of toxic content in the age of

social media Location: Room 109 Session Chair: David Chavalarias Session Chair: Floriana Gargiulo

Cognitive Warfare on Social Networks

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Cognitive warfare is an expanding phenomenon, operating within the domain of the human mind, which is revolutionizing how information is shared and interpreted on social networks. The dissemination of disinformation and fake news, driven by advanced technologies—particularly generative artificial intelligence—heightens the complexity of these strategies, whose primary objective is to manipulate individuals' thoughts and behaviors. The analysis of this emerging form of warfare and its global implications guides this study, which aims to provide valuable insights for the formulation of public policies to counter threats to the psychosocial expression of democracy resulting from the amplification of such influence on social platforms.

To achieve this aim, a mixed-methods approach was employed, incorporating exploratory and systematic literature reviews, case studies, and semi-structured interviews. This research stands out not only for the innovative nature of its subject matter but also for its complexity, evidenced by the integration of knowledge from diverse fields. The findings reveal that the manipulation of information and public perceptions on social networks is a central weapon of cognitive warfare, exploiting brain vulnerabilities to influence emotions, shape behaviors, and destabilize democratic societies.

Recent events illustrate how this dynamic unfolds, exposing significant vulnerabilities in the psychosocial expression of democracy. In light of the growing influence of cognitive warfare on social media and its global ramifications, this study offers valuable contributions toward the development of public policies. Moreover, its recommendations present concrete applicability, outlining a set of actionable measures

A Data-Driven Adaptive Approach to Supporting Fact-Checking and Mitigating Mis/Disinformation Through Domain Quality Evaluation

<u>Kaveh Kadkhoda</u>¹, Anna Bertani^{1,2}, Thomas Louf¹, Riccardo Gallotti¹ ¹Fondazione Bruno Kessler, Italy; ²University of Trento, Italy

Misinformation spreads rapidly on social media, harming public debate, democracy, and social stability. To address this concern, we propose a real-time machine learning system that predicts website trustworthiness by analyzing 48 domain features, including PageRank, Domain Authority, and Spam Score. Our system achieves a mean absolute error of 0.12, demonstrating high accuracy in estimating website reliability. It adapts to the changing online environment and enables researchers, media agencies, and policymakers to identify suspicious domains more efficiently.

Existing tools such as NewsGuard and Media Bias Fact Check offer valuable assessments but only cover a limited number of sites and often require paid subscriptions. These constraints make it challenging for large-scale efforts to reduce misinformation. Our approach overcomes these limitations by using a comprehensive dataset of domains, gathered from six expert sources. Missing data was handled using advanced imputation, and a unified trustworthiness score between 0 and 1 was assigned to each site. Higher scores indicate more reliable domains, while lower scores suggest questionable sources.

We follow a streamlined workflow that includes data preparation, splitting, model training, performance evaluation, and new domain assessment. Because the system updates as the internet evolves, it supports fact-checking organizations, social media platforms, and other stakeholders in making timely, informed decisions about untrustworthy sites. Fact-checkers can focus on highly suspicious domains, and social media companies can label or prioritize content more effectively. In summary, our system provides a scalable, adaptive, and cost-effective solution to evaluating domain credibility, meeting an urgent need to mitigate the spread of misinformation.

A temporal-network perspective on the longitudinal analysis of online coordinated behaviour

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Network-based methods have proven successful in detecting coordination in social media, for example to identify deceptive attempts to increase the visibility of social media posts and websites. The typical approach consists in constructing networks of social media accounts, where edges indicate a sign of possible coordination (for example the simultaneous sharing of the same URL by two accounts), then looking for dense subnetworks (communities) potentially indicating coordinated botnets. In this approach, time is fundamental, as it is used to select and/or weight edges; yet little attention has been dedicated to the longitudinal aspects of coordination. In this work we examine the suitability of different temporal network analysis methods for the longitudinal study of online coordination, where the network is split into temporal slices and communities are traced over time. In particular, we focus on two methodological questions: (1) How to slice the network so that analytically interesting communities emerge? Here we consider calendar-based, data-based, and community-based slicing. (2) Which temporal community detection methods provide the most informative results? Here we test both multilayer methods (simultaneously looking for communities across all slices) and layer-by-layer methods (looking for communities in individual slices and tracing their temporal evolution). For our empirical study we use a climate-change-communication dataset with 64500 Facebook posts published by 470 manually-selected actors (294) and counter-actors (176) active on the climate debate, posted between 2023 and 2024. Our results confirm the intuition, recently suggested in the literature, that a longitudinal approach can find more traces of coordination and reveal dynamic patterns that are otherwise lost in a static analysis. At the same time, we raise questions about the validity of existing design choices, their consequences, and suggest associated guidelines. A noteworthy result of our experimental study is the observation that the most common community detection approach used in the literature to identify coordination risks to identify groups for which there is no strong evidence of actual coordination, and that this problem is exacerbated when a longitudinal perspective is adopted.

How algorithms recommend political content on social network.

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Recommendation algorithms are widely used on social media platforms and play a crucial role in shaping users' information environments. These algorithms leverage traces of online behavior—such as likes, shares, and social ties—to predict user preferences. Given that such behaviors correlate with political attitudes, to what extent do recommendation algorithms learn and leverage users' political leanings? And how would recommendations change if algorithms were prevented from using this information?

Using algorithmic explanation methods, we identified political information within the representation learning space of recommendation models. We then manually reduced the influence of this information and examined its effects on political bias and content diversity.

In a case study based on URL-sharing data from X (formerly Twitter), we trained a recommendation algorithm and used political attitude estimates to analyze how political patterns emerge in the model's hidden layers. Our findings show that even when trained solely on behavioral data, the algorithm captures users' political traits, steering recommendations toward partisan content. We observed that ignoring political information effectively reduces political bias in recommendations but also diminishes content diversity as recommendations shift toward mainstream sources.

This study proposes a method to assess the impact of political information in recommendation systems, opening new avenues to understand recommender's role in shaping online political discourse amplification.

Studying information segregation on YouTube: Structural differences in the recommendation graph

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The impact of YouTube's recommendation algorithm has been the subject of debate. Case studies and anecdotal evidence have suggested that algorithmic recommendations may lure the platform's users into rabbit holes where they are exposed to biased content and misinformation. Empirical research on rabbit holes, however, has been challenging to conduct because of the difficulty of separating the effects of the algorithm from user behavior. In this study, we study algorithmic recommendations separately from user behavior through a comparative network approach. We collect data for various political and non-political issues on what videos the YouTube algorithm recommends to watch after having consumed a given video. The resulting networks of YouTube recommendations between videos on different issues are then compared on structural network characteristics. If the algorithm creates

rabbit holes, one would expect the recommendation networks of videos on conspiratorial content should be characterized by stronger modularity. To test this hypothesis, we analyzed 15,455 videos and 154,311 recommendation links on 40 topics, each belonging to one of four main categories: news, science, conspiracy, and non-controversial. On the macro level, we find that conspiratorial video networks are small, sparse, and centralized, with their density partly explained by lower view counts and network size. They often link to leftist partisan channels but not more than other networks. The sentiment of their videos is negative on average---like news networks, but unlike science and non-controversial networks. Finally, on the micro-level we find that sentiment does not predict in-degree but recommendations are driven mainly by view count.

OS-30: Historical Networks

Location: Room 114 Session Chair: Demival Vasques Filho

Co-occurrence Networks in Historical Research

<u>Taylan Yenilmez</u>

Istanbul University School of Business, Turkiye

Historical network research often relies on links formed through specific interactions among historical entities, such as family relationships, political alliances, or correspondence. While these approaches have proven insightful, this study highlights the potential of another one: co-occurrence networks of historical entities. Using biographical data from Wikidata, I construct co-occurrence networks based on the idea that two entities are connected if a significant number of individuals are linked to both. As examples, I construct three separate co-occurrence networks: ancient Roman administrative positions, 20th-century conflicts, and modern German political parties. Graphical representations of these networks are presented, and the centrality values of the nodes are calculated. The analysis of the Ancient Roman network shows that positions like "proconsul" and "magister equitum," despite having fewer members, exhibit high closeness and betweenness centrality, making them critical for connecting other influential roles. In the 20th-century conflicts network, major global events like the world wars emerge as central nodes, while the "Vietnam War" displays high betweenness centrality, acting as a bridge between earlier and later conflicts. The German political parties network reveals clear ideological and temporal partitions, highlighting divisions between leftoriented and right-oriented parties, with further separations between historical and contemporary groups. These examples demonstrate that historical co-occurrence networks can yield meaningful results. They simplify complex data into clear network structures and adapt flexibly to diverse contexts where direct interaction data is limited. These qualities show that co-occurrence networks can offer insights alongside other network approaches.

A Network of One's Own: Recovering Women Scientists through Historical Network Analysis

<u>Silvia Jolien Donker¹, Mathilde Contreras Latorre²</u> ¹Rijksuniversiteit Groningen, The Netherlands; ²Numen Europe

Existing scholarship has shed light on structural barriers women faced in gaining intellectual recognition in the development of early modern science. While traditional research has given us insights into singular cases, a more comprehensive understanding of women's presence (or lack thereof) is still to be identified. This study explores the application of network analysis to uncover the often-overlooked contributions of women in early modern science.

We employ a combination of distant reading, close reading, and network analysis. We cross reference a dataset of over mentions from over 400 works on early modern natural philosophy with datasets of early modern female authors, to investigate their appearance in the literature. Through a feminist archival approach, the study integrates data from different archives to identify explicit mentions of women in scientific discourse, as well as implicit, such as by proxy of a male scientist. Using networks to analyse these references to women scientists, who are typically absent from historiographical narratives, allows us to investigate their presence as embedded within the broader field of natural philosophy. Findings highlight the appearance of explicit references to for instance Maria Agnesi, and Laura Bassi, as well as indirect presences, such as Maria Margaretha Kirch and Caroline Herschel.

In this presentation, we showcase how we can integrate approaches from digital humanities, network science, and feminist history to create an integrated, more nuanced understanding of the past. We offer an examination of how archiving practices such as reparative description and counter-archiving can challenge biases in historical data representation.

Consumer Credit Networks in Renaissance Florence

Paul Douglas McLean

Rutgers University, United States of America

The history of consumer credit in Europe goes back several hundred years. Extensive evidence of widespread consumer credit networks exists for Florence in the fifteenth century, earlier than much economic historiography penetrates. Summary transcriptions of account books in the 1420s and 1430s document myriad credit relations between dozens (actually, hundreds) of companies and shops on the one hand and thousands of Florentine households on the other in two-mode network form. Specifically, there is copious qualitative and quantitative evidence of high-quality Florentine cloth being sold on account to Florentine households, a very substantial part of the market under-examined relative to Florentine merchants' export of high-quality cloth abroad. Descriptive analysis shows that consumer credit ties are distributed unevenly: some companies did much more local business than others. At the same time, most companies dealt with households of relatively similar wealth levels, and they trafficked in both highand medium-quality cloth; there was little market 'segmentation' by wealth or luxury level. Family and neighborhood homophily are only weak predictors of who does business with whom; they were at most the core of wider networks of consumer credit. What structure does exist beyond market imperatives may have arisen due to baked-in accidental patterns of the past, or it may be linked to patterns within and across networks of personal credit exchanges and networks of company-to-company relationships of financing, production, and distribution. Concerning the latter, I intend to use ERGM modeling to explore some of the complex cross-network connections within Florence's multiplenetwork ecology.

Derailed: The Collapse of Pacific Electric (1911 – 1961)

<u>Stephanie Zhang</u> UCLA, United States of America

This project seeks to characterize the disappearance of the Pacific Electric rail system in Los Angeles County between 1911 and 1961. This system was the largest light rail system in the United States, accounting for nearly 5% of all rail laid at one point. Existing work, primarily qualitative has pointed to a variety of top down pressures such as the rise of the automobile, highway construction and revenue related concerns in the demise of Pacific Electric. However, these have often neglected the spatial component of such networks, leaving a significant gap in understanding how these larger forces played out at a system level. Los Angeles is a unique case due to the unique urbanization and suburbanization patterns driven by such an expansive system. Utilizing spatial network analysis of network representations of the rail system in five year intervals, I draw on community detection algorithms as a way of measuring fragmentation. I demonstrate that the patterns of rail closure created a system that was more cohesive than random and closely resembled a modern transit system in structure, pointing to the preservation of several key arteries. I then combine these results with archival documents concerning public commissions hearings, newspaper articles and other urban planning documents while also pointing to two periods of rapid network shrinkage in the late 1930s and late 1940s. This project highlights the need to study historic rail transit systems utilizing network analysis to better understand spatial and urban patterns and the interaction of transit and social structures.

Gender bias in medieval inquisitions and its place in shaping knowledge about the heterodox

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This study examines gender bias in the investigative practices of medieval inquisitors, focusing on Albert of Castellario's 1335 trial of the Waldensians in Giaveno, Italy. Situating our analysis within sociological and criminological frameworks, we conceptualize inquisitorial trials as structured yet discretionary information-gathering processes shaped by the inquisitor's judgments about which leads to follow and which testimonies to prioritize. Employing social network analysis and survival methods, we evaluate whether Albert demonstrated gendered biases in his investigative decisions, particularly regarding the weight assigned to testimonies from men versus women. Our findings demonstrate that Albert systematically prioritized testimonies from male informants, even when similar levels of incriminating evidence were present for both genders. This bias highlights the significant role of societal gender norms in shaping inquisitorial practices, raising questions about the reliability and representativeness of historical records of heretical movements. Beyond showing Albert's gendered biases, this study underscores the broader utility of our methodological framework for addressing related historical inquiries, including the political motivations behind the medieval inquisition.

OS-3: Agent-based modelling and social networks

Location: Room 116 Session Chair: Federico Bianchi Session Chair: Filip Agneessens Session Chair: Károly Takács

A Bayesian Approach for Estimating Parameters and Random Coefficients of Agent-Based Network Formation Models

<u>Francesco Renzini</u> University of Milan, Italy

Recent years have seen a resurgence of interest in using agent-based models (ABMs) for network formation research, leveraging their analytical flexibility and granularity to capture complex mechanisms that shape empirically observed macroscopic patterns. Many of these mechanisms — such as thresholds, cognitive states, and frames — are difficult or impossible to observe directly. Yet, ABMs provide a means to infer their relative importance in shaping social networks structures.

Despite this potential, integrating ABMs with empirical network analysis remains largely "artisanal", lacking a systematic estimation framework to quantify uncertainty and automatically fit various summary statistics. Additionally, ABMs are often validated against a single observed network, whereas developing robust middle-range theories requires fitting models to multiple networks within a given context.

To address these challenges, we introduce ByPy, a Python-based framework that applies amortized Bayesian inference to fit arbitrarily descriptive ABMs to social network data. ByPy enables researchers to estimate uncertainty around model parameters, assess their role in network formation, and control for classical network processes such as homophily, reciprocity, and transitivity. Furthermore, ByPy incorporates a method for estimating how ABM parameters vary across multiple networks within the same context — analogous to random coefficients in multilevel SAOMs. We demonstrate ByPy's capabilities by estimating threshold- and emotion-based network formation mechanisms in a single-case advice network and multiple classroom-based friendship networks, respectively.

Assessing Spillover of Pre-Exposure Prophylaxis from Sexual Partners using a Simulated Individually Randomized Trial in Agent-Based Models among Sexual Networks of Men who have Sex with Men

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Pre-Exposure Prophylaxis (PrEP) is a highly effective method for preventing HIV infection, especially for people at higher risk of HIV acquisition. It may not only prevent HIV acquisition for the treated individual but also their sexual partners. We used a trial emulation approach in agent-based models (ABMs) to assess the spillover of PrEP in a sexual network of men who have sex with men (MSM) in Atlanta, Georgia, from 2015 to 2017. We simulated an individually randomized trial stratified by race in each run of the model. We allowed for possible spillover from an agent's HIV-uninfected partners and defined coverage as the proportion of an agent's HIV-uninfected partners receiving treatments. We also let the sexual network update at discrete six-month intervals. We estimated spillover in each simulated trial using an inverse probability-weighted estimator adjusted for race and baseline substance use. Then, we averaged over 100 simulations to obtain estimates and corresponding simulation intervals (SI). The estimated spillover effect was protective but smaller in magnitude than the direct effect. Additionally, the estimates were larger for the contrast of 75% versus 25% coverage (Indirect risk ratio (RR) = 0.72, 95% SI = 0.45, 1.02), compared to the contrasts that reflected only a 25% change in PrEP coverage (Indirect RR = 0.81, 95% SI = 0.62, 0.99). This ABM approach can be used to validly assess causal spillover effects from an agent's sexual partners to improve the delivery of PrEP to MSM and their sexual partners

Between solidarity and expediency: uncovering framing-based mechanisms of advice network formation through an empirical agent-based model

Federico Bianchi, Francesco Renzini

Department of Social and Political Sciences, University of Milan, Italy

Sustainable cooperation in contemporary societies is based on prosocial behaviour driven by a mix of rational calculations of expediency and compliance with perceived normative obligations towards others. However, research on prosocial behaviour has rarely addressed the time-varying, context-dependent nature of underlying motives and their macro-level consequences. In particular, ego's decision to provide alter with costly support may depend on ego's framing of the relationship as solidary or instrumental. Moreover, ego's framing of their relationship with alter may vary over time as a macro-micro feedback of certain contextual features, such as the connectivity of the wider social network. Although the empirical literature on advice and support networks is relatively rich, social network research has rarely attempted to identify formation mechanisms based on different motivations, mostly driven by the availability and power of standard statistical models (e.g., ERGMs or SAOMs) which often lack the required flexibility. To test our hypothesis, we analysed the formation of a network of advice and support among independent freelancers sharing a coworking space in Northern Italy. We collected multiplex network data along with various individual characteristics of the subjects and fitted an empirically calibrated Agent-Based Model to a set of macro-level network summary statistics. The model parsimoniously simulates support seekers' partner selection and potential givers' decisionmaking processes, estimating parameters using Approximate Bayesian Computation. Preliminary results show that the observed support and advice networks can be explained by nodes switching between instrumental reciprocity and normatively based solidaristic prosocial behaviour according to threshold-based changes in overall network density.

Bridging Statistical Physics and Agent-Based Models with Simulation-Based Inference

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Statistical physics provides powerful but often abstract models of collective behavior. Agent-based models (ABMs) can be more expressive and realistic, but their integration in empirical analyses remains challenging. In this work, we demonstrate how simulation-based inference (SBI) can leverage statistical physics models - specifically, the Ising model — as interpretable and principled summary statistics to compare the plausibility of multiple ABMs of social behavior. To illustrate this approach, we study the diffusion of a convention in physics (the metric signature, which involves a choice between two equivalent possibilities). We identify the favorite conventions of 2,277 physicists and their co-authorship and co-citation networks. By solving an inverse Ising problem, we reveal the contribution of local mechanisms of coordination (endogenous to a social network) and global mechanisms of coordination (transcending the network) in the adoption of a convention. The Ising model unveils the structure of the underlying coordination game and the relevant social networks. More interestingly, the parameters of the Ising model measured from the data can be used as summary statistics to compare the likelihood of realistic ABMs of preference-formation using simulation-based inference and amortized Bayesian model comparison. We consider a strategic agent model, a model of global cultural transmission, and a model of local cultural transmission by the imitation of peers. The analysis reveals more evidence for the latter. This work shows that statistical physics models can play an intermediate role in simulation-based inference with complex models, and contributes a method for distinguishing endogenous from exogenous collective behavior in multi-layered networks.

Clustering Promotes Giving and Reduces Inequality in Altruistic Networks

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The high rates of prosocial and altruistic behavior observed in humans is largely driven by our embeddedness in social networks. One of the key mechanisms through which networks promote cooperation is clustering. Similarly, altruistic giving can generate chains of generalized giving characterized by structural closure. Here we test arguments linking network clustering in altruistic networks to increases in the overall benefits derived by members and decreases in inequality in the overall benefits. We argue that publicly rejecting acts of giving (as opposed to private discarding) will increase the amount given and overall inequality. Similarly, we argue that framing altruistic contributions as a gain in net benefits (as opposed to a loss to the system) will increase the amount given and overall inequality. Importantly, we also argue that network clustering will moderate these effects by increasing benefits while decreasing inequality. To evaluate our arguments, we collected experimental data from 40 triads. Participants were endowed each round and could give points to others. Points given were doubled and participants could accept one gift per round. We varied whether rejections were made public or if this information was not disclosed, and whether giving was framed as a doubling of value or a loss to the system. Those data were used to train a large-scale simulation varying the clustering of an underlying network of 1,000 agents. Results show that clustering increases giving and decreases

inequality while also moderating our manipulations in predictable ways. Implications and future directions are discussed.

OS-83: Social networks and health among multiply marginalized populations

Location: Room 125 Session Chair: Cho-Hee Shrader Session Chair: Peng Wang Session Chair: Martha Tillson

A co-occurrence network analysis of the Refugees' mental health research

Manal Etemadi

University of Bristol, United Kingdom

The Problem: Refugees represent a population that is at a high risk of mental health problems be-cause of the accumulation of stressful and traumatic life events. This study aimed to objectively describe the knowledge domain and emerging trends of refugees' mental health.

The Approach: The author conducted co-occurrence network analyses to graphically depict the relationships between the extracted words. 81 journal articles published on mental health of refugees and asylum seekers in post-covid area have been reviewed. The co-occurrence matrix was used by the UCInet software.

Findings: 82 nodes(words) and 266 ties (co-occurrence frequency) has been identified. Depression, anxiety, PTSD and Post-migratory difficulties had the highest degree centrality, while social work, equality and diversity, cultural competency and post-migratory trauma had the lowest degree centrality. Moreover, Depression, PTSD, Discrimination, and anxiety had the highest betweenness centrality, identified as the vital points that provide important bridging connections between two research interests.

Implications: The presentation of the thematic map of the articles will make the researchers more aware of the status of the research conducted and the subject's gap. It could help readers broaden innovative ideas and discover new research area opportunities and served as important indicators for host health system governance, especially LMICs.

Assessing predictors of enacted stigma in relational dyads of people living with HIV in Uganda

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Among people living with HIV (PLH), high levels of internalized stigma are related to reduced adherence to ART, increased mental health and substance use issues, poorer health and diminished quality of life. Research has shown that enacted stigma from members of PLH's networks increased internalized stigma, while greater trust from members of PLH's networks decreased internalized stigma. Using data from the control arm of a randomized controlled trial of the Game Changers HIV intervention, we explore these findings further, using multi-level dyadic analyses to explore the relationship and network member characteristics that predict enacted stigma in PLH-network member dyads. Data were collected using Network Canvas and follow a personal network survey design. Enacted stigma was assessed using a 4-item scale covering expressions of stigma against PLH such as: A person with HIV/AIDS must have done something wrong and deserves to be punished. Network member enacted stigma will be predicted using alter characteristics such as age, gender, role in the relationship, network member degree, support provision, and HIV status. Relationship characteristics such as frequency of contact, trust, and emotional closeness will also be assessed. Index characteristics will be controlled for. We will present results of dyadic analyses conducted as a set of lagged regressions across four waves of data collected at baseline and 6, 12, and 18 months. Results of these analyses will help refine social network interventions aimed at enacted and internalized stigma reduction, leading to improved care adherence and better quality of life for PLH in Uganda and elsewhere.

Improving the surveillance system of Peste des petits ruminants (PPR) in Nigeria, using network tools to describe disease propagation and estimate the effect of missing information

<u>Asma Mesdour</u>¹, <u>Sandra Ijoma</u>², <u>Muhammad-Bashir Bolajoko</u>², <u>Mamadou Ciss</u>³, <u>Eric CARDINALE</u>⁴, <u>Stephen Eubank</u>⁵, <u>Mathieu Andraud</u>⁴, <u>Andrea Apolloni</u>¹

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Animal mobility is essential to Nigeria's economy and pastoral culture but facilitates the spread of highly contagious diseases like Peste des petits ruminants (PPR). Despite this risk, there is no adequate surveillance system or proper tracking of animal movements. Instead, data is gathered through ad-hoc mobility surveys, which are often limited in scope, making it challenging to identify key areas for disease monitoring. Using mobility data from three Nigerian states and a simulation framework, we evaluated the impact of missing movement links (unrecorded by surveys) on PPR spread in Nigeria.

The small ruminant mobility network was reconstructed using market survey data from three Nigerian states, comprising 233 villages and 335 movement links. Using the COCLEA algorithm, contagion clusters were identified, and a stochastic SIR model was used to simulate PPR spread using 10,000 transmission and recovery probability combinations. Sentinel nodes, crucial in early outbreaks, were determined based on structural, socio-economic, and environmental factors. An uncertainty analysis assessed the impact of missing movement links, predicted with a Hierarchical Random Graph (HRG), by gradually adding probable links to the network.

The livestock mobility network identified seven geographically dispersed communities. Epidemic simulations were categorized into four groups based on final epidemic sizes. While the number of sentinel nodes varied, their structural characteristics, especially in-degree, in-closeness, in-neighborhood, and eigenvector, remained stable and more important than socio-economic factors. The uncertainty analysis showed that epidemic size remained stable with 1% of missing links but fluctuated beyond 3%, stabilizing after adding 50% of probable links. Less probable links required 90% inclusion for stability. The study highlighted the importance of in-closeness and in-neighborhood in node vulnerability.

Predicting missing links presents a promising method for enhancing the reliability of sentinel node identification, ultimately contributing to more effective disease surveillance and control strategies in Nigeria.

OS-95: The intersection of social norms and social networks

Location: Room 202 Session Chair: Holly Baker (Shakya) Session Chair: Kathryn M Barker

Parents' perceptions about others' support for discussing HIV prevention with adolescents: a sociocentric network and norms study in rural Uganda

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Background: Understanding parental communication with adolescents about HIV prevention is critical in HIV-endemic settings. Little is known about social network factors and perceived social norms as drivers of these conversations.

Methods: We collected sociocentric network data from all adult residents of eight villages in rural southwestern Uganda (2023–2024; response rate >92%). Parents with children aged 12–17 reported whether they had any HIV prevention discussion with their adolescent(s) in the last three months and their perceptions about whether other village parents had done so and thought parents should do so. We fitted a multivariable logistic regression model to estimate associations between any discussion and alter behavior, perceived injunctive norm, total degree, and other factors.

Results: Among 525 parents, 308 (59%) had discussed HIV prevention. Despite 366 (70%) having at least one non-spouse alter who talked with their adolescent and 309 (59%) having at least one non-spouse alter who supported such discussions, 156 (30%) parents incorrectly believed that most village parents had not talked with their adolescent and 239(47%) incorrectly believed that most village parents were unsupportive of such discussions. Parents who thought most parents supported having these discussions were themselves more likely to have engaged in HIV prevention discussions with their adolescents (adjusted odds ratio = 3.53; 95% Cl 2.51-4.96; p < 0.001). Total out degree was also associated with having a discussion while alter discussion behavior was not.

Conclusion: Correcting misperceptions of supportive norms through network-targeted interventions may bolster efforts HIV prevention among youth in rural Uganda.

Social networks, social norms, and male circumcision uptake in rural Uganda: a sociocentric network study

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Background: Medical male circumcision is associated with decreased risk of HIV/STI transmission. Voluntary uptake in adulthood remains short of target goals in many countries despite increases over the past two decades. No studies have explored social network factors as drivers of voluntary medical male circumcision in HIV-endemic settings.

Methods: We conducted a sociocentric network study of all residents living in eight villages in southwest Uganda (response rate > 95%). We identified network ties using five locally-adapted name generator questions. We asked all men if they were circumcised. Explanatory variables included having circumcised male alters and male alters who believed men should get circumcised, perceptions of village-level norms about male circumcision, and total outdegree. We fitted a multivariable logistic regression model to estimate associations between circumcision and these explanatory variables of interest, adjusting for sociodemographic characteristics.

Results: Among 791 men, 263 (33%) were circumcised at 20 years old on average, with 25-46% circumcised across villages; 404 (51%) had at least one circumcised alter. Personal circumcision status was associated with having 2 circumcised alters (adjusted odds ratio [aOR]=1.71; 95% Cl 1.08, 2.71, p=0.020) and the belief that most men in the villages were circumcised (vs. incorrectly thinking few to none were circumcised) (aOR=2.98; 95% Cl 1.53-5.81, p<.001). Other explanatory variables were not associated with circumcision status.

Conclusion: Future research will explore perceived norms about circumcision within ego networks and other measures of network centrality as drivers of uptake. This research suggests peer- and norms-based interventions may help motivate voluntary male circumcision uptake.

The Association of Friends and Family Social Networks on Wife-Beating Beliefs in Rural Honduras

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Wife-beating (WB) —men physically abusing their wives or cohabiting partners —is a traumatic forms of intimate partner abuse. WB has been recognized as a long-term global health concern(1)and one of the indicators of the Sustainable Development Goals(2). The consequences for victims, families, and communities are complex and call for multiple levels of analysis (3). Communities with norms that support WB not only have increased perpetration risks but also become adverse environments for victims, discouraging reporting, prevention, and timely treatment (4,5). Victims of WB face numerous and diverse repercussions (ranging from detrimental mental health conditions, chronic diseases, and substance misuse, as well as higher risks of re-victimization and food insecurity)(6,7), including spillover effects on their children's development and quality of life.(6,8) These unfortunate realities are prevalent in resource-limited settings and Low- and Middle-Income Countries (LMICs). Past research in these high-risk areas remains limited and has overwhelmingly centered on individual factors rather than broader social influences, such as social networks (4,8,9). Nevertheless, prior network studies of WB (4,10) have shown that WB support is shaped by the friends and family's perceptions of WB. Between 2015 and 2019, we collected sociocentric data (including friendship, kin, and antagonistic ties) from 176 isolated villages in western Honduras through face-to-face interviews. WB attitudes were assessed via surveys. We estimated three mixed-effects logistic regression models by gender to assess individual, network, and village-level factors associated with WB support (n==9,891 women and n=5,323 men), measured by asking respondents' agreement on whether a husband is justified in hitting his wife for given situations (leaving without telling, neglecting children, arguing, burning food, refusing sex). Our results show that older age, higher education, and having a partner were protective factors, lowering the risk of WB support for men and women. Social networks were significantly associated with WB Support: having more antagonistic increased WB support, while more friendship ties had a protective effect (for both men and women). Family influence varied by genderpartnered women were more likely to accept WB if their father-in-law or siblings endorsed it. The WB endorsement of unpartnered women and men was associated to their father's WB beliefs. Our study highlights the differential role of signed networks and family ties in shaping WB attitudes and beliefs. Our results emphasize the need to consider these cultural dynamics when designing studies or interventions to reduce physical partner violence in LMIC rural settings.

The Effects of Two Different Forms of Social Exchange on Trust and Cooperation Beyond the Dyad

Maurice Bokanga

University of Chicago, United States of America

We use sociological social psychology to compare the potential of two forms of dyadic exchange studied in the social exchange literature, reciprocal and negotiated exchange, in their ability to produce trust and cooperation outside of the exchange dyad. Reciprocal exchange has been shown to produce stronger feelings of solidarity and trust in a dyad (Molm, Collett, and Schaefer 2007; Molm, Melamed, and Whitham 2013; Molm, Schaefer, and Collett 2009; Molm, Whitham, and Melamed 2012; Molm, Schaefer, and Collett 2007), in part because networks of reciprocal exchange are more likely to be perceived by participants as groups to which they belong (Savage and Sommer 2016). While this can reliably produce trust and cooperation within a dyad, it is unclear what effect this has on cooperation towards those outside of that dyad, or those not involved in exchange. There is little evidence that the trust and solidarity cultivated in reciprocal exchange persists into new forms of exchange, much less into new relations (Cheshire, Gerbasi, and Cook 2010). Even worse, the production of feelings of group belonging can actively harm extra-dyadic relations, as the affective attachments that support in- and out-group boundaries can be a barrier to cooperation and solidarity outside the perceived group (Aksoy 2020; Balliet, Wu, and De Dreu 2014; Chen and Li 2009; Tarrant et al. 2012; Triplett 2012). However, it could also be the case that perceptions of interpersonal conflict that are adaptive for negotiated exchange (Kuwabara 2011) are carried into other interactions in a way that hampers trust and cooperation (Peysakhovich and Rand 2016).

Using a behavioral experiment, we compare the potential of negotiated and reciprocal exchange in their potential to produce cooperation towards people outside of the exchange dyad, what will be called extra-dyadic cooperation. Participants will be randomly assigned to engage in either reciprocal or negotiated exchange with a fixed partner. After performing social exchanges, participants will then be randomly paired with a new partner and play a one-shot prisoner's dilemma, an experimental game where players have the opportunity to cooperate and maximize their mutual benefit, despite the incentive to maximize their own individual gains at the expense of their partner, i.e. to defect in the game. Unlike social exchange, the prisoner's dilemma is a situation in which, regardless of one's beliefs about the other player's likely actions, it is always better from a selfish point of view to not benefit the other player, making this a more stringent test of which exchange form can more reliably produce trust and cooperation beyond the dyad.

The resonance of reciprocity: How reciprocity informs social network structure

Diane Felmlee¹, Cassie McMillan²

¹Pennsylvania State University; ²Northeastern University

Sociologists have recognized the power of reciprocity in social processes for decades, with Alvin Goulder in 1960, for example, proposing a "norm of reciprocity." According to this norm, people are expected to respond in kind to actions directed towards them by another, typically referring to positive, prosocial actions. In recognition of the foundational role of reciprocity in social processes, statistical analyses of social networks routinely control for this process. Even though the effect of reciprocity is sizeable in almost all social networks of interest, the overabundance of mutual dyads is continuously taken-for-granted. The purpose of this paper is to examine systematically the degree to which the presence of reciprocity shapes social network configurations. We accomplish this by estimating Exponential Random Graph Models (ERGMs) on a sample of over 40 social networks. The networks in our sample represent diverse genres of social interaction (e.g., friendship among adolescents, advice seeking between coworkers, cyberbullying on social media) and include relationships defined by both amity and conflict. Then, we rely on our ERGM estimates to simulate a series of empirically-informed networks and quantify the extent to which local tendencies toward reciprocity inform the broader macro-level structures of social networks (e.g., centralization, clustering, connectedness). Our results suggest that the social effects of reciprocity can extend beyond the immediate dyad to influence broader, network-level topologies that often improve population-level outcomes.

OS-86: Social Networks in Schools: Promising Intervention Approaches Location: Room 203

Session Chair: Leslie Echols Session Chair: Sandra Graham

Applying Social Network Analysis in Schools: A Pilot Study in Chile

Guillermo Beck^{1,2}, <u>Gino Cortez</u>²

¹Pontificia Universidad Católica de Chile, Chile; ²Agencia de Calidad de la Educación

Social interactions within the classroom are fundamental in shaping students' academic performance, social inclusion, and overall school climate. However, traditional educational assessments focus mainly on individual traits, often neglecting the relational dynamics that shape learning and student well-being. In Chile, the Agencia de Calidad de la Educación (ACE)—the government institution responsible for assessing education quality through national and international evaluations—recognizes the importance of integrating methodologies that capture these relational aspects to enhance the continuous improvement of schools and classrooms.

This study explores the impact of friendship networks and social dynamics in the classroom using Social Network Analysis (SNA). Integrating relational measures into school climate assessments aims to generate empirical evidence to inform pedagogical strategies and public policies aligned with the objectives of the ACE.

To achieve this, a pilot study will be conducted in 100 Chilean schools, focusing on students in 8th and 12th grades. The study will analyze trust, classroom cohesion, and peer interactions using survey-based data collection. Statistical modeling and network analysis will examine how social network structures relate to academic performance, student well-being, and school inclusion.

The expected findings will provide valuable insights into how different network structures influence key school outcomes, such as academic achievement and classroom well-being. This initiative represents an innovative approach to understanding social dynamics in education and fostering more inclusive school environments. Since the study is still in its early stages, we will present our progress at the conference to foster discussion and guide its implementation.

Beyond Individual Effects: The Relational Externalities of Institutional Interventions

Ramina Sotoudeh

Yale University, United States of America

Institutions seek to shape the behaviors of their constituents. Because individuals are embedded in complex webs of social relations, by shaping personal behaviors, institutions may unwittingly reshape network structure. In this paper, I introduce the concept of relational externalities — the unintended relational consequences of a policy or intervention. I elaborate two different forms that relational externalities commonly take, the mechanisms that bring them about, and the role they play in creating or amplifying inequalities. I then empirically illustrate this concept through the case of the punishment of smoking behavior in a sample of U.S. high schools. I show that harsh punishment of smoking behavior is associated with the social isolation of smokers and increased homophily on smoking status in friendship networks. A subsequent exploration of the mechanisms behind these effects reveals that they are likely driven by non-smokers eschewing friendships with smokers. Finally, I show that relational externalities of anti-smoking policies are most acute for students with the least behavioral elasticity with regards to smoking. Students who are least able to change their behaviors change their friends, putting them at a dual disadvantage.

Linking Schools and Universities: using SNA to develop and evaluate inter-organisational engagement strategies for collaborative improvement

Thomas Cowhitt, Lauren Boath, Lindsay Gibson

University of Glasgow, United Kingdom

Research Practice Partnerships (RPPs) are now prominent collaborative structures in the Research and Development infrastructure of education systems. These long-term working arrangements focus on key dilemmas and challenges facing practitioners. Importantly, they are mutualistic and include carefully designed rules, roles, routines, and protocols that structure interaction to support school improvement.

This presentation will cover the efforts of a three-year RPP between researchers at the University of Glasgow and practitioners working at a local secondary school as they attempted to implement an approach to professional learning known as practitioner enquiry with all school staff. Practitioner enquiry is a cyclical process of professional learning where educators identify problems of practice and engage with relevant research and embedded evidence from their own classrooms to inform changes in their teaching.

This presentation will explore how Social Network Analysis can be used to evaluate the inter-organisational engagement strategy (e.g. the roles and routines for structured interaction) between researchers and school-based

educators working to maintain an RPP for both knowledge exchange and to support the adoption of a new approach to professional learning. Furthermore, the network analysis was used to inform changes to the engagement strategy to strengthen the inter-organisational links between the University and secondary school as the implementation matured. Specifically, the network analysis encouraged the research team to engage with formal middle leaders at the secondary school instead of the senior leadership team. Implications for knowledge mobilisation and fidelity in the programme implementation will be discussed.

Network dynamics and adolescent risk behavior: the case of Russian vocational schools

Valeria Ivaniushina, Apollinariia Ermolaeva, Daniel Alexandrov

HSE University, Russian Federation

In this study, we expand our prior longitudinal SNA research in Russian vocational schools. Along with the drinking and smoking behavior of adolescents, we include a wide range of risk behaviors and explore the dynamics of peer effects on sexual behavior and sexual literacy. Unlike smoking which is highly visible, and alcohol consumption, which is relatively visible among friends, sexual behavior is highly private. Still, we expect that the time of sexual debut may exhibit both effects of influence and selection within the years of vocational education and training. Moreover, our qualitative research shows that sexual knowledge is predominantly shared informally in peer communication networks, and thus we expect to find influence effects in the dynamics of sexual (il)literacy. We address these questions using a longitudinal dataset collected between 2016 and 2020 from 13 vocational colleges in St. Petersburg, Russia. Students in vocational schools often come from low SES families, and risk behaviors are more prevalent there than in academic schools, making this environment advantageous for our study. The survey includes data on smoking, drinking, and sexual experience across four waves, along with measures of sexual literacy obtained in two waves. We employ RSiena for statistical modeling to investigate peer influence and selection dynamics. In the presentation, we will discuss our preliminary results as well as the limitations of our data and analysis in the hope of constructive feedback.

Professional Development and Rural Science Teachers' Expanding Social Networks: A Longitudinal Analysis

Rebecca Sansom, Syahrul Amin

Texas A&M University, United States of America

Rural science teachers, often grappling with extreme professional isolation due to significant geographic separation and a lack of same-subject teaching colleagues nearby, face unique challenges. This longitudinal study, conducted in a Western US state, delves into the impact of technology-mediated lesson study (TMLS) professional development on rural chemistry and biology teachers' collaboration, advice-seeking, and friendship networks. Using a stepwise approach to specify stochastic actor-oriented models (SAOMs) in RSiena, we analyzed changes in the three networks over three years. The survey respondents included teachers who participated in TMLS across two cohorts (N=13) and those who did not (N=67). Our findings reveal that, while overall collaboration networks expanded initially and then stabilized, the advice-seeking and friendship networks exhibited continuous growth, indicating the positive impact of TMLS. Outdegree (density), reciprocity, and triadic closure were significant in all three networks, indicating the cohesive formation of subgroups. Despite minimal homophily effects, geographic separation emerged as a significant barrier to tie formation. However, TMLS program participation significantly increased tie formation in all three networks, even across long distances, effectively overcoming geographic barriers to professional connection. These findings underscore the value of sustained technology-enhanced professional development models that foster longterm collaboration, trust, and knowledge exchange among rural teachers.

OS-77: Social network approaches in the study of socio-economic inequality

Location: Room 204 Session Chair: Nikolitsa Grigoropoulou Session Chair: Florian Koenig

Beyond Proximity: Investigating Crime with Organic Neighborhoods and a Two-Stage Unsupervised Learning Approach

Kerstin Ostermann

Institute for Employment Research, Germany

As living in a certain neighborhood substantially affects individuals' opportunities and available resources, the investigation of neighborhood effects has a long history in sociology. However, processes like gentrification constantly change neighborhoods' appearance making time-constant one-size-fits-all neighborhood measures unlikely to capture important local dynamics. Similarly, previously applied modern network approaches are often considered as "aspatial", i.e., they do not account for the genuine spatial dimension of neighborhood networks. This paper presents a data-driven approach for estimating neighborhood network effects with overlapping and arbitrarily shaped neighborhoods with time-dynamic boundaries. Constructed in a two-stage clustering design, the first stage identifies homogeneous groups within a city, while the second stage clusters homogeneous groups by spatial proximity to "organic neighborhoods". The approach prioritizes spatial proximity for neighborhood construction and accounts for homophily being an important facet shaping the accessibility and distribution of resources. An application to city crime based on administrative data from 86 million person-year observations from 76 German cities exemplifies the algorithm. From a social inequality perspective, crime can either be considered as rights-denied access to local resources or as a sign of social disorganization. In theoretical terms, the paper complements previous research by showing that a larger spatial expansion of affluent neighborhoods and neighborhood stability negatively correlates with crime even if the level of resources stays constant. Higher fragmentation and heterogeneity correlate positively with crime rates. The findings stress the importance of flexible neighborhood estimation techniques and the necessity to view neighborhoods as non-constant entities for explaining cross- but also inner-city inequality.

Economic Inequality, Labor Market Resilience, and the Network Structure of Occupational Mobility in Europe

Florian Andersen Sciences Po, France

Economic inequality and social mobility are linked. Modern intragenerational careers are often portrayed as "boundaryless," meaning individuals freely transcend organizational and occupational boundaries (Arthur and Rousseau 1996) whereas studies of balkanized, segmented labor markets (Kerr 1977, Reich et al 1973) and insideroutsider divides (Emmenegger et al 2012) posit the opposite. Thus, it is crucial to determine the observable boundaries to intragenerational mobility and relate them to economic outcomes. Which boundaries to social mobility exist in different national labor markets? How do these boundaries influence individual wage trajectories? Is there crossnational variation in career patterns? Are boundaryless systems better at absorbing economic shocks?

In this contribution, I study macrological patterns of occupational mobility in several European countries. Utilizing a graph-based approach that conceptualizes the mobility table as a network of occupational nodes (Block 2023, Lin and Hung 2022, Cheng and Park 2020, Villareal 2020) and EU-SILC data, I uncover hidden trends and variation in European occupational labor mobility. The study aims to shed light on developments in the fragmentation of occupational communities by uncovering latent boundaries to inter-occupational mobility via network community detection. I further relate the connectivity of mobility systems to their capability to absorb economic shocks and to occupational wage inequality.

This project extends recent US-based research and shows how network analysis can produce novel discoveries in the study of occupational mobility. It further embeds the study of labor flow networks in the rich theoretical tradition of research on comparative political economy and welfare state research.

Internal Communication and Remote Work

Prithwiraj Choudhury¹, Miguel Espinosa², Taruna Khanna³, <u>Christos Makridis</u>³, Kyle Schirmann³ ¹Arizona State University, United States of America; ²Bocconi University; ³Harvard Business School

The rapid adoption of hybrid work by firms has led to a debate between managers and workers on the relative value of remote and in-person communication. Colocation between workers may be helpful for communication, aid with coordination, and affect the intensity of monitoring of workers by managers. Exploiting a hybrid work field experiment involving HR workers and using unique data related to the text of electronic communication between employees, this paper provides causal evidence of how colocation between employees affects internal communication within firms. A machine learning analysis of email content reveals that colocation is a substitute for horizontal, coordination-related communication, but--somewhat surprisingly---a complement to vertical, monitoring-related communication.

Is Homophily Enough? Exploring Friendship Choices by SES among School Students

Anastasiia Kuznetsova^{1,2}

¹University of Mannheim, Germany; ²Goethe University Frankfurt, Germany

With economic inequality rising in most countries, studying the mechanisms of its reproduction is a pressing matter. Research shows that friendships among children of different socio-economic backgrounds affect their future education achievement and income, inter-SES (socio-economic status) friendships especially improving the outcomes of children from lower-SES families.

Few studies explored the mechanisms of friendship preferences and choices of school children so far; the results of the studies that did are conflicting. The main mechanism assumed to guide friendship choices is homophily, and it is not found consistently in the data. I will test it once again with one of the cutting-edge tools of network analysis, Stochastic Actor-Oriented Modeling (SAOM). I will also test a different mechanism of friendship choice that has never been tested before - friendship hypergamy: children of higher SES are more desirable as friends. This mechanism might account for the cases in existing research where homophily wasn't found.

Existing research suggests that homophily, or assortativity, is not the only mechanism behind friendship selection: research shows that higher-SES students overall have more friends, while lower-SES children have less friends and are more likely to be isolated. Moreover, since SES is clearly hierarchical, homophily does not make sense as the only mechanism of friendship selection with regards to SES. Thus, exploring homophily and potential alternative mechanisms of friendship selection will broaden our understanding of friendship choice by SES as a mechanism of inequality reproduction, potentially outlining a need for more rigorous theory building on the topic.

Spatial Networks and Financial Inequality: Unpacking the Locational Decisions of Traditional and Alternative Financial Institutions

<u>Florian Koenig</u>¹, Nikolitsa Grigoropoulou¹, Mario Luis Small² ¹University of Bremen, Germany; ²Columbia University, USA

Racial inequality is affected by space, as neighborhood conditions shape access to resources, opportunities, and services. Research has shown that many low-income and minority neighborhoods lack traditional banks, which undermines access to financial services, savings and checking accounts, loans, and credit. In contrast, such neighborhoods often have a disproportionate number of alternative financial institutions (AFI), such as payday lenders and check cashers – known for charging higher fees and interest rates. We ask why. The distribution of conventional banks vs AFIs reflect managerial decisions, and we use data on 50 interviews with managers of financial institutions to understand how such firms make location decisions. We conceive the spatial distribution of firms as a network in which firms are nodes and co-occurrence in neighborhoods are edges. Our study thus examines, using qualitative data, the decisions underlying network formation at the organizational level. This approach provides analytical leverage to understand neighborhood clustering in structural terms. We find that major factors in the decision process are the locations of other businesses, including competitors, in addition to traffic patterns and perception of neighborhood activity. We also found an unequal use of data. While AFIs rely heavily on observation and experience, banks rarely make decisions without extensive data analysis. We discuss implications for the understanding of the ecological distribution of resources and network process.

OS-27: Global Perspectives on Personal Networks: Data Sources, Case Studies, and Cross-Cultural Comparisons Location: Room 206

Session Chair: Guillaume Favre Session Chair: José Luis Molina

"Remittances from Guinean migrants to their relatives back home: A continuation of local solidarities?"

Mamadou Habib Diallo

Université de N'Zérékoré/LISST-Cers, France

While numerous studies have focused on remittances from diaspora communities, particularly in West Africa, few have examined Guinean migrants, and even fewer have quantitatively described the relationships underpinning these solidarities. Yet, like its neighbors, Guinea experiences massive emigration of its nationals, not only to other African countries but also to other parts of the world. This emigration often serves as a source of financial support for locals, with 61.7% of my respondents reporting receiving monetary assistance from a relative living abroad.

This study aims to analyze the financial transfers from the Guinean diaspora by examining the "personal networks" of a sample of 978 residents in the Conakry metropolitan area. The survey employs "name generators," in which

respondents are asked to list individuals within their social circles. One specific question required them to name people from whom they receive financial support, both locally and from abroad.

Far from being a unique form of solidarity, I argue that these financial transfers represent a continuation of local solidarities in a context where state-driven solidarity is lacking. Furthermore, research on remittances often focuses on fund providers. By analyzing personal networks, my study offers a perspective on remittances from the Guinean diaspora through the experiences of beneficiaries who remain in the country.

Collecting Panel Personal Network Data in Rural Eastern Europe

Marian-Gabriel Hancean^{1,2}, Juergen Lerner³

¹University of Bucharest, Romania; ²Center for Innovation in Medicine; ³University of Konstanz, Germany

Purpose: This presentation addresses the methodological challenges of collecting longitudinal personal network data in rural Romanian communities, aiming to capture the dynamics of social networks over time.

Methods: We conducted a two-wave panel study in a rural Romanian community (N = 4,124). In the first wave (September 2023), 83 egos and 1,970 alters were surveyed using a fixed-name generator (n = 25 alters). The second wave (March 2024) included 94 egos and 1,513 alters, utilizing a free-name generator (average = 16 alters). Sixty-eight egos participated in both waves. Alters were tracked using unique identification codes; inconsistencies were resolved by cross-referencing demographic and relational attributes without imputation. A link-tracing sampling method was employed, starting from six seeds with a variable number of recommendations per participant.

Contributions: Our findings highlight the effectiveness of combining fixed and free-name generators to reduce respondent burden and improve data quality in longitudinal personal network studies. We also discuss the challenges of modeling multiple network data dependencies and outline plans to replicate this research design in Bulgaria's Plovdiv region. This work contributes to advancing cross-cultural panel PNA methodologies, particularly in underrepresented rural Eastern European contexts, and offers insights for evaluating community-level public health interventions aimed at cancer prevention.

How Do Political and Economic Contexts Shape Social Networks? An International Comparison of Personal Networks in France, China, and Guinea

Guillaume Favre¹, Habib Diallo², Michel Grossetti³, Jin Huang⁴

¹University of Toulouse Jean Jaurès, France; ²University of Nzerekore; ³CNRS; ⁴Independent reseracher

Sociological theories suggest that interpersonal relationships and social ties are influenced by broader societal structures and cultural contexts. Traditionally, this process has been studied through the lens of individualization, observing how modern societal structures—such as markets and technological change—encourage diverse, geographically dispersed, and specialized relationships beyond family or local community. This paper provides an international comparative analysis, examining personal networks in France, China, and Guinea. Despite numerous national studies, international comparisons remain scarce due to methodological inconsistencies. Our approach relies on three surveys conducted with the same name-generator methodology: A survey in Toulouse, France (709 respondents, in 2017), Chongqing, China survey (650 respondents, in 2018) and Conakry, Guinea survey (944 respondents, in 2019)

Results reveal both similarities and significant differences: family ties are more prevalent in China and Guinea, while Toulouse respondents maintain more geographically and emotionally distant relationships. Neighborhood ties notably dominate in Conakry. Structurally, networks in China and France show similarities despite a distinct role for partners, whereas Guinea's networks are denser and more interconnected. These variations in social network composition and structure reflect differences in economic conditions and institutional stability, including market structures and welfare systems.

Structural variability in ego networks: methodological insights and impact of name generator choice

<u>Miguel A. González-Casado</u>¹, Alejandro Cruzado Rey², Miroslav Pulgar Corrotea³, Christopher McCarty⁴, José Luis Molina³, Angel Sánchez^{1,5}

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We present an analysis of the impact of the number of alters elicited in an ego network on the structural properties of those networks. There continues to be debate about the pros and cons of eliciting a fixed number of alters. This article explores a random assignment of respondents to three treatment groups – 1) a fixed number of alters set at 30, 2) a variable number of alters up to 45, and 3) a variable number of alters up to 45 with a 20 alter minimum. The results indicate that, from a non-structural perspective, all levels of emotional proximity, interaction contexts, genders, and ages are consistently sampled across the three name generators. At the structural level, the behavior of individual metrics is also largely similar. However, the most significant differences arise in the collective behavior of structural variability. When a name generator constrains network size, it reduces the sparsity of the correlation matrix, effectively decreasing the number of independent global variables needed to describe network structure and making these global variables less interpretable. In other words, networks constructed with a name generator that limits size tend to be more similar to each other, exhibiting less structural diversity and yielding differences that are harder to interpret. However, we discuss how these differences may simply be mathematical artifacts, without necessarily implying a clear advantage in choosing one name generator over another.

Twofold data collection strategy for mapping personal networks across countries

<u>Alejandro Dinkelberg</u>¹, Ángel Merino Hernández¹, Alejandro Cruzado Rey², Miguel A. González-Casado¹, Miroslav Pulgar Corrotea³, Ángel Cuevas Rumín¹, Christopher McCarty⁴, José Luis Molina³, Ángel Sánchez¹ ¹Universidad Carlos III de Madrid, Spain; ²Universidad Loyola Andalucí; ³Universitat Autònoma de Barcelona; ⁴University of Florida

The perception of culture influences learning and reinforcement of actions from individuals as parts of society. The individuals' interactions, captured in personal networks, might reflect unique cultural properties. We are building a database for comparing structural characteristics of personal networks with cultural diversity. This work is the first stage of a global data collection across ten countries. Our survey-based data collection is twofold. First, the participants construct their personal network with a fixed-choice name generator. They name and describe their alters, including alter-alter connections, and further evaluate the perceived social norms in their country. Second, we follow an innovative approach and request the participants to donate their Data Download Packages from Facebook and/or Instagram, which contains all their digital traces on those platforms. This rich data set enables us to draw comparisons between cultural features and the personal network structure, between the personal network and the online social network, and also between the two online social networks Facebook and Instagram. With insights from over 600 participants in Mexico and Romania, we examine the prevalence of personal network types and approximate structural differences between the two countries. Moreover, we link cultural features of Mexico and Romania, such as Mary Douglas' Grid/Group dimensions, to network properties. Finally, linking culture diversity and structural characteristics of personal networks uncovers new perspectives across various social disciplines. This extends to social challenges, such as fostering more integrative societies, informing about the structural characteristics for integrating new members of society from other cultural backgrounds.

OS-158: Words and Networks 2

Location: Room 105 Session Chair: Andrea Fronzetti Colladon Session Chair: Roberto Vestrelli

Global Citizenship Education as a collaborative and ambivalent policy network

Carla Inguaggiato, Massimiliano Tarozzi

Università di Bologna, Italy

Global Citizenship Education (GCED) is an expanding and internationally recognized educational framework. This paper presents a novel approach to analyzing the GCED policy landscape, drawing on political science research that examines how innovative responses to global challenges emerge through the actions and discourse of organizations involved in policymaking. The study is based on 51 interviews with key GCED advocates in Europe and North America and employs Social Network Analysis and Content Analysis to explore both the structural dynamics of policy networks and the diverse conceptualizations of GCED among participating organizations.

Findings reveal that organizations at the center of policy networks often adopt multiple interpretations of GCED in their discourse. This conceptual fluidity has both advantages and challenges. On one hand, it enhances adaptability across various educational settings; on the other, the absence of a unified definition complicates implementation. Additionally, there is a risk that GCED could be absorbed into mainstream education policies in ways that dilute its transformative intent.

The core-periphery structure of the policy network has three main implications. First, the absence of cohesive subgroups or dominant actors (Wasserman & Faust, 1994) suggests a decentralized network where influence is more evenly distributed, fostering frequent interactions among a diverse range of stakeholders. Second, while core actors are embedded in dense, closely bonded networks, these structures may inhibit innovation (Burt, 1992), making them less likely to endorse radical GCED positions. Third, the lack of clear political divisions underscores the need to examine policy beliefs (Sabatier, 1988), particularly given that GCED spans a spectrum from soft to critical approaches (Andreotti, 2014).

Furthermore, the "multivocality" of core actors presents both opportunities and risks. Their ability to navigate multiple policy arenas and integrate GCED into diverse political agendas strengthens advocacy efforts. However, this flexibility also raises concerns that softer, more neutral, and less critical interpretations of GCED could become dominant, limiting its potential for transformative change. Balancing inclusivity with maintaining GCED's critical edge remains a pressing challenge for stakeholders in the field.

Judgement-derived semantic networks are modality-independent

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Semantic networks (SemNets) derived from relatedness judgment tasks (RJTs) are thought to reflect semantic memory organization. Participants typically judge the relation between written words. Interestingly, because processing written words requires accessing lexical information, it is unclear whether these networks capture purely conceptual (i.e., amodal semantic) or lexico-semantic (i.e., word-based) structures. Stimuli in different modalities share common semantic representations, but differ significantly in processing demands and the neural pathways leading to semantic activation. This study examines whether RJT-derived SemNets reflect conceptual or lexico-semantic information, and whether these effects are modality specific.

One hundred and two native English speakers completed three modality-specific versions of the RJT, with written words, spoken words, and images. In each version, items referred to the same 28 concepts. Participants provided pairwise relatedness ratings, from which SemNets were generated. Global network metrics (i.e., diameter, average shortest path length, clustering coefficient, modularity, small-worldness) were compared across modalities using generalized linear mixed models, alongside analyses of local metrics and ratings distributions.

No significant differences were found between written- and image-derived networks, suggesting that lexical processes utilized in the written RJT do not influence the networks. A marginal trend toward more condensed, small-world networks in the spoken version was observed, potentially due to differing processing demands in the spoken version and modality-dependent methodological differences. Semantic similarity (fastText-derived cosine distance) was the strongest predictor of ratings across all versions.

We cannot rule out that RJT-derived semantic networks accurately reflect conceptual structures, reinforcing the validity of RJTs to assess semantic memory.

Mapping Justice: A Social Network Analysis of U.S. District Court Citations

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Citation analysis is commonly found in studies of scientific research production but also fits sociological legal studies. Detailed documentation of decisions enhances the judiciary's collective claim to legitimate authority.

District Courts are of interest since they belong to the bottom of the organizational hierarchy (under circuit courts of appeal and the Supreme Court). We hypothesize that since they possess lower claims to hierarchical authority, they

might resort to documentation to enhance it. The hypothesis could find support in a dense citational network. Previous studies on appeals courts indicate a structure that is dense at the center with sparse edges for most nodes, while Supreme Court decisions are overloaded with citations.

To test this hypothesis, we collected all termination documents from 1924 to 2024 from the online JUSTIA US Law legal database. Documents are processed into machine-readable text using Python's pypdf module. Text analysis (LexNLP, Spacy, and custom rules-based models) is also applied to extract author and legal citations. This results in a network modeled either as (1) document-to-document, (2) judge-to-document (bipartite), or (3) judge-to-judge (projected).

Preliminary results of the projected judge-to-judge network show a structure of unconnected or loosely connected nodes and structural holes, i.e. overall unconnectedness. Our ongoing analyses describe a stratified network system within a social system in which network connections are sparse at the bottom stratum (district courts), much denser at the middle stratum (appeals courts), and exceedingly dense at the Supreme Court level.

Mapping meta-ethical stances in organizations' discourse and rhetoric : an AI-assisted exploration and network visualisation

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Foundation.

We build on "A network visualisation method of cognitive dissonance in discourses: discovery, validity, application, and extensions", which was shared at Sunbelt 2017. Specifically, Meta-Ethical Stances (MESs) were then determined by expert interviews of Comparative Philosophy of Ethics academics and are leveraged here in a novel fashion.

Method.

Our research is conducted in 5 stages :

- stage I is to prompt four Large Language Models (LLMs) to semiotically detect the presence or not of each aforementioned MESs in all sentences present in a panel of diverse organizations' English-language annual reports from years 2021 to 2023 [diversity here includes geopolitic, industry vertical, legal status].

- stage II is to statistically manually qualify, for each MES, 3 sub-samples of sentences (all LLMs detect this MES, some do and some don't, and none do); this manual check is undertaken by the team with second line support from Philosophy academics expert in each MES).

- stage III is to retain only the best LLMs, as qualified in stage II, for stage IV onwards (when the socio-semiotic network analysis kicks off).

We now have annual reports of select organizations (public, for profit, non profit, public-private partnerships, stateowned enterprises,...) parsed to derive the implicit or explicit expression in any passage of an MES-laden statement (if any) and the stance it is derived from .

Consolidation of these individual, weighed indications of expressed MESs creates a two-mode network map where nodes are either organizations or select organizational categories, and stances and vertices either are "organization, or region, or culture, or vertical industry, or entity of legal type (i.e locutor or locutor aggregate set) Expresses stance" or "stance Contradicts stance".

- stage IV to analyse these networks from the perspective of locutor aggregate hypergraphic centrality, i.e treating the vertices as nodes and visually explore visual representations of regions, cultures, vertical industries, legal types of entities and the stance mix and breadth of their set members (even perhaps longitudinally)

- stage V is to, in parallel, ponder future research avenues, and speculate on implications from applying our novel approach to discourse analysis for stakeholders (including those sensitive to sustainability and governance issues).

Mapping Urban Health Interdisciplinary Discourse: Integrating Text Mining and Network Analysis

<u>Haokun Liu</u>, Céline Rozenblat University of Lausanne, Switzerland As urbanization becomes more generalized in the world, the quest for healthy and sustainable cities is met with diverse urban risks and challenges. To address these challenges, researchers have increasingly turned to interdisciplinary approaches that integrate diverse methods and perspectives (Quah, 2016). Nevertheless, the pursuit of long-term and comprehensive urban health intervention demands a more intricated understanding of the interdisciplinary synergies on specific urban health topics (Rutter et al., 2017, Gatzweiler et al., 2021).

To address this gap, our research leverages text mining techniques, topic modeling, and network analysis (Van Eck and Waltman 2010, Aria and Cuccurullo, 2017) on a comprehensive corpus of urban health literature sourced from databases such as Web of Science, PubMed, and Scopus. This topic modelling illuminates both the overlapping themes and unique nuances across diverse scientific domains by revealing how boundary objects—such as keywords, topics, and indicators in these research—act as anchors for multidisciplinary collaboration. The visualizations generated through network analysis further demonstrate how distinct fields—from public health and environmental science to urban planning—converge to tackle shared urban health challenges between different scientific disciplines.

This fine-grained analysis of word networks not only delineates the conceptual boundaries within urban health research but also enriches our understanding of how ideas diffuse across multidisciplinary fields. Ultimately, this method contributes to the integrated knowledge base, informing innovative strategies for urban health interventions through the lens of language and network dynamics.

OS-146: Mixed methods for social network analysis 2

Location: Room 106 Session Chair: Francisca Ortiz Ruiz Session Chair: Nuria Targarona Rifa Session Chair: Miranda Jessica Lubbers

Artistic Networking within the Digital Turn: How ethnography helps understand artistic gossip

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How do interiorized learning patterns from art school shape the ways artists work? The digital turn constitutes a process of institutionalization of artistic practices. Previous studies show that art studios are spaces for cultural and social capital formation. Moreover, current practices are linked to learning conditions and previously embodied, distributed and extended cognitive experiences. Digital and analog tools are key epistemic objects that reproduce patterns of artistic gossip among artists and beyond the studio walls. We claim that video-aided ethnography shows how artistic networking shapes the cognitive process of artistic practice. The sample consists of 45 interviewed artists from different generations and four visual disciplines, with more than 10 years of professional experience, balanced by age and gender. The mixed methods design is a video aided ethnography with interviews, observation, participatory photography, video elicitation, SNA, and focus groups. Qualitative data analysis includes grounded theory, thematic analysis, conversational analysis, multimodal analysis with ELAN and quantitative analysis of egonetworks with Egonet/Ucinet. Centrality and compositional measures formalize the accumulation of successful relationships. The visualization of the network is a useful tool to produce more specific discursive data from the subjects, as well as an objective contrast to their expectations on how they socialize among their colleagues and friends. At the same time, artistic gossip from ethnographic observation and interviews contextualizes the networking patterns. Structural factors permeate the micro-level so that networking becomes a key component of the creative process.

Becoming Homo Investigator: Engaging in Dialogue on Relational Ethnography and Parallel Design in Social Network Analysis

Alice Ferro

Scuola Normale Superiore, Italy

During and up to the present moment in the academic formation journey, I have recognized myself as a relational sociologist, currently interested in coordination of collective action engaged in climate change. I have designed the doctoral research as a relational ethnography to investigate how the unfolding of collaborative relationships among collective actors shapes the identization process during a wave of mobilization. Between 2019 and 2024 the research design followed a parallel mixed-methods approach on the case of Fridays for Future in Italy. Participant observation and thick descriptions of meetings have led to the investigation of the decision-making procedures shaped by ties' dynamics. Two survey's rounds have produced longitudinal and multi-layer whole and ego-network data, further

enriched by in-depth interviews capturing alter-alter ties, which have allowed for an analysis of the roles within the social structure. Notably, in-depth interviews have facilitated the emergence of the grassroots collective actors' narratives which, through within-case and cross-cases coding of relational mechanisms, have reconstruct the pathways of modes of coordination traversed by the grassroots collective actors. The paper aims to unfold the choices, difficulties and solutions faced during the research process, engaging with studies in which network is both a theoretical concept and an analytical tool. Thus, the themes explored concern: the fluidity of the boundaries delineated by co-attendance ties; the relational ingredients chosen, found, and re-evaluated as relevant for the identization process; the relational mechanisms that shape the collective actors' pathways; and finally, the dynamics of trust relationships within the research process itself.

Analysing attributed network: a DISTATIS-Based approach

<u>Valeria Policastro</u>, Roberto Rondinelli, Giancarlo Ragozini University of Naples Federico II, Italy

In recent years, the literature has proposed different studies that combine the analysis of node-level attributes alongside topological information of the network. These proposals range from hierarchical clustering algorithms including relational constraints to communities in the context of Subgroup Discovery, and data-driven probabilistic methods on multilayer networks. While these methods have been proposed to integrate structural and attribute-based information, achieving a balanced and coherent representation remains challenging. In this work, we apply DISTATIS, a three-way multidimensional scaling technique, to jointly analyze network topology and node attributes. Through simulations on networks with different attribute types, our results demonstrate that DISTATIS effectively captures the coherence between the attributes (qualitative and quantitative) and network structure. This approach offers a valuable tool for extracting complex relationships in real-world networks where both structural and attribute-driven factors are crucial.

Local dominance unveils clusters in networks from a perspective of community center

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Clusters or communities can provide a coarse-grained description of complex systems at multiple scales, but their detection remains challenging in practice. Community detection methods often define communities as dense subgraphs, or subgraphs with few connections in-between, via concepts such as the cut, conductance, or modularity. Here we consider another perspective built on the notion of local dominance, where low-degree nodes are assigned to the basin of influence of high-degree nodes, and design an efficient algorithm based on local information. Local dominance gives rises to community centers, and uncovers local hierarchies in the network. Community centers have a larger degree than their neighbors and are sufficiently distant from other centers. The strength of our framework is demonstrated on synthesized and empirical networks with ground-truth community labels. The notion of local dominance and the associated asymmetric relations between nodes are not restricted to community detection, and can be utilised in clustering problems, as we illustrate on networks derived from vector data.

Mapping the Italian Public Debate of Intellectuals and Experts: A Mixed-Methods Approach Integrating Textual and Network Analysis

<u>Raffaella Gallo</u>, Carmelo Lombardo, Selene Greco Sapienza University of Rome, Italy

The increasing involvement of academics and intellectuals in the Italian public debate, often on topics that go beyond their original expertise, raises questions about the role of expert knowledge and its interaction with the media field. Building on this premise, we propose an analysis of the relational and content dynamics shaping public debate of experts and intellectuals in their digital interactions.

This study adopts a mixed-methods approach that integrates Social Network Analysis (SNA) with statistical text analysis techniques. Specifically, we will examine the network of interactions among public figures in the Italian context on Social Network X, where connections — defined through mentions, replies, and retweets — will be labeled according to thematic categories extracted via cluster analysis using the Reinert method, applied to the corpus of posts published by the authors.

In our view, this analytical strategy allows us to explore the relationship between network structure and the specialization or transversality of discourses, providing a framework to assess whether digital public debate tends to fragment into thematically defined communities or, conversely, whether more hybrid and interconnected configurations emerge.

From a methodological perspective, this study addresses key challenges in network construction, including the thematic characterization of ties, the management of intersections between multiple discursive categories, and the definition of criteria for measuring the thematic specialization or transversality of specific relational configurations. The ultimate goal is to determine whether the structure of digital interactions reinforces the polarization of public debate or, alternatively, facilitates more fluid and interconnected dynamics.

OS-160: Opinion dynamics : from data to models and back 2

Location: Room 107 Session Chair: David Chavalarias Session Chair: Chiara Giaquinta

Modeling the Emergence of Shared-Issue Networks in the Era of Fragmentation Using Digital Log and Survey Data

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As signified in the phrase, 'no issue, no public,' attention to shared issues brings strangers together. In today's increasingly fragmented issue landscape, establishing a common understanding of issues becomes particularly crucial for social cohesion. This study investigates what promotes issue overlap between individuals engaged in personalized news curation.

Through stochastic actor-oriented modeling (SAOM) with digital log data and survey data, we investigate underlying mechanisms leading to the formation of shared-issue networks during South Korea's presidential election. We also compare network dynamics between individuals with low and high involvement in politics, examining how the election's increased issue salience and meta-narrative catalyzed joint interest differently across involvement levels.

Our findings reveal that the likelihood of forming shared-issue relations increases over time, when individuals are less susceptible to political homophily, accumulate greater political knowledge, and practice manual filtering to increase exposure to diverse news genres. Notably, specialized issue interests tend to develop from general interests, rather than vice versa. Individuals became involved in specific issues based on their broader understanding of related contexts, highlighting the significance of cultivating genre-level news interests and ensuring diversified genre exposure in news consumption patterns.

This research extends scholarly discourse beyond personalized news consumption to issue sharing mechanisms by shifting the focus from the individual level to the network level—an approach rarely taken in public opinion formation literature. It offers insights into the evolving public discourse landscape shaped by both low-and-high involvement citizens. Our findings also contribute to a deeper understanding of the current information dynamics.

Network pragmatic arenas: Analyzing a vaccine controversy on YouTube

Alexandre Doré CERMES3, France

CERMESS, France

This study explores the relational and discursive dynamics of the COVID-19 vaccine controversy on YouTube French content between 2020 and 2023, using a network analysis approach. It distinguishes between production arenas (subscription networks between channels) and consumption arenas (shared commenter networks) to uncover structural patterns. Key concepts such as clusters, centrality, and inter- and intra-cluster relationships are examined.

An innovative method, the disparity filter algorithm (Serrano et al. 2009), is employed to reduce graph density and reveal the network's "backbone." This approach enhances the readability and interpretability of large-scale digital networks, addressing key challenges in social network analysis.

By conceptualizing YouTube as a public arena, this study pragmatically moves beyond conventional filter bubble and echo chamber theories. Instead, it investigates how discourses are structured, circulated, and interact in algorithmically shaped environments. Comparing articulated (subscription-based) and behavioral (comment-based) networks, we examine their convergence and divergence in structuring online controversies.

Results reveal distinct thematic clusters, where institutional and scientific channels form relatively closed communities, while critical and alternative narratives interact more dynamically. The reduction of the commenter network exposes cross-cluster interactions, identifying key mediation zones where conflicting discourses meet. These findings suggest that controversy on YouTube is not purely polarized but structured around differentiated arenas with varying degrees of permeability.

Therefore, this research contributes to understanding the organization of digital controversies. It offers both theoretical and methodological insights into how network analysis can reveal the underlying structures of online debates, particularly in contentious scientific and political issues.

Phase Transitions in Socially Balanced Systems: Why More Interactions Drive Polarization

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Survey data provide strong evidence that the average number of close social connections has increased over the past two decades. Simultaneously, societal opinions have become increasingly polarized. To explore whether these trends are connected, we use a multidimensional opinion dynamics model that realistically captures both homophily and social balance.

In this model, individuals interact dyadically, yet triad statistics consistent with social balance theory emerge naturally. We find a phase transition where, at critical connectivity of the underlying social network, a rapid transition from practically no to strong polarization occurs.

By understanding how increased social connectivity necessarily leads to polarization we

discuss strategies to mitigate polarization in highly connected societies.

TIDEM: Measuring Political Distance and Polarization through Retweet Networks in Spanish Regional Elections

Raul Broto Cervera, Albert Batlle, Cristina Pérez-Solà Universitat Oberta de Catalunya, Spain

This study introduces TIDEM (Twitter Ideological Distance Estimation Method) a novel methodology for measuring ideological distances and evaluating political polarization using Twitter retweet networks. By using network-based analysis and spatial proximity within ForceAtlas2 layouts, the method captures ideological dynamics and provides a complementary perspective to traditional approaches such as self-placement surveys, the Chapel Hill Expert Survey (CHES), and Manifesto analysis. The methodology is applied to three Spanish regional elections (Catalonia and Madrid 2021, and Andalusia 2022) revealing consistent results through the three cases. A cross-election comparative demonstrates consistency in the relative positioning of left-right ideological blocks and the two major national parties (PP-PSOE). When evaluating TIDEM against traditional methods, the results indicate a strong correlation with selfideological surveys across all three elections, except for the positioning of Cs in Madrid. However, comparisons with CHES and Manifesto data show mixed outcomes. Additionally, the analysis highlights the importance of regional context in shaping party positions, particularly in multi-dimensional ideological scenarios like Catalonia. Key findings indicate that TIDEM shows higher levels of polarization, likely due to the clustering effects inherent in retweet interactions. While traditional methods tend to position parties more centrally and show reduced distances between ideological blocks, our approach underscores the fluidity of public sentiment and the amplifying effects of online discourse. These results accentuate the potential of social media data as a valuable, scalable, and cost-effective source. TIDEM provides a relevant methodology for studying ideological distances and polarization. While it cannot replace traditional methods, it serves as a powerful complement.

Discerning media bias within a network of political allies: an analytic condition for disruption by partisans

<u>Jarra Reynolds Horstman</u>, Andrew Melatos, Farhad Farokhi University of Melbourne, Australia Opinion dynamics models are a versatile tool for investigating how a network of politically affiliated agents form perceptions collectively about media bias under exogenous (independent analysis of media outputs) and endogenous influences (peer pressure). Previous numerical studies of these models show that persuadable agents in politically allied networks are disrupted from asymptotically learning (learning in the long run) the true bias of a media organization, when the network is populated by one or more obdurate agents (partisans), who are not persuadable themselves but exert peer pressure on other agents. Partisan disruption occurs in two ways: agents asymptotically learn a false bias, or agents' opinions never settle and vacillate indefinitely between belief in a false bias and the true bias, a phenomenon called turbulent nonconvergence. In this paper, we derive (and validate with Monte Carlo simulations) an analytic instability condition that distinguishes these two modes of partisan disruption, in terms of the learning rate and key network properties, for an idealized model of media bias featuring a biased coin. We interpret the condition as expressing a balance between the exogenous influence of the media organization's published outputs, and the endogenous influence of the partisans. We explore the partisan influence as a function of network size, sparsity, and partisan fraction and find that the network is less likely to experience turbulent nonconvergence as the learning rate increases, size decreases, sparsity increases, and partisan fraction increases. These results and their social implications are interpreted briefly in terms of the social science theory of structural balance.

OS-154: Organizational Networks 2

Location: Room 108 Session Chair: Spyros Angelopoulos Session Chair: Francesca Pallotti Session Chair: Olaf Rank Session Chair: Paola Zappa

Effective governance of syndicated projects for collaborative innovation: comparing three cases of innovation spaces in the German bioeconomy

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A key objective of innovation policies supporting large, syndicated projects for collaborative innovation is to facilitate boundary-spanning knowledge exchange across individuals, organizations, sectors, and regions. This exchange helps recombine existing knowledge and generate new insights. Despite policymakers increasingly adopting large-scale, often self-governing funding formats, empirical evidence on their effectiveness in fostering collaboration and innovation remains limited. To address this gap, we examine Innovation Spaces in Germany—large consortia of inter-organizational R&D projects under a shared funding initiative aimed at advancing the bioeconomy. We surveyed interpersonal knowledge-exchange networks within three Innovation Spaces, each focused on distinct technical domains: (i) bioeconomy in metropolitan areas, (ii) biobased textiles, and (iii) bioeconomy in marine environments. Using the situational organizational network analysis (SONA) approach, we analyzed knowledge exchange among 200 individuals spanning 56 projects and 170 organizations. Our network analysis investigates how governance practices influence collaboration levels and the extent to which learning relationships transcend individual project boundaries.

Employer referral networks

<u>Annatina Aerne</u>

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How do employers, competing in the same markets, come to cooperate? In dyads, cooperation evolves if pairs of actors interact repeatedly, because it is mutually beneficial. Third actors support such dyadic cooperation by circulating information on actors' past behavior allowing actors to avoid non-cooperators. This paper focuses on the role of these third actors in cooperative networks. It shows that third actors establish local hierarchies (transitive triads), rather than horizontal connections (cycles). Local hierarchies may reflect actors' desire to achieve prestige by connecting to higher-standing actors. Empirically, the paper analyzes how employers cooperate in networks by exchanging information on prospective employees (referral networks). It analyzes eight local referral networks in two different economic sectors based on exponential random graph models. Results show that triadic closure in these networks takes a hierarchical (transitive) form, rather than one of horizontal exchange (cycles). It also shows that employers in these triads are more prestigious. This finding is interesting considering the literature highlighting reciprocity as an important factor facilitating cooperation.

For Me or For Us: When Are Return to Brokerage Captured by Organizations?

Antoine Vernet

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The social network literature shows that brokers accrue benefits from their position, but often overemphasize the informal organization and overlooks formal arrangements, in addition, it overwhelmingly focuses on individual performance, rather than collective outcomes. I argue that returns to brokerage are heterogenous across brokers and that this is as a result of the effects of the formal organization. I also suggest that understanding the effect of brokerage on collective outcomes is important as most of the relevant outcomes for firms are collective ones. I theorize that collective return to brokerage will be greater when associated with formal positions of leadership. I test this in the context of creative performance of projects using a network of French movie crews (comprising directors, producers, art directors, editors, and cinematographers) between 1996 and 2010. I find that the network position of the team leader—the movie director—has a positive effect on collective creative performance: leaders in a brokerage position enhance collective creative performance. I explore the implication of this theory for managers and discuss paths for future research.

From Relation-based to Resource-based Mechanisms of Partnership Formation: Evidence from Venture Capital Syndication in China

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Management literature highlights two key mechanisms for forming collaborative partnerships between firms: fostering trust through repeated interactions (relation-based mechanism) and building capabilities by expanding and specializing in diverse resource pools (resource-based mechanism). This study investigates how firms balance and transition between these mechanisms over time. While both mechanisms are integral throughout a firm's development, their relative importance evolves. For firms with limited investment experience, relation-based mechanisms are essential for fostering trust and mitigating uncertainties. However, as firms accumulate experience and develop coordination capabilities, they increasingly rely on resource-based mechanisms to broaden and specialize their resources. This study examines this dynamic interplay using a longitudinal dataset of 3,401 venture capital (VC) firms in China from 1994 to 2023. By employing relational event models, we capture the endogenous processes underlying network formation. Findings reveal that relational reciprocity and inertia initially drive new syndicate formation, while geographical distance and industry overlap between VC firms pose barriers. However, as firms gain experience, they gradually reduce their reliance on reciprocity and inertia while seeking geographically distant or industrially overlapping partners. The paper goes beyond viewing partnership formation as a one-time consideration and offers a dynamic perspective in which firms balance relationship building with resource accumulation.

How Structural Network Patterns Characterize Cognitive Social Structures

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Network perception deals with the understanding of an individual's perception of their surrounding networks and the comprehension of relational ties. The mental representations of relationships in a person's mind can be captured by assessing an ego's cognitive social structures (CSS). The deviation between actual and perceived networks, one's cognitive network accuracy, plays a crucial role for the gathering of resources, goal attainment, and power in a social network. This means in turn, that the degree of accurately perceiving the social network, shapes interpersonal interactions. Structural mechanisms have been shown to influence social network patterns (e.g., advice seeking, friendship) among professionals in actual networks. Our study aims to shed light on the role of structural network patterns, such as homophily, triadic closure and preferential attachment, for perceived networks in professional settings. We introduce a novel perspective on CSS by exploring network mechanisms as drivers for (mis-) perceived social networks in the context of entrepreneurship through exponential random graph models (ERGM).

We recruited 93 students from three distinct classes, who were enrolled in an entrepreneurship course at a prestigious business school (response rate 89,25%). The survey participants were part of a long-term international MBA program tailored for senior corporate executives and experienced entrepreneurs, creating a unique data set. Our preliminary results indicate varying levels of homophily and triadic closure on the perceiver level, as well as accuracy depending on the personal attributes of the perceiver.

OS-117: Beyond detection: disinformation and the amplification of toxic content in the age of

social media 2 Location: Room 109 Session Chair: David Chavalarias Session Chair: Floriana Gargiulo

The COVID-19 Infodemic on Twitter: Exploring Patterns and Dynamics across Countries

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The COVID-19 pandemic was accompanied by a wide spread of false and misleading informa- tion on online social media (the so-called infodemic). Having reliable indicators of the extent of infodemic is crucial to enable targeted interventions, protect public health and promote ac- curate information dissemination. In this study, we validate the three infodemic metrics of the FBK COVID-19 Infodemics Observatory (Gallotti et. al, 2020), elaborated on a large dataset of over 1.3 billion tweets, by assessing their degree of correlation to a set of 20 country-level socioeconomic indicators for 37 OECD countries. Using dimensionality reduction techniques such as Uniform Manifold Approximation and Projection (UMAP), we project socioeconomic indicators and countries into a two-dimensional space to identify underlying structures in the data. Our findings reveal distinct clusters of countries based on their infodemic risk index and socioeconomic characteristics. Countries with stronger democratic institutions, higher education levels, and diverse media environments exhibited lower infodemic risks, while those with greater political and social polarization were more vulnerable to misinformation. Addi- tionally, we examine the evolution of Infodemic Risk over time, identifying shifts in misinfor- mation dynamics through k-means clustering and principal component analysis. Furthermore, we analyze the role of media diversity (Bertani et al., 2024) in shaping a country's resilience against misinformation. Our results indicate a positive correlation between media pluralism and lower infodemic risks, emphasizing the importance of a diverse news ecosystem in miti- gating misinformation spread. These insights provide valuable implications for policymakers and researchers aiming to combat digital misinformation and enhance public trust in information sources.

The Diffusion of Propaganda on Social Media: Analyzing Russian and Chinese Influence on X (Twitter) during Xi Jinping's visit to Moscow in 2023

<u>luliia Alieva</u>

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Propaganda and disinformation have become central tools for both the Kremlin and China in advancing their political goals and strategic narratives. The rise of social media and the computational power of the Internet have significantly amplified these efforts, enabling the widespread dissemination of political messaging designed to shape and control public discourse.

Prior research has documented Kremlin-affiliated disinformation operations, such as those conducted by the Internet Research Agency (IRA), which has sought to influence political and social discourse in multiple countries. The IRA has been identified as a primary source of malicious online activity, using divisive messaging on social media to manipulate public opinion, promote strategic narratives, and foster destabilization, polarization, information disorder, and societal distrust. Notable instances include interference in the 2016 U.S. presidential election, the 2016 Brexit referendum in the United Kingdom, and other socio-political events (Badawy et al., 2019; Bastos & Mercea, 2018; Linvill & Warren, 2020).

Scholars have also examined propaganda and disinformation narratives surrounding Russia's invasion of Ukraine (Alieva et al., 2024; Geissler et al., 2023). Additionally, researchers at the European Union Disinformation Lab (EU DisinfoLab) identified "Operation Doppelgänger," a 2022 Russian disinformation campaign that created fake websites mimicking legitimate news outlets to spread pro-Russian narratives and undermine support for Ukraine. Investigations by the U.S. Department of Justice further exposed the campaign's covert methods and infrastructure (EU DisinfoLab, 2022; U.S. Department of Justice, 2024).

This study contributes to the existing research by analyzing the propaganda strategies employed by Chinese and Russian state actors, identifying key users and the main narratives they propagate. Specifically, it examines discourse on X (formerly Twitter) surrounding Chinese leader Xi Jinping's visit to Moscow in March 2023 to meet with Russian President Vladimir Putin, focusing on the diffusion of narratives promoted by Russian and Chinese actors.

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The role of moral values in the social media debate

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Social media platforms serve as digital arenas for public discourse, shaped by news providers, political entities, and user interactions. Within this space, leader-follower relationships influence debate dynamics, often affected by polarization, misinformation, and toxicity.

Our research examines the role of moral values in shaping engagement and toxicity in online discussions. We focus on Moral Foundations Theory (MFT), which defines five moral dyads: care/harm, fairness/cheating, loyalty/betrayal, authority/subversion, and purity/degradation.

We analyzed immigration-related tweets (2018–2022) from 516 Italian news providers and political figures, along with follower interactions. Using a fine-tuned deep learning model, we identified the primary moral dyad in each tweet and combined this information with toxicity scores from Google's Perspective API.

Our findings show that fairness/cheating and authority/subversion correlate with engagement, while purity/degradation and care/harm respectively correlated and anti-correlated with toxicity. Community analysis based, on retweets of moral content, provided a finer-grained segmentation of the Italian political landscape than standard methods. Progressive and conservative leaning of political accounts in the same group aligned with their mentions of moral values as expected by the MFT. Finally, we found evidence of in-group bias, with followers engaging more toxically when interacting with out-group communities.

These insights suggest that leveraging moral alignment, between users and contents from opposing communities, could help design interventions fostering healthier discourse between polarized groups.

Unveiling emerging moderation dynamics in Mastodon's federated instance network

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Mastodon, a decentralized online social network (DOSN), has experienced rapid user migration from traditional social media platforms. As a microblogging platform within the Fediverse, Mastodon operates through independent instances that communicate with each other. This decentralized nature reshapes network structures and alters information flow, presenting new challenges in moderation and the management of harmful content.

This study investigates the relationship between Mastodon's friendship network, based on follow relationships, and its moderation mechanisms, which define inter-instance restrictions. By analyzing structural changes in this signed and directed network over a year, we identify evolving moderation actors while observing persistent large-scale

patterns. The banning-banned network naturally divides into two groups: a majority of banned instances and a smaller, highly active minority responsible for most bannings.

Using an information diffusion model, we analyze how these structures influence the spread of information. Our findings reveal that the minority group predominantly shares information internally, while the majority group demonstrates less cohesion. Additionally, cross-group information flow is asymmetrical, with the majority group becoming rapidly isolated, whereas the minority retains greater resilience in spreading information. An echo-chamber effect emerges, reinforcing the separation of the minority from untrusted instances.

Understanding these mechanisms is critical to mitigating the spread of harmful content and fostering healthy, diverse digital ecosystems. This study provides insights into moderation dynamics in decentralized networks, offering implications for platform governance and information integrity.

Amplifying Extremism: Network Dynamics of Conspiratorial and Toxic Content in the Canadian Freedom Convoy Movement

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Crises often fuel conspiracy theories, which can serve as radicalizing mechanisms and pathways to extremism. This was evident during the COVID-19 pandemic, as anti-vaccine groups advanced narratives suggesting the virus was engineered or that vaccines were a coordinated scheme between pharmaceutical companies and governments. The 2022 Canadian Freedom Convoy protests emerged from such sentiments, evolving into a movement where right-wing extremists played a key role in spreading conspiracy theories and mobilizing digital activism.

This study examines how conspiratorial and extremist narratives propagate through online networks. Using discussions from three pro-convoy X (formerly Twitter) hashtags, we employ large language models to detect and classify conspiracy theories, analyzing how they spread through network structures. Moving beyond individual-level characteristics of conspiracy theorists, we investigate the role of network positions in amplifying toxic content. Applying community detection methods, we assess whether conspiratorial discourse is confined within echo chambers or bridges broader audiences. Additionally, we conduct network analysis of the most shared URL domains to evaluate their ideological bias and role in spreading conspiracy theories and right-wing extremism.

By examining the lifecycle of conspiracy theories—tracking their reach, speed of proliferation, and engagement—we provide insights into the structural mechanisms that sustain digital extremism. This research highlights how online networks facilitate the amplification of toxic content, offering broader implications for understanding the intersection of digital activism, misinformation, and radicalization.

OS-141: Historical Networks 2

Location: Room 114 Session Chair: Demival Vasques Filho

Investigations and Conspiracies in Pre-War Warsaw: The Historical Networks of Criminal Fiction

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Luc Boltanski, in his book Investigations and Conspiracies, explores the modern detective novel as an expression of political imagination. The author posits that this genre was a specific product of the 19th-century nation-state. Detectives and investigators acted as guardians and monitors of the nation-state's function of ensuring and upholding justice, whose stability was threatened by external and internal enemies.

The English and French states developed different methods of exercising power, which were reflected in their criminal novels. In England, detectives—such as the most famous, Sherlock Holmes—operated primarily within the social sphere of the elite. The English state was built on a compromise between the Crown and Parliament, so secrets and crimes had the potential to weaken this class's power. In the French context, represented by Commissioner Maigret, the source of order lay in the administration, which unified classes into the singular organism of the Republic.

My interest lies in the Second Polish Republic—a state that existed from 1918 to 1939. The history of this short-lived political entity was tumultuous and encompassed two developmental visions. Since the Second Polish Republic was a relatively new state with an unestablished administrative structure, the paths of interaction for the main characters could resemble both the contexts depicted in English and French novels. Investigators might remain within their own class (elites) or traverse various social environments.

I analyze a corpus of criminal novels from the Crime Stories of Pre-War Warsaw series to reconstruct the map of relationships detectives and investigators engage in. For the analysis, I employ the extraction of interpersonal relationships within the texts. This involves the automatic detection of individuals mentioned in the text and the verb expressions connecting them (at the sentence level). The next step is to reconstruct the network in each novel, where each character is a node, and direct interactions between two or more characters serve as edges (e.g., "Krzysztof took Hanna for a car ride, Szalski listened to their conversation from the back seat"). This approach goes beyond the previously used conversational network extractions (Elson et al., 2010) to reconstruct a map of all social relationships between characters in the novels (Lee & Yeung, 2012).

Subsequently, the ego-network of the main character is analyzed, encoding the class positions of surrounding characters and the investigator himself. This analysis infers measures of the character's social embeddedness within the environment surrounding him and his investigation. The study will reveal whether the social trajectories of Polish investigators resemble the republican (multi-class/mosaic) consciousness of Maigret, the elitist approach of Holmes, or present a unique quality specific to the ephemeral political organism that was the Second Polish Republic.

Modeling Medieval Incrimination Networks: Quasi-States, Events or Hyperevents?

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Inquisitions were established by the Catholic Church in the 13th century to systematically investigate and suppress religious dissent through formal trial procedures. These trials were led by papally appointed inquisitors and documented by notaries, working to gather incriminating evidence against individuals through testimonies. Extant inquisition registers allow us to extract historical incrimination networks, but also raise methodological questions about their optimal representation and analysis. Given the virtual irrevocability of incriminations, we can conceptualize them as quasi-states and use Exponential Random Graph Models (ERGMs) to study the long-term aggregated characteristics of incriminations. However, the ERGM model needs to be adapted to account for the inquisitors' practice of summoning individuals. We can conceptualize incriminations as dyadic events and apply Dynamic Network Actor Models (DyNAM) to focus on individual decision-making patterns. However, as one deponent could incriminate multiple others, Relational Hyperevent Models (RHEM) might be more appropriate as they account for the polyadic nature of incriminations. In this talk, we compare these three approaches by applying them to incrimination networks collected from multiple medieval inquisition registers.

Nanohistory.org: a Prototype Network Data Model and Method for History-as-Data

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Historians are pre-occupied with telling 'what happened'. Even so, how they do so in a digital context is confounded by a simple dilemma: how can history itself – not just its lists of places, people, or artifacts - be represented as structured data? Historical scholars are avid users of computation, but there remains no sure model for considering history-as-data. Conversely, existing models for structured data for events or actions are not only not historiographically robust, most reify historical events - something antithetical to modern historical theories and philosophical premises around what constitutes history itself. Networks provide a solution, but their use requires a clear approach to types of nodes and a vocabulary of edges.

Nanohistory.org is an open-source prototype platform designed to test drive the degree to which history itself can be represented as structured data using network and graph theory as the interface between computation and historical theories.

This paper will outline its theoretical foundations to illustrate how creation of the smallest historical forms possible, the nanohistory (a statement of historical action cast as a named directed graph), allows for the documentation and analysis of more complex historical phenomena that is historiographically robust, and well-structured data. Nanohistory.org functions as a digital annal, capturing provenance, agency, and multi-vocality in a way that is both machine and human readable. Rendering historical knowledge as a discursive narrative network positions history-as-data between the lists and datasets of historical evidence, and the prose of historical scholarship. The result is transformation of historical discourse into a multi-dimensional ergodic k-partite network, complete with histories' multi-faceted pathways, mapping conflict, colligation, and confluence across a variety of historical records.

Networks of Power. Social capital of political institutions in the Dutch Cape Colony (1668-1688)

Maarten F. Van Dijck

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This paper examines the Dutch Cape Colony. Serial sources make it possible to reconstruct social networks that provide insight into the initial social conditions of this settlement. Baptism registers, in particular, are highly suitable for this purpose, as they document the majority of the Christian population. By combining these data with lists of colonial officials, it becomes possible to assess the extent to which colonial authorities were open to interaction with the broader population. The Cape Colony was originally established as a refreshment station, and in the early years of settlement, there were no particularly attractive factor endowments, such as cash crops or minerals. According to new institutional economists, this would suggest that the Cape Colony was more likely to develop open-access institutions. However, access to power in the early modern period should not be equated with participation in the political system. Genuine democracy had not yet emerged, which is why it is more appropriate to speak of access rather than participation. To better understand this, it is essential to study the networks of those in power. Network research can reveal the extent to which the political elite remained closed off or engaged with the broader population. Scholars such as Putnam have previously argued that broad, open networks can be considered a form of social capital that contributes to a well-functioning society and political system.

Reconstruction of Social Networks through the Analysis of Diaries from the Reform War (1858-1860) in Mexico

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The Reform War (1858-1860) was one of the most violent and politically polarized conflicts of 19th-century Mexico. The Liberal victory led to an official historical narrative that oversimplified the war, obscuring the complexities of wartime society. To challenge this simplification, we analyze personal diaries as firsthand accounts that reveal the structure and dynamics of wartime social networks. In previous research, we reconstructed the social network of Juan de Vildósola's Diary using natural language processing (NLP), text mining, and network science. The resulting network, modeled as a subgraph of a larger system with a Barabási-Albert structure, uncovered key actors, affiliations, and interactions within his social sphere. Expanding this approach, we analyze four additional diaries from the same period, written by individuals with diverse political affiliations. Using NLP, we extract and normalize entity mentions to reconstruct social networks, comparing structural patterns across different perspectives. This study validates previous findings while offering new insights into how personal experiences shaped social relations during the war. Our research highlights the potential of network analysis for reinterpreting historical processes, addressing key challenges in historical network research such as data incompleteness, ambiguity, and bias in personal accounts. By demonstrating how personal diaries serve as valuable datasets for social network reconstruction, we provide a methodological foundation for further studies on civil conflicts through computational and relational approaches.

OS-108: Agent-based modelling and social networks 2

Location: Room 116 Session Chair: Federico Bianchi Session Chair: Filip Agneessens Session Chair: Károly Takács

Co-Evolutionary Dynamics in Seed Diffusion: An Agent-Based Approach to Sustaining Crop Diversity

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Small farms depend on diverse crop species and varieties to navigate variable socio-ecological conditions. Empirical studies suggest that the structure of seed circulation networks is vital for maintaining a collective pool of crop diversity and ensuring equitable access for farmers. Yet, little is known about which network properties best support diversity in rural communities, and existing models often overlook the complexity of farmers' seed sourcing and information diffusion behaviors. Combining Agent-Based Modeling (ABM) with network analysis offers a promising approach to address this gap.

In our study, we investigate how individual seed-sourcing and allocation strategies shape and are shaped by network structures driving seed diffusion dynamics, ultimately influencing the collective capacity to sustain crop diversity amid perturbations that may cause local crop extinctions. We introduce an agent-based co-evolutionary network model of farms, where each agent operates within a multi-layer network representing distinct relationships (e.g., familial, commercial). The model integrates crop-variety-specific strategies through probability vectors that determine the likelihood of sourcing seeds from each layer. By incorporating multiple crops and varieties, it captures how the distribution and prevalence of varieties affect seed diversity and availability. Additionally, agents allocate seeds among different uses (planting, sharing, discarding, storing) via imitation and experimentation.

The model iteratively updates agents' states and reconfigures the network as they seek higher-quality seeds. Our findings offer insights into how micro-level decision-making drives macro-level network evolution, informing targeted interventions to enhance seed circulation networks and bolster agricultural resilience.

Combining Structure and Cognition: A Bayesian Approach to Coleman's Trust Framework

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Coleman's theory shows that specific network structures, especially densely connected groups, can build social capital and encourage trust. While he acknowledges that individuals make decisions, most of his work highlights how these structural factors boost cooperation. Our research expands on Coleman' Theory by including an in-depth look at individual differences, including factors like risk tolerance, betrayal sensitivity, and personal experience, which can significantly affect how a person trusts others. We use a Bayesian approach to explain how people update their trust beliefs over time. Every person starts with some initial sense of how trustworthy others might be. Then, as they gather information (e.g., reputation, prior outcomes, or direct observations), they revise those beliefs. However, not everyone updates similarly: one person might trust easily with little evidence, while another demands a lot of proof. Individual traits—like a low tolerance for losses or an intense fear of betrayal—can lead to slower or faster belief changes. In simulations, we show that when these belief-updating styles vary, very different network patterns can emerge—even if everyone begins in the same type of tightly knit group. Dense networks spread trust-related information rapidly, but personal preferences still shape how that information is interpreted. One cluster may become open and trusting, while another remains cautious and fragmented. By adding these individual-level dynamics to Coleman's focus on structure, our model illustrates why people in similar network settings may follow very different trust trajectories, shedding light on how trust can thrive or falter within seemingly uniform social environments.

Horizontal and Vertical Homophily as a Mechanism of Social Dynamics

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In many agent-based models of cultural and opinion dynamics, social influence processes are often based on a singledimensional homophily. That is, in modeling terms, multiple social characteristics of an actor (e.g., cultural tastes; opinions; gender; race) are considered equally as n-states of a vector, and the overall difference between the vectors of two connected actors in a network generates the process of being more similar (i.e., homophily; similar actors become more similar) or being more dissimilar (i.e., heterophobia; dissimilar actors become more dissimilar). Yet, this assumption overlooks that actors' perception of social relationships can be hierarchical by their social class, and thereby the feeling of similarity may work differently for actors' change of cultural/opinion states, by whether the actors are in the same or different classes. In this study, I propose an agent-based model that assumes a twodimensional horizontal and vertical homophily-instead of the previous one-dimensional homophily. First, based on Blau's (1977) theoretical idea of inequality and heterogeneity, it is assumed that actors are positioned in a network (or structure) where they feel the hierarchy/non-hierarchy and similarity/dissimilarity of relationships, by their social class and cultural/opinion states, respectively. Second, considering Bourdieu's concept of distinction (1984), I assume that when actors are in the same social class, their similar cultural/opinion states become more similar (i.e., horizontal homophily), but when their classes are different, their similar cultural/opinion states become dissimilar (i.e., horizontal homophobia). The model shows very different results compared to existing models, implying the unexpected importance of network segregation.

Locally similar but globally diverse: the role of social foci in network fragmentation and polarization <u>Ivana Smokovic</u>, Christoph Stadtfeld

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Whilst empirical studies consistently find evidence of micro processes of homophily and social influence, evidence for the corresponding macro-level outcomes such as network fragmentation and polarization remain scarce. We approach this problem by arguing that people organize their relationships around different social foci. Each focus has both a relational fingerprint and a set of attributes which are more relevant within. For example, a sports team promotes the formation of leisure or sporting ties, and relevant attributes may be physical fitness or sporting ambition. We consider a network as multi-relational and the union of several sub-layers. We argue that dynamic processes of homophily and influence are focused and unfold within contextually relevant and focused layers of the overall network.

We expect that these focused micro-processes can produce fragmented and polarized communities within the respective focused layer. However, the overall network could remain sufficiently heterogeneous due to differentiation between the layers. Taking empirical data relating to several layers within a student population, we assess the extent to which each of these is fragmented along the lines of the associated relevant attributes, compared to the overall (unfocused) network. We then conduct a comparative simulation study based on empirically-calibrated ABMs to explore the macro consequences of considering homophily and influence to be either focused or unfocused. Our study sheds light on the role of social foci in masking, but also, potentially, in overcoming network fragmentation and polarization, by providing access to diverse alters in other layers.

Modeling the Impact of Heterosexism on Queer and Trans Vietnamese Americans: A Network-Based Approach

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University of Michigan, United States of America

This study explores the unmet mental health needs of queer and trans Vietnamese Americans (QTVAs) in California, using an original dataset to develop an agent-based simulation model within a dynamic egocentric network environment. Prior studies found that QTVA individuals have differing levels of social support conditional on belonging to a community-based organization, positioning some to be more susceptible to events that worsen mental health, such as daily heterosexism. Assuming a scenario of "no current support," an agent may encounter a heterosexist event node at each timestep that may worsen mental health. If the event impacts mental health, an agent's Kessler Psychological Distress (K6) score is incremented, with a decaying effect applied to additional events to simulate increased resiliency to heterosexism over time. The model was simulated for 30 days across 10,000 runs. K6 scores were assumed to follow a negative exponential distribution with a mean of 9.42 (scores ≥ 5 indicate "moderate mental distress"). Results indicate the initial K6 score increases by approximately 0.71 points over 30 days, with nearly one-fourth of simulations resulting in increases greater than 1 point. A small percentage (2.09%) of K6 scores cross the threshold (≥ 13) of "severe mental distress." While this represents a worst-case scenario of no current support, the results demonstrate how a vulnerable agent's mental health may worsen over time without the necessary community and social support resources to address daily heterosexism. Bolstering and complementing community support is needed for the QTVA population to mitigate the mental health harms of heterosexism.

OS-7: Artificial Academia: Exploring the Risks and Hopes for Artificial Intelligence in Science

Location: Room 125 Session Chair: Antoine Hugo Houssard Session Chair: Sylvain Fontaine Session Chair: Floriana Gargiulo

Research Networks of Artificial Intelligence

<u>Oscar M. Granados</u> Universidad Jorge Tadeo Lozano, Colombia

The evolution of Artificial Intelligence research has been consolidated with the interaction of scientists operating as a social network. This evolution has had a set of people or groups represented by institutions, each of which had connections of some kind with some of the others. However, AI research has consolidated knowledge networks such as other scientific fields that work through interconnected scientists, but the structure and dynamics evolution could be different.

In some growing social complex networks, one may expect that the preferential attachment scheme should be effective. In such networks, the addition of a new agent to the system (e.g., scientific field) may be driven by their pursuit of more influential agents capable of connecting it to a center for expediting their objectives. The sought-after centrality of the new agent does not exclusively correspond to the highest degree within the network, but rather, it can manifest through various forms of centrality. This centrality can be captured through the eigenvector centrality and betweenness centrality. The first one is defined as the summation of the centralities of the neighbors of a given vertex. A high eigenvector centrality does not necessarily translate to a high degree centrality, but it means that the vertex under focus has very good connections. The second one is defined as the vertex quality of being "in-between" communities.

Traditionally, the co-authorship network constantly expands with the addition of new authors and new edges between old and new authors. Namely, the topological properties are determined by the dynamical properties of networks, especially by the preferential attachment. I considered knowledge networks as a network focused on dynamics and evolution, but in Al knowledge networks can have a limit, i.e., the scientists have a maximum number of co-authorships and, in some cases, the interactions are not an exclusive result of preferential attachment. This argument is aligned with the idea that the scale-free property is not prevalent in all complex networks and the degree-driven preferential attachment model has limitations in describing social networks.

In this study, I present two models. The first one is the growth model in which preferential attachment is a linear function of the vertices' eigenvector centrality rather than their degree centrality. This model demonstrates some similarities with a winner-takes-all scenario which is identified by the fact that one vertex catches a proportion of all links. The second one shows that vertex betweenness is power-law distributed and correlated with link weight distributions. Such empirical pieces of evidence suggest that, for co-authorship networks, the vertex degree is not the main driver of preferential attachment, therefore, other metrics may explain better the ties attractors. I conclude that vertex betweenness and in some way, the approach of eigenvector centrality, are the key metrics for the new social ties as opposed to vertex degree or other centrality metrics. The empirical findings align partially with some research and well with previous research in some particular cases. However, some methods like cliques identify other features and patterns of that scientific field.

AI-Assisted Tools in Bibliometric Network Analysis

Daria Maltseva

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Over the last decades, various bibliometric analysis tools have been developed to study scientific disciplines and their evolution. Bibliometric network analysis involves analyzing networks of co-authorship, citation, co-citation, bibliographic coupling, and co-occurrence of bibliometric units. Research typically follows three stages: 1) creating a bibliographic database, 2) preprocessing and constructing bibliographic networks, and 3) analyzing these networks. Tools like VOSviewer, CitNetExplorer, Bibliometrix, and Biblioshiny offer diverse solutions, catering to different research needs and user expertise levels.

In recent years, Artificial Intelligence (AI) technologies have advanced rapidly, transforming research practices by enabling new tools for data analysis, hypothesis generation, process optimization, and result interpretation. However, integrating AI faces technical, organizational, educational, and psychological challenges. The intersection of network analysis and AI offers promising opportunities for mutual enhancement. AI can be applied in bibliometrics for tasks like automated data collection, citation analysis, author disambiguation, co-authorship analysis, research impact assessment, text mining, and recommender systems (Saeidnia et al., 2024). Despite its potential, there is a need for a systematic overview of these currently fragmented practices and tools.

Our study explores how AI techniques and tools can enhance bibliometric network research across its three main stages. Using the Open Alex database, we analyze English-language publications (2015-2025) on AI applications in bibliometric analysis. Through a quantitative approach, we identify key areas for AI integration. A qualitative case-study of selected sources highlights practical applications for researchers. The findings are validated via interviews with experts in the field of bibliometric network analysis.

Patterns of bibliographic diversity in post-2022 publications on "LLMs" and "ChatGPT"

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We compiled a dataset of 71,717 publications from the Dimensions.ai database using three keyword searches— "ChatGPT," "large language model," and "LLM"—covering the period from January 2022 to January 2025. After performing standard preprocessing, we extracted the author and publication metadata fields. The author fields include first name, last name, and gender, and the publication fields include publication id, date, type and venue of publication, concepts, research areas (from the category_for field in Dimensions), times cited, supporting grant ids, funding USD, and countries of funders. To categorize research areas, we used the ANZSRC 2020 (Australian and New Zealand Standard Research Classification).

The gender of authors was identified using the Namsor algorithm, which recognizes morphemes—the smallest units of construction within languages that help comprise words—to classify a name's gender, ethnic origin, and other information. The accuracy of Namsor's model has been verified by multiple studies and audits, and it is used frequently within academic and international institutions, particularly in the context of examining gender disparities. Our primary research questions center on analyzing patterns of gender diversity in post-2022 publications on large language models and ChatGPT, applying pre-existing scholarship to a rapidly emerging and highly publicized research domain. After identifying the gender of authors using Namsor, we evaluated the distribution of male and female authors across interdisciplinary research, journals, open access types of publications, number of citations, grant support, and countries of the funders.

Finally, we examined four types of networks derived from our dataset: co-authorship networks, citation networks, networks of shared concepts, and networks of shared fields of research. Furthermore, we conducted several statistical analyses using the Relational Hyperevent Model (RHEM), a family of statistical models designed to assess the likelihood of continued interactions among actors over time. RHEMs are particularly well suited for handling fine-grained, time-stamped events, such as those found in co-authorship networks. In this study, we applied RHEM to evaluate the likelihood of authors continuing their collaborations and to determine how these collaborations are influenced by the presence of grants and the sharing of common research concepts and fields.

The ethos of science as a category that controls the development of Al.

<u>Magdalena Zdun</u>

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The research tradition of innovation, including the achievements of anthropologists and sociologists proves that innovation is subject to double legitimization: cognitive (the usefulness of innovation, etc.) and axiological (fitting into the system of norms, values). In addition, research conducted at the beginning of the twentieth century by anthropologists on the diffusion of innovation proves the importance of the axiological legitimization of the novelty. In this context, Linton wrote about the "troublesomeness of innovation", and Rogers pointed to different levels of acceptance of the novelty: individual, collective, and the level of authority. These findings encourage AI (as a technology used in the area of modern science) to be evaluated on the basis of axiological criteria. The aim of the presentation will be to identify factors influencing the axiological legitimization of AI in the area of the modern university. Two concepts will serve this diagnosis: innovation and the ethos of science. The first of these will allow us to indicate the dimensions of AI: technical, interactive, and normative. All these dimensions must be seen as related to the key paradigms of the theory of innovation. The concept of ethos, in turn, will allow us to add axiological duties to these dimensions. Finally AI, it will be inscribed in the scheme of axiological assumptions, and ethos can be recognized as a category that conditioning the further development of this technology. The method of analysis will be theoretical discussion in the context of the sociological theory. The result will be an AI legitimization scheme.

The Influence of Trust Networks on Students' Perceptions proficiency of Artificially Intelligent Assistants

<u>Yutong Bu</u>, Andrew Melatos, Robin Evans The University of Melbourne, Australia

The increasing integration of artificial intelligence (AI) tools in educational settings has sparked extensive debate. Educators use AI to design lesson plans, provide feedback, and grade assessments, while students leverage these tools for background research and, in some cases, to directly generate answers to assessment tasks. This growing adoption has prompted a many-sided conversation about ethics, philosophy, fairness and bias, educational goals, and adoption patterns. A particularly pressing issue is academic integrity, as AI tools enable students to complete assessments with minimal human input, prompting the development of policy frameworks to address this risk.

A critical question in Al-assisted education is how effectively Al tools perform assessment tasks, as evaluated by human experts. This question has two dimensions: intrinsic proficiency and perceived proficiency. Intrinsic

proficiency, which has been widely studied, refers to the AI's measurable capability in both objective tasks (e.g., solving mathematical problems) and subjective tasks (e.g., writing essays). Perceived proficiency, however, remains underexplored. While often assumed to correlate with intrinsic proficiency, perceived proficiency is a socially emergent construct that directly influences the rate and equity of AI adoption across educational contexts.

This study examines how students in networked cohorts form perceptions of AI tool proficiency. Using Monte Carlo multi-agent simulations, we investigate how students' trust ties and personal observations interact to shape their opinions. A probabilistic opinion dynamics model is employed, wherein each student's perception is represented by a probability density function (PDF) updated iteratively through independent observations and peer influence modulated by trust relationships.

Our model generalises previous, non-probabilistic work that restricts agents to holding a single belief at a time by allowing agents to maintain a spectrum of uncertain beliefs at any given time. We also considers the antagonistic interaction between agents by introducing negative ties within the network.

The findings underscore the role of trust and peer dynamics in shaping perceived proficiency, which can diverge from intrinsic performance. We compute students' asymptotic learning time as a function of the number of AI users in different types of networks. We find that in high-trust networks, students are able to infer the AI tool's proficiency correctly, while in low-trust networks, most agents infer the proficiency incorrectly. Disturbing the network with even one partisan -- obdurate agents who refuse to change their opinion, regardless of external inputs or peer pressure -- makes students' opinions fluctuate indefinitely. We also explore the role of teachers in shaping students' opinion on the AI tool's proficiency. We finally discuss the implications for the design of policies governing AI use in education. Specifically, we highlight potential unintended and inequitable outcomes stemming from counterintuitive network effects, emphasising the need for strategies to ensure fair and effective adoption of AI tools.

OS-5: Ambivalence in Relationships and Networks

Location: Room 202 Session Chair: Shira Offer

"If it was all bad, it would have been be easy..." : Lessons from the narratives of adult estranged children for better conceptualizing ambivalence in role-based relationships

Michelle Nadon Bélanger

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Intimacy is positively associated with relational ambivalence, particularly in immediate familial relationships, which are classified as ambivalent more frequently and to a greater extent than other types of relationships. In fact, relational ambivalence is not negatively associated—but often co-occurs—with strong, enduring, and beneficial kinship ties. Conversely, research on familial estrangement suggests that ambivalence may also coincide with difficulty, dissonance, and other problematic tie qualities that contribute to decay and dissolution in strong, role-based ties. This suggests that prevailing conceptualizations of ambivalence in network research lack the descriptive precision needed to systematically account for how ambivalence interacts with tie qualities to shape tie dynamics and statuses in role-based relationships.

This paper presents a qualitative analysis of how individuals understand the state of their close kinship ties in relation to the ambivalent sentiments they evoke and the broader social contexts in which they unfold. Drawing on 27 in-depth interviews with adults in Canada and the United States who have intentionally estranged themselves from one or more parents, this study identifies patterns in how estranged adult children conceptualize tie ambivalence, difficulty, dissonance, maintenance, decay, and dissolution.

Findings show that individuals perceive role-based ties as ambivalent based on the coexistence of positive and negative sentiments, regardless of how these sentiments are balanced. Moreover, the 'tipping point' argument—where an ambivalent tie is assumed to become positively or negatively valenced once one sentiment dominates— oversimplifies how ambivalence shapes tie dynamics and relational change. Instead, this paper argues that ambivalence is best understood as a structural tie characteristic that interacts with distinct valenced tie qualities, such as difficulty or dissonance, producing qualitatively different forms of ambivalent ties that effect different kinds of relational change. By reframing ambivalence as a fundamental feature of role-based relationships rather than a transitional state, this study advances a more nuanced understanding of how ambivalence informs tie persistence, decay, and dissolution over time.

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Social relationships significantly influence health and longevity, yet existing research typically focuses on either supportive or purely stressful interactions, neglecting relationships characterized by both support and strain. Such ambivalent social ties-relationships simultaneously supportive and stressful-may critically shape health outcomes. This study investigates how ambivalent social ties influence biological aging, using comprehensive egocentric network data derived from five network name generators, combined with DNA methylation-based aging measures (GrimAge and DunedinPACE), from the Person-to-Person Health Interview Study (N=2,223), a state-representative probability sample of Indiana residents. Our analysis reveals four central findings. First, difficult social relationships are widespread, with approximately one in four network members perceived as difficult and 60% of respondents reporting at least one difficult tie. Second, ambivalent ties-relationships characterized by both positive and negative interactions-represent 72% of all difficult relationships. Third, compared to purely negative ties, ambivalent relationships disproportionately involve close family members, exhibit stronger emotional bonds, and are more deeply integrated within individuals' personal networks. Fourth, and most critically, ambivalent ties-simultaneously providing support and stress-are significantly associated with accelerated biological aging. In contrast, purely negative ties alone show no detectable biological effect. These findings challenge the conventional assumption that purely negative relationships pose the greatest risk to health. By illuminating the nuanced role of complex social interactions, this study significantly advances our understanding of how ambivalent relationships contribute to biological aging.

Ambivalent Ties and Bullying Dynamics: Empirical Insights into Social Relationships in Middle School

Villalta Enzo

Université Grenoble Alpes, France

As counterintuitive as it may seem, ambivalent ties are a part of daily life: friends can be aggressive at times and bullies may show care. Social network analysis researchers have increasingly acknowledged these complex relationships, yet many empirical questions remain. This presentation explores the prevalence and dynamics of ambivalent ties through a longitudinal study of bullying relationships in French middle schools. Over two school years, a cohort of approximately 500 middle school pupils identified their friends, those they disliked and those who had assaulted them or that they assaulted, through multiple surveys. Since pupils could nominate each other in multiple categories, some reported ties were ambivalent. This dataset offers a unique lens to examine the dual roles individuals may play within their social networks, blurring the lines between friendship, hostility and bullying. The presentation will explore the dynamic behavior of ambivalent ties, examining the types of ties that precede them, the ties they evolve into, and their stability over time. Particular attention will be given to the transition from ambivalent to non-ambivalent ties (and conversely), examining whether and how such ambivalence is (or not) transformed. The goal is also to investigate the relationship between ambivalence and bullying among teenagers.

Difficult Ties to Kin and Nonkin Friends and Their Fate in Personal Networks Over Time

<u>Shira Offe</u>r

Bar Ilan University, Israel

Family relationships hold a unique status. They are typically long-lasting, rooted in a shared history and identity, and reinforced by strong norms of obligation and deep commitment. These attributes make them an important source of support and belonging for many. However, these same attributes can also make family relationships more prone to evoking negative emotions or being experienced as burdensome and difficult. Yet, family relationships tend to endure, unlike more voluntary and less institutionalized relationships, such as friendships, which are more easily severed when they become unsatisfying or conflict-ridden.

That said, some research suggests a growing convergence between the roles of family and friends within personal networks in Western societies. Kinship ties are increasingly influenced by individualistic norms that grant people greater autonomy in choosing how to live and with whom to associate. As a result, emotional closeness is becoming more central to family relationships, while traditional obligations may be less rigidly upheld.

Against this backdrop and using an egocentric network approach with longitudinal data from the University of California Social Networks Study (UCNets), this article examines the status of different types of relationships from an analytic perspective that has received less attention in empirical research – namely, the fate of ties to difficult kin and nonkin friends. It asks (1) how likely are difficult ties to remain in the network over time; (2) for those that remain, how likely are they to remain difficult; and (3) to what extent these patterns differ between kin and non-kin friends?

Findings show that immediate kin are the most likely to be perceived as difficult and the most likely to become difficult over time. Yet, 80% remain in networks, highlighting their resilience. These relationships are characterized by emotional closeness but often reflect ambivalence, combining both positive and negative sentiments, partly due to their central role as support providers Extended kin, on the other hand, are less frequently identified as difficult and less likely to persist in networks. However, those who endure tend to remain difficult while being less emotionally close, reflecting weaker involvement and a sense of duty rather than intimacy. Friendships ties, while rarely perceived as difficult, exhibit a high level of persistence, which may reflect commitment and loyalty often rooted in past exchanges and shared experiences.

Overall, findings highlight the complex ways in which relationships with immediate kin, extended kin, and nonkin friends differ when accounting for their difficulty status and implications for network dynamics. They reveal some similarities but also underscore the unique status of each type of relationship, from the emotional intensity to immediate kin, to a sense of obligation to extended kin, and the voluntary yet sometimes committed nature of friendships.

OS-201: Social Networks in Schools: Promising Intervention Approaches 2

Location: Room 203 Session Chair: Leslie Echols Session Chair: Sandra Graham

Social network interventions in high schools: Evidence from the Inclusivity Norms Project

<u>Maarten van Zalk</u>

University Osnabrück, Germany

Research on social norms shows that targeting perceptions of inclusive and diverse norms can be a fruitful method for promoting positive intergroup relations. However, despite this promising earlier research, it is important to better understand how social norms that promote positive intergroup relations can be spread effectively throughout the wider community. Individuals within social networks whose behaviors strongly affect perceptions of social norms, referred to here as social referents, may be important to engage in interventions to effectively spread information and innovations within social networks. Building on this notion, we evaluated our school intervention from the INCLUSIVITY project (www.inclusivitynorms.com). We implemented two waitlist-controlled intervention trials in five high schools (n = 3,911, aged 10-19); two of these schools were at high risk for conflicts between ethnic and religious groups. RSiena was used to examine intervention effects in school networks and to control for confounding processes (e.g., friendship influence). In intervention schools, social referents increased their friends' respect and tolerance toward discriminated groups and also enhanced perceived inclusive and diverse social norms, even after controlling for friendship influence. No evidence of outsized influence from social referents was found in control schools. Furthermore, evidence for school-level changes was limited and inconsistent. Thus, targeting social referents may be a promising strategy to promote tolerance and positive intergroup relations among friends, yet it has limited potential to change intergroup tolerance at the school level.

The Power of Peers to Deliver School-Based interventions and the Role of SNA in Detecting Diffusion Effects

Sandra Graham¹, Leslie Echols²

¹UCLA, United States of America; ²Missouri State, United States of America

Powering Up is a novel school-based intervention that utilizes three sources of power to combat peer victimization in middle school: (1) Why Power is a 12-lesson curriculum designed to alter the maladaptive attributions of at-risk victims; (2) Friend Power uses experimental techniques to build friendships between victims and influential peers in their grade; and (3) Peer Power harnesses the power of these influential youth to change peer norms about the acceptability of bullying. The current research utilizes longitudinal social network analysis (SNA) approaches such as Siena and Latent Space Modeling to examine diffusion and peer influence effects among Powering Up participants in three U.S. middle schools (N=1004). One notable finding from Peer Power was that closeness to peer leaders in the network significantly increased participants' endorsement of defending behaviors. Various other applications of these dynamic tools will be explored using pre- and post-intervention data from Powering Up, and the role of SNA in conducting peer-led interventions will be discussed.

OS-217: Social network approaches in the study of socio-economic inequality 2

Location: Room 204 Session Chair: Nikolitsa Grigoropoulou Session Chair: Florian Koenig

The Effects of Classroom Parental Networks on Students' Academic Performance

<u>Yannan He</u>

University of Manchester, United Kingdom

Parents interact with other parents throughout the childcare process, forming parental networks in a variety of scenarios and places. Classrooms are the appropriate contexts to explore the interplay of social categories (e.g., gender, ethnicity, socioeconomic status), parental ties and other multiplex classroom relationships (e.g., student friendships) fostered within the social systems of family, class, school and neighbourhood. As suggested by social capital theories, social networks are loaded with valuable social capitals from which parents can gain advantages for themselves and their children. The relation-based factors, including nodal network positions and the features of connected ties, can influence parents' access to educational resources and opportunities and further determine their children's academic performance. There is an essential concern on whether parental networks might amplify the advantages that their children derive from family socioeconomic status, thereby multiplying the existing inequalities in children's education. This study is based on the 2010-2011 Children of Immigrants Longitudinal Survey in Four European Countries (CILS4EU). The tie-level data are given attention with the use of multilevel models involving random ego, classroom and alter effects. The effects of tie characteristics, ego attributes, alter attributes, egocentric network structural properties, and school (institutional) characteristics on students' average grades of math, English and the survey country language are tested. The findings will shed light on the parental relational determinators of students' academic achievements, contributing to the discussion on the relationship between social networks and educational inequalities.

Freedom as the Engine of a Market. The Ideological Trap of the Content Creator Socio-economic Model

Vanessa Lamattina

University of Salerno, Italy

The aim of my speech is to reflect, from a theoretical-critical perspective, on the ideological elements that support the content creator economy. The reciprocity of influence between the actions of online creators and those of online users could be considered a revival of "catallactic competition", first theorized in the 1940s by economist and ante-litteram promoter of neoliberalism Ludwig von Mises. A fundament of Mises' economic model was a new conception of freedom, according to which no external interference must prevent individuals from expressing themselves within the wider market. Today, this freedom to act in one's own interest within the market is actuated by the interplay of various individuals involved in the platform economy, in which consumers are no longer considered passive, but "sovereign". They influence the choices of content creators who, in turn, are able to entrepreneurially react by shaping their influential content to meet more people's needs. This reaction, however, is but an illusion of exercising catallactic freedom. In such a socio-economic model, the individual seems freed from external imposition of preordained market logic yet is not at all detached from it, because herein freedom is not opposed to constraint but is based on constraint. Within the tight and immediate loop of content creation and content consumption it can become impossible to imagine realities other than those efficiently offered by the market and its enabling technologies. In this order, everyone becomes a potential entrepreneur but also an unconscious reproducer: the individualistic ideology of self-affirmation enslaves people to the marketable self.

Childhood Predictors of Perceived Discrimination Across 22 Countries

<u>Nikolitsa Grigoropoulou</u>¹, George Yancey², Michael Emerson³, Tyler J. VanderWeele^{4,5}, Byron R. Johnson^{2,5}

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Perceived discrimination—the feeling of being treated unfairly due to one's race, gender, religion, age, etc.—remains widespread worldwide. Such experiences can undermine economic opportunities, life satisfaction, social relationships, and overall health. While much is known about the negative effects of discrimination, less is understood about how early life experiences shape perceptions of discrimination in adulthood across cultures.

Family relationships in childhood play a key role in shaping identity, self-esteem, and coping skills, which can influence a person's vulnerability or resilience to discrimination in adulthood. Secure, supportive early relationships help foster emotional regulation and self-worth, equipping individuals to navigate discriminatory experiences more effectively. Conversely, adverse childhood experiences (ACEs)—such as abuse, neglect, and feeling excluded within the family—may heighten sensitivity to rejection and marginalization.

Using data of 202,898 participants from 22 countries from the Global Flourishing Study, we performed a random effects meta-analysis of regression coefficients from each country. We identified significant childhood predictors of perceived discrimination in adulthood. ACEs, including abuse and feeling as an outsider with the family, were linked to a higher risk of perceived discrimination almost universally. Interestingly, close childhood relationships with mothers and fathers were associated with reduced risk in some nations but increased risk in others.

These findings highlight the lasting impact of childhood experiences on how discrimination is perceived in adulthood. They also underscore the need for culturally informed interventions that address early life factors, offering valuable insights for policymakers and researchers seeking to reduce discrimination and promote social equity worldwide.

OS-139: Global Perspectives on Personal Networks: Data Sources, Case Studies, and Cross-Cultural Comparisons 2

Location: Room 206 Session Chair: Guillaume Favre Session Chair: José Luis Molina

Integration and Differentiation: Institutional Forces Shaping Individual Social Capital Across 31 Countries

<u>Xiaoguang Li</u>, Xiaoxian Guo Xi'an Jiaotong University, China

International comparison of social capital has long been a central focus in this field, yet systematic theoretical mechanisms remain underexplored. This article, from the theoretical perspective of integration and differentiation, investigates how institutional forces in the economic, cultural, and social dimensions shape the construction of individual social capital. Using data from the 2017 International Social Survey Programme, this study measures individual social capital with the position generator and conducts a comparative analysis across 31 countries. The results reveal significant differences in individual social capital across countries, with notably higher levels in Nordic countries and relatively lower levels in East Asian countries. Similar findings emerge in social networks' upper reachability, extensity, and heterogeneity. Importantly, the dynamics of integration and differentiation at the economic, social, and cultural dimensions within each country emerge as institutional forces shaping the construction of individual social capital.

International comparison of social trust: the evidence from ISSP2017

<u>Runqi Zhou</u>

Xi'an Jiaotong University, China, People's Republic of

Existing studies have explored the impact of economic, political and social objective factors on social trust, but the effect of country-level cultural differences is under-explored. This paper attempts to explain international differences in social trust from a cultural perspective. Based on Hofstede's cultural dimension theory, we use the 2017 International Social survey data to explore the social trust in 29 countries around the world, and use multi-level analysis and qualitative comparative analysis (QCA) to deeply analyze the mechanism of culture's influence on social trust. The main findings are threefold. First, there are significant differences in social trust among different countries. Second, culture is an important reason for the differentiation of social trust. Specifically, individualism and long-term orientation have significant positive impacts on social trust within a country, while uncertainty avoidance has a significant negative impact on the trust level. Third, the effects of culture on social trust are characterized by asymmetry and configuration. Asymmetry addresses that among these cultural dimensions, high power distance and low long-term orientation are key factors leading to low social trust, while high individualism is an important basis for high social trust. Configuration addresses that the influence of the six cultural dimensions on social trust presents a combination of interrelated characteristics, with no single dimension having a singular effect. The findings broaden the cultural explanation of international differences in social trust and social interaction patterns from a global perspective, and provide a new approach to study the influence of culture on social trust.

Accuracy, projection, and conformity: ego reports of alters' beliefs and behaviors in rural Senegal

John Sandberg

The George Washington University, United States of America

Network analysts have long been concerned with the accuracy of and potential sources of bias in ego reports of their alters' characteristics, a concern that has gained new relevance with work promoting the use of such reports in dynamic modelling of social phenomena as 'remote social sensing'. This research, using data collected as part of a network panel survey of a population in rural Senegal (the Niakhar Social Networks and Health Project), addresses the accuracy of respondents' reports of alters' characteristics across a number of observable demographic and household characteristics (number of children, age of youngest, household possessions), as well as health beliefs (acceptability of family planning and violence against women). We estimate the association between report accuracy and characteristics of ties between respondents (egos) and their alters including relationship type, subjective value assigned to alters by ego, and time spent in interaction with them. We then estimate the accuracy of aggregate estimates of alter characteristics relative to parameters for these in the local populations in which respondents live. Finally, using data from a unique survey experiment in which the order of questions concerning respondents' own and their alters' health beliefs was randomized, we attempt to assess the degree to which reports of alters' health beliefs exhibit priming biases associated with projection (alters' beliefs closer to those of the respondents' reports are associated with local majority beliefs and variance in these.

OS-159: Words and Networks 3

Location: Room 105 Session Chair: Andrea Fronzetti Colladon Session Chair: Roberto Vestrelli

The Influence of Cognitive Proximity on Collaboration Between Projects in Teacher Education

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This study was conducted at the University of Kassel (Germany) as part of the PRONET project (Professionalisation through Networking), funded by the BMBF. The central aim of PRONET was to foster active collaboration among the participating 34 sub-projects, bringing them together to jointly develop new outputs such as concepts, materials, seminars, and workshops. These efforts were designed to advance research, teaching, and practice in teacher education.

The evaluation of collaboration between the sub-projects was conducted through an online survey at three points in time (winter 2015, summer 2017, and winter 2018). The resulting connections between the sub-projects were analyzed using network analysis. The goal of the evaluation was to assess the impact of cooperation on the activities of the sub-projects.

This study seeks to operationalize cognitive proximity between projects in teacher education and to examine its influence on collaboration. Cognitive proximity was operationalized by analyzing the frequency of word usage (correspondence analysis) in the publications of the projects. In this context, the use of different words increases the distance between two projects, while the use of similar words brings them closer together.

The first research question addressed in this study is whether cognitive proximity directly influences network collaboration. This question was explored by testing the ego, alter, and similarity effects of cognitive proximity on collaboration between projects.

The second research question examines whether cognitive proximity influences the reciprocity of collaboration (mutuality) and the clustering within the collaboration network (triadic closure). The longitudinal analysis was conducted using a stochastic actor-oriented model (SOAM). A key finding related to the first question was that the alter effect of cognitive proximity has a negative impact on collaboration. In other words, as expected, projects that are cognitively distant are less likely to be mentioned or chosen as collaboration partners.

Translation of concepts in organizational fields: How ideas travel through social and conceptual space

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When concepts spread over a network of organizations, they are adapted and translated. In an organization field, organizations adopt elements of concepts that help them reflect environmental expectations they face, they leave out other elements that they do not deem to be relevant or a good fit in their context, they creatively recombine them with other concepts that are already at place in their organizations, potentially creating new conceptual ideas. As a result, there exists a variety of instances of concepts, even within one organizational field. But how can we measure and make sense of this variety of concepts' meanings within and across fields? And how can this variety of concepts be explained by the network structure of the field?

We argue that the idea of translation is valuable for addressing this question. Concepts travel within and across organizational fields through networks and cultural linkages. In the network, the members are acting as both recipients and transmitters of concepts which, in turn, allows for an alteration or recombination of those. The greater the diversity of receiving concepts, the greater the recombinatorial possibilities. Organizational fields are characterized by network structures and a shared meaning system driven by isomorphic pressures. Field constellations can thus help making sense of the variety of concepts observable among field members.

We explore the variety of concepts in the context of three fields: The fields evolving around Blockchain technology, the issues of cooperativism and sharing economy. We argue that these three fields are promising for exploring concept variety as they all are based on conceptual ideas of decentralization and sharing: Blockchain technology allows decentralized data storage. Cooperativism involves shared ownership and decentralized decision-making in organizations. The sharing economy is based on the idea of organizing shared access to distributed products, services and resources. Based on the argument that textual embedding models are a powerful approach to representing multidimensional conceptual spaces, we apply these models to the texts we find on organizational websites using a measurement approach. Different from Acevas & Evans (2023), we will use sentence embeddings such as SBERT (Reimers & Gurevych, 2019) where sentences (or paragraphs) are already the unit of text the model was trained on. We use Wikipedia as data source to identify and describe central dimensions for the three conceptual ideas characterizing the cores of the three fields:

Blockchain technology, cooperative organizational form and sharing economy. Wikipedia reflects the social stock of knowledge as conceptualized in the theorization literature.

Our contributions are twofold. Theoretically, we contribute by emphasizing translation as an agentic process where the adoption of elements of a concept depends on both the position of an organization within the conceptual space and the social space.

Methodologically, we contribute by utilizing language models to measure the variety of the three concepts that are reflected on the websites. This allows us to trace which elements are adopted and how they are recombined with the elements of the other concepts.

Using the Semantic Brand Score to Evaluate the Impact of Online News on Retail Sales

<u>Roberto Vestrelli</u>², Andrea Fronzetti Colladon¹ ¹Roma Tre University, Italy; ²University of Perugia, Italy

This paper explores how fluctuations in the importance of brands within online news can impact retail store sales across different product categories. Using a dataset of over 250,000 news articles from The New York Times between 2019 and 2023, along with daily sales data from more than 60,000 U.S. stores, we explore the connection between brand importance and consumer behavior in physical retail environments. We analyze semantic networks and employ the Semantic Brand Score (SBS) to evaluate the prevalence, diversity, and connectivity of well-known brands across sectors such as grocery, fast food, and specialty merchandise. Our findings demonstrate that a one standard deviation increase in brand importance is associated with a sales increase of over 1%, with this effect persisting for up to five weeks. In contrast to the short-lived impact of social media, the influence of news media on sales appears to be more sustained. This paper contributes to the literature by shifting focus from social media to online news, offering detailed insights into the media's impact across a broad range of retail sectors, and using big data in place of traditional surveys. Our results highlight the importance of maintaining a strategic presence in news media and suggest that retailers can benefit from continued media coverage, which has the potential to shape consumer behavior over an extended period.

OS-147: Mixed methods for social network analysis 3

Location: Room 106 Session Chair: Francisca Ortiz Ruiz Session Chair: Nuria Targarona Rifa Session Chair: Miranda Jessica Lubbers

Methodological Framework for Analyzing Prescribing Cascade Effects in R&D Networks: A Mixed Methods Approach to Science and Technology Policy Analysis

Chang Hoon Yang

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This study addresses a critical methodological gap in social network analysis by developing a novel analytical framework that adapts the "prescribing cascade" concept from medical science to analyze evolutionary complexity in R&D networks in science and technology policy implementation. While existing SNA approaches capture network structure at discrete timepoints, they lack tools for analyzing cascading effects of policy interventions across multiple stages of network evolution.

The proposed mixed methods framework integrates four matrix-based analytical techniques: (1) Basic adjacency matrices capturing initial R&D network relationships, (2) Weighted adjacency matrices quantifying relationship directionality across intervention stages, (3) Policy intervention matrices tracking new institutional relationships introduced by each policy intervention, and (4) Network evolution matrices measuring changes in key network properties including density and average path length across cascade stages. We operationalize this framework by developing weighted matrices that capture the nature of relationships between actors (universities, industries, government agencies, coordination bodies, and evaluation institutions), tracking from Stage 0 (initial network) through Stage 1 (first cascade) to Stage 2 (second cascade).

Our methodological contribution demonstrates how tracking matrix transformations and resulting network property changes can reveal cascade patterns in policy interventions. This matrix-based methodology offers researchers a systematic way to analyze how initial policy interventions designed to enhance R&D coordination can paradoxically increase network complexity. Beyond R&D networks, the framework can be applied to various complex systems where policy interventions trigger institutional adaptations, advancing both theoretical understanding of policy-induced network evolution and practical methodological tools for analyzing cascade effects in social networks.

Disentangling social and universal phenomena from face-to-face interaction networks.

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The collection and analysis of empirical temporal contact networks have experienced remarkable growth over the past two decades. Sociopatterns, a research collaboration, has gathered high-temporal resolution data on physical proximity and face-to-face interactions across a wide range of social contexts (J. Stehlé et al., 2011). These datasets have paved the way for a new wave of quantitative studies on individual and social behaviors. This advancement is particularly significant when combined with sociological and psychological metadata collected through participant surveys, as demonstrated in studies conducted during conferences (M. Génois et al., 2019).

Disentangling phenomena that require social explanations from those that do not is a complex task, necessitating the development of new analytical methods. Further research has shown that certain behavioral characteristics appear to be universal and can be explained by simple mechanisms (R. Masoumi et al., 2024). In this context, we identify among all determinants measured onto the empirical face-to-face networks, the ones that can be correlated with social and psychological behavior, from others with universal properties. Moreover, by leveraging the diversity of social contexts studied using consistent data collection methods, alongside statistical tests and renormalization processes to assess the relevance of behavioral observables, we compare these determinants across different contexts through longitudinal studies. For instance, this method unveils that loyalty, the repetition of interaction, is correlated to individual properties and social context.

This method, by integrating network features with metadata analysis, provides researchers with a more comprehensive framework for analyzing and explaining social behaviors in face-to-face interaction networks.

Relational determinants of well-being support for marginalized university students

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The goal of the project is to identify key patterns of relationships that best predict strong social support and positive emotional well-being and thriving for Black and Indigenous college students. Using a quantitative critical and social network analysis approach (QuantCritSNA), this project consists of a mixed methods secondary data analysis on the (n=300) supportive people and spaces of 22 college students, collected at one large public land grant university in the Midwestern United States, to address the following aims: 1) Identify specific social network characteristics and compositions that best predict strong well-being support, accounting for effects due to the students (egos), whom they turn to for support (alters), the type of support offered, and contextual variables such as location of support; and 2) determine the processes involved in the creation and maintenance of strong well-being support both on and off campus. Employing a mixed methods social network analysis (Dominik et al., 2020) allows for the testing of social and relational mechanisms that support college student well-being, combined with the narrative evidence of the process of well-being support, ultimately building an evidence-based intervention development foundation, which as a necessary precursor to network intervention research and implementation. As such, this research will fill a research gap by identifying network mechanisms to provide greater evidence of associations between social networks, social support, and college student emotional well-being, which can guide institutional practice and policy that targets specific institutional resources and interactions that promote equitable well-being for all.

Social network configurations and the perception of social support in patients with cancer; a Qualitative Comparative Analysis

<u>Reza Yousefi Nooraie</u>, Kah Poh Loh, Gretchen Roman, Supriya Mohile, Ron Epstein University of Rochester, United States of America

Aims: We sought to understand how structural configurations of personal social networks collectively explain perceived social support among older adults with advanced cancer. We used Qualitative Comparative Analysis (QCA), a systematic approach for comparing multiple cases to discern how different combinations of factors jointly produce an outcome. Rather than isolating single variables, QCA treats each condition as a set and uses set-theoretic principles to reveal which combinations of set memberships reliably account for the outcome. Designed for small to medium samples, QCA uncovers real-world complexities overlooked by conventional statistical approaches.

Methods: Fifteen older adults with advanced cancer participated in the study. Each participant was guided through completing a personal network chart—a visual map showing the key individuals involved in their health and well-being (1). On this chart, participants specified how different people (e.g., spouse, family, friends, neighbors) connect both to them and to one another. They also completed the Berkman-Syme Social Network Index, a tool that measures perceived social support.

We conducted a fused Mixed-Methods analysis (2,3), integrating insights from personal network visualizations (qualitative data) with quantitative network analysis. This approach enabled us to identify various structural patterns within personal networks. We then applied QCA to determine which sets of configurations predict higher social support. For QCA, we established four theoretically grounded conditions: (1) existence of a network core (one or more crucial individuals—such as a spouse—connected to many others), (2) existence of a dominant cohesive circle (a tightly interconnected cluster, for instance, of family members), (3) the presence of segregated clusters or isolated individuals (e.g., friends, colleagues, extended family), and (4) the size of the inner circle in the network chart. QCA helped us pinpoint consistent combinations of these conditions that lead to higher perceived social support.

Using the intermediate solution—a QCA approach that employs theoretically guided assumptions while avoiding extreme simplifications—we found that patients tend to perceive higher social support when any of the following configurations is present: (1) the network is less segregated, featuring fewer isolated clusters and more interconnected ties; (2) a spouse is part of the network alongside a larger inner circle; or (3) the network has a larger inner circle even without cohesive clusters. These configurations demonstrated high consistency of 0.85 (measuring how reliably a set of conditions is associated with the outcome, Pi consistency: 0.81) and coverage of 0.81 (the proportion of outcome cases that a particular set of conditions explains).

In addition, necessity analysis showed that most instances of higher support had either a less segregated network or a larger inner circle (relevance of necessity: 0.553, necessity coverage: 0.783).

Conclusion: This study demonstrates that less segregated networks or the existence of a robust inner circle predict a higher sense of social support among older adults with advanced cancer. Notably, even networks without overall cohesion patterns still achieve high levels of support with a robust inner circle. These findings can inform the adaptation of network-building interventions to reduce isolation and strengthen social support.

OS-155: Organizational Networks 3

Location: Room 108 Session Chair: Spyros Angelopoulos Session Chair: Francesca Pallotti Session Chair: Olaf Rank Session Chair: Paola Zappa

Induced Centrality as a measure of relative destination value for airlines and their major alliances.

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Universidad de Sevilla, Spain

This study proposes the use of the induced centrality measure to the destination network of airlines worldwide. The use of this Social Network Analysis measure in this industry aims to provide a tool to business managers on what is the relative value of each destination for each airline. This relative value is given based on how much the loss of a destination means for the company in terms of the sum of the geodesic distances. In this sense, if eliminating a destination increases the total geodesic distance, this will mean that airlines will have to increase the number of intermediate nodes to reach other destinations and thus also increase costs (due to more take-offs and landings).

The data used for this study are all origin and destination routes (more than 1200) of the 300 most important airlines worldwide in 2015. Including their grouping in the three major alliances: Star Alliance, Sky Team and One World. Therefore, this study applies a multilevel analysis by looking at this issue not only at the airline level, but also at the Grand Alliance level. Thanks to cooperation between airlines, these companies are able to reach destinations they would not otherwise be able to reach. Therefore, this study examines the impact of this measure in both cooperative and non-cooperative situations.

Instrumental Ties and Chain of Command Distance: Results from Eight Scandinavian Organizations

Starling David Hunter

New Uzbekistan University

Chain of command distance (CCD)—defined here as the undirected geodesic distance along the chain of command significantly influences workplace tie formation yet remains relatively understudied compared to other structural factors such as physical proximity, homophily, and transitivity.

This study examines CCD's impact on the formation of instrumental ties across eight Scandinavian organizations: (1) a municipal government agency (2) a state-owned gaming company (3) a university engineering department (4) a construction equipment rental firm (5) an architectural/urban planning practice (6) a financial services company specializing in debt collection (7) a global developer of renewable energy systems and (8) a provider of flow assurance solutions for optimizing oil and gas flows through pipelines.

Analysis was undertaken using logistic regression quadratic assignment procedure (LRQAP). Controls included various demographic and organizational factors including gender, tenure, age, nationality, employment status, native language, and place of work.

Results demonstrate exponential decay in tie likelihood as CCD increases, with the probability decreasing 50-70% per unit increase in command distance. This pattern holds consistently across both information-seeking and advice-seeking relationships in all organizations, with one notable exception: the gaming company's R&D unit (n=84) showed less than a 15% decay per unit distance.

These findings parallel research on physical proximity's effects on organizational networks, suggesting formal organizational structure shapes informal networks through similar mechanisms.

The study contributes to our understanding of how hierarchical structure influences informal network formation and highlights the importance of considering command chain distance when designing organizational interventions aimed at fostering collaboration and knowledge sharing.

Nationality Bias in Online Workplace Interactions: Evidence from GitHub

Alex Yan¹, Steve McDonald², Chao Liu³

¹Yale University; ²North Carolina State University; ³Minnesota State University - Mankato

As digital workspaces become increasingly central to knowledge production, unlike the traditional face-to-face spaces, virtual platforms enable rapid, global knowledge exchange, reshaping how information circulates between the Global South and North and integrating workers into open-source environments. This paper investigates how nationality shapes the evaluation of knowledge transfers in digital workspaces, focusing on the role of status in determining perceptions of legitimacy. Grounded in social closure theory, we argue that national identity serves as a boundary that reinforces in-group preferences and exclusionary practices. As a marker of social status, nationality could influence how competence is assessed, determining whose contributions are recognized and whose are marginalized in virtual professional settings.

This study focuses on GitHub users who worked for software development companies founded in the US. Using a database of 87,122 pull requests on GitHub from 9,836 software developers from 2018 to 2021, we operationalize knowledge transfer through the platform's pull request function, where project members decide whether to accept or reject proposed code contributions. Preliminary results indicate that nationality status and homophily strongly influence pull request rejection, software developers in the US are significantly more likely than non-US developers to have their pull requests accepted, while also being less likely to accept the pull requests that they receive. Pull request acceptance is also highly likely when the requester and the decider are from the same country. These results reveal how nationality affords status, homophily, and social closure benefits for knowledge and innovation transfers in high-tech online workplace communities.

NEURODIVERSITY AND WORKPLACE RELATIONSHIPS: THE IMPACT OF ADHD ON SOCIAL NETWORK TIES

Joshua Marineau

North Dakota State University, United States of America

How neurological disorders affect the social activity of individuals in the workplace has received little to no attention in the management and organization literature. This is the case despite the high prevalence of certain disorders, such as ADHD (Attention Deficit/Hyperactivity Disorder) in the adult population, and the detrimental effects of ADHD on multiple social and work-related outcomes. This is an important gap in our understanding given the robust literature showing the importance of social networks on work performance. Recent research in developmental and clinical psychology has begun to focus on the positive aspects of ADHD, some of which might directly relate to social behaviors and personal relationships. However, the question of whether ADHD helps or hinders individuals' social activity in the workplace, which ultimately impacts their unique set of work-related social ties, is unanswered. This study is a first step in linking ADHD with social networks in work-settings by investigating the personal (ego) networks among adult entrepreneurs in the US. The findings indicate that ADHD is directly related to the number of reported conflict, advice, and friendship ties. However, findings also indicate key differences in social networks between hyperactive and inattentive ADHD subtypes. Supplemental analysis of data from a large organization of 892 employees finds connections between ADHD and various brokering orientations.

Resilience in Adversity: Adverse Events and the Evolution of Physician Collaborations

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This study examines how adverse events shape the evolution of professional collaborations in healthcare. Drawing on a longitudinal dataset of 13,842 physician dyads using Florida's inpatient discharge data from 2016 to 2021, we investigate how extreme adverse events - patient deaths - influence the persistence of dyadic collaborations. We focus on physician dyads that experienced a patient death and exploit the quasi-random variation in the timing of death, using difference-in-differences event study design. We find that brokers - attending providers works in multiple hospitals and hence have exposure to multiple organizational environments – are more likely to keep the same collaboration ties compared to non-brokers. At the same time, brokers are also more selective – they are more likely to retain collaboration ties when the death was from a complex case instead of a simple case. The study contributes to the growing literature on network evolution by advancing our understanding of how adversity shapes the evolution of professional relationships.

OS-118: Beyond detection: disinformation and the amplification of toxic content in the age of

social media 3 Location: Room 109 Session Chair: David Chavalarias Session Chair: Floriana Gargiulo

Streamwork Makes the Dream Work! Cross-Platform Collaboration and Community-Building Among Far-Right and Conspiracy-Ideologist Actors on Telegram and YouTube.

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¹Johannes Gutenberg University Mainz, Germany; ²Institute for Democracy and Civil Society Jena, Germany

How do political actors build communities across platforms? This question arises when trying to understand how digital counter-publics function in far-right extremist and conspiracy-ideological milieus. To generate attention, the actors have to network well and navigate their audience across platforms. YouTube has become a key platform for far-right, conspiracy-ideological groups, and channels spreading (coronavirus) disinformation, influencing discourse from the margins to the mainstream (Baele et al., 2023; Knüpfer et al., 2023). These actors view YouTube as a vital space for networking and constructing an alternative public sphere (Munger & Phillips, 2022): Youtubers can benefit from the followership of prominent figures in the scene through mutual invitations, interviews and joint video podcasts (Lewis, 2018).

This is where our contribution comes in. Based on data from around 2,000 German Telegram channels from far-right and conspiracist milieus, we examined cross-platform use and identified which actors use Telegram and YouTube in parallel (RQ1). Additionally, we analyzed their collaborative behavior on YouTube to identify the factors underlying potential collaborations between actors (RQ2) and to assess whether these community-building efforts are successful (RQ3).

By analysing the bimodal, cross-platform link network, we were able to find 470 actors who operate channels on both platforms. Using a custom-built retrieval augmented generation (RAG) system, we were then able to identify their collaborations through shared appearances in their 77,770 videos. Exponential random graph models of the collaboration network on YouTube show that ideological similarity is the main driver of collaborations and that conspiracy ideologues in particular build bridges across milieu boundaries. Finally, we will assess the success of their community-building efforts by using Relational Event Models to analyze how collaborations influence audience viewing behavior, as reflected in the video comments.

The resilience of conspiracy theory networks on social media: from COVID-19 to the Russian invasion of Ukraine

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Digital communication and social media increasingly act as sources of information and news. At the same time, this shift has facilitated the spread of misinformation and conspiracy theories, as social media has come to play a central role in the spread of conspiracy theories, particularly during crises. The COVID-19 pandemic saw an explosion of misinformation and conspiratorial narratives, with social media networks of conspiracy theorists reinforcing and amplifying these claims. While previous research has found that conspiracy theories can act as monological belief systems, so that believing in one theory predicts believing in another, less is known about whether social media conspiracy theory networks are resilient to sudden changes in the underlying societal crises. We argue that the historical and geopolitical context may mediate the extent to which the changing societal crisis act as a challenge to the resilience of conspiracy theory networks on social media.

In this paper, we examine the extent to which the social media networks of conspiracy theorists are resilient to changing crises, shifting their focus from one issue to another while retaining their network structure and the positions in those structures. We examine Finnish Twitter data of conspiracy theory networks associated with COVID-19 and examine what proportion of accounts started spreading Ukraine-related conspiracy theories and what their network positions are in both networks. We also examine how resilient the networks around these topics are to the spread of conspiracy theories. The Finnish context makes the case a "hard" test of conspiracy theory resilience because of a history of conflictual relations with Russia and because belief in the Russian narrative was marginal in Finland compared to many other countries. The results show that conspiracy networks are relatively resilient, especially the core group of users, but also that their influence outside of their own epistemic bubbles remains limited.

OS-142: Historical Networks 3 Location: Room 114 Session Chair: Demival Vasgues Filho

The Social Network of the 'Righteous Among the Nations': A Computational Analysis of Holocaust Rescuers

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¹Ben-Gurion University of the Negev, Israel; ²Yad Vashem, the World Holocaust Remembrance Center

In 1963, Yad Vashem, the World Holocaust Remembrance Center, launched a global initiative to honour the Righteous Among the Nations (RAN) - non-Jews who risked their lives to save Jews during the Holocaust. While some rescuers acted alone, historical evidence suggests that many operated within rescue communities - loosely connected or structured networks that provided shelter, forged documents, illegal transfer, food, and other life-saving assistance.

This study applies Social Network Analysis (SNA), Natural Language Processing (NLP), and Large Language Models (LLMs) to examine the structure and evolution of these networks. Using 10,903 rescue cases from the Yad Vashem Archives, it constructs a dynamic multiplex network of rescuers in Poland, integrating ties based on shared rescue activities, family relationships, organizational affiliations, and common narratives. A novel text-based entity extraction method uncovers previously undetected connections, enhancing the reconstruction of social ties.

The analysis examines two key periods: June 1941 - Late 1942, marked by Operation Barbarossa, mass murder escalation, and ghetto liquidations, and Late 1942 - January 1945, when intensified Nazi persecution led to evolving rescue efforts. Findings suggest that document forgery and illegal transfer were likely facilitated by previously undocumented rescue communities, while mixed-gender collaborations and family networks played a crucial role in sustaining rescue operations.

This study advances historical network research by demonstrating how computational approaches can address gaps in incomplete and ambiguous historical data. It offers a scalable framework for analysing rescue networks in extreme conditions, with broader implications for historical and contemporary humanitarian studies.

Tracking the paw prints of death: A network analysis of the god Anubis in the Roman Empire through three local case studies

Simon Bralee

UCL, United Kingdom

The jackal-headed god Anubis was worshipped alongside a small group of other Egyptian gods across the Mediterranean during the Roman period, part of a religious movement that at one point rivalled Christianity in popularity. The other Egyptian gods revered within this movement (Isis, Serapis, Osiris and Harpocrates) were all depicted in human form, in contrast to their depiction in Egypt. Only Anubis retained his animal shape. Much previous scholarship has assumed that Anubis, as an animal god, was aberrant to the vast majority of people in the Roman empire. The literary evidence certainly presents a negative view of him. Yet a closer analysis of other forms of evidence shows that the lived reality was more complex and Anubis was warmly received by many people across a wide social spectrum and in different regions across the Roman Empire.

I have analysed the god Anubis within three different case studies: Alexandria, Delos and Pompeii. I have chosen these regions for two reasons. First, the nature of the evidence is especially strong for Delos and Pompeii, which enables me to analyse Anubis within a local context and create networks of the different gods attested in surviving evidence from the two towns. Second, these three points are nodes on the supposed route of transmission of the Isiac cults via the maritime trade network from Alexandria via Delos (an important trading port in the Aegean) and on to Pompeii (close to Pozzuoli which was the major international port in Italy at the time). If this theory holds true, we would expect a similar network in the three locations, but there are crucial differences.

I looked at centrality measures to understand embeddedness in local pantheons (or groups of gods). The network connections are formed when the gods are mentioned together in the same piece of evidence. For example, in inscriptions carved on walls in buildings or temples, often recording donations, dedicated to groups of gods. Creating a network of such connections, means I have been able to analyse how entities were believed to relate to one another within a local pantheon. By doing this, I have been able to understand: how connected was Anubis to other gods; whether Anubis replaced Greco-Roman gods; the relative importance of different gods and powers. As a result of this approach, I am able to identify powers and qualities associated with Anubis that are different to those put forward in previous scholarship.

OS-110: Agent-based modelling and social networks 3

Location: Room 116 Session Chair: Federico Bianchi Session Chair: Filip Agneessens Session Chair: Károly Takács

Network dynamics in heterosexual matching drive sexes to become highly differentially selective

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Research in social psychology consistently shows that men and women differ markedly in their selectivity when choosing partners for casual relationships, with women typically exhibiting more stringent criteria than men. While this robust phenomenon has traditionally been explained through evolutionary or sociocultural frameworks, we propose an alternative mechanism based on network dynamics. Our explanation derives from two fundamental properties of heterosexual matching networks: first, each match must involve one agent from each group (men and women), and second, changes in selectivity within one group directly affect matching opportunities in the other. Using both analytical and numerical methods, we demonstrate how these properties create a feedback loop that amplifies small inherent differences between the two sexes, inevitably driving one group toward high selectivity and the other toward minimal selectivity. This dynamic renders largely irrelevant within-group variation both in relationship goals and attractiveness: even an attractive man who prefers fewer, quality encounters is driven to become non-selective. This mechanism explains observed sex differences in mate selection without requiring evolutionary adaptations or sociocultural forces, though it remains compatible with their influence.

Online Social Network Protocols

louis dalpra university of Strasbourg, France

In the competitive market of Online Social Networks (OSNs) used by the popula- tion, explaining why one platform outperforms another, or why users migrate, remains a complex challenge. While existing literature often emphasizes the competitive ad- vantage created by network effects, our research proposes that network protocols - the foundational rules shaping the creation of OSNs and the interactions within them - play a crucial role in why users prefer one platform over another. To substantiate our argument, we employ computer simulations of different network structures, derived from various network protocols. Our findings reveal significant insights; for instance, directed networks can markedly impede the diffusion of information, and the presence of sub-communities is vital for enhancing collective actions. These simulations demonstrate that the nuances of network design can lead to vastly different outcomes, providing a deeper understanding of user behavior and platform dynamics in online social networks.

Relational Constraint of Network Diversity: An Agent-Based Model of Opinion Polarization

Patrick Park

Carnegie Mellon University, United States of America

An influential network-based explanation for the growing political polarization observed in social media platforms focuses on the self-reinforcing opinion dynamics where social influence leads to the formation of two opposing ideological camps. This explanation overly focuses on the tail ends of the ideological spectrum, thereby overlooking the social processes that describe the moderate majority who are not necessarily a herd of politically apathetic, uninformed, bystanders. How, then, can online polarization intensify despite the existence of this moderate majority? In this study, I develop an explanation that focuses on the amplified relational constraints that users with diverse social networks experience inside highly visible, open communication environments stripped of contextual information. Using a communication network dataset of 26M U.S. Twitter users, I first empirically demonstrate the signs of network brokers' attempts to mitigate such relational constraints through self-censorship, as measured by their more frequent tweet deletions. Then, I build an agent-based model that explores the generative implications of the empirically observed brokerage and self-censorship association for opinion polarization under varying initial conditions and behavioral assumptions. Extending standard opinion dynamics models that incorporate well-understood polarization mechanisms of homophily and social influence, this model introduces agents' self-expression choices (i.e., self-censorship), determined by ego-alter and alter-alter opinion differences. These self-

censorship decisions at the agent level can collectively distort the perceptions about the true opinion distribution of the population, which, in turn, affects each agent's subsequent opinion change. Simulation results obtained under a variety of network structures and initial opinion distributions show that, contrary to the empirical findings, agents in brokerage positions generally self-censor less frequently. Furthermore, macro polarization tends to only increase marginally when self-censorship is enabled. However, in completely connected networks that resemble the open, context-collapsed online communication environments, these patterns completely reverse – network brokers (i.e., agents whose tie strengths are more evenly distributed) tend to self-censorship, the uncensored opinions at equilibrium appear more polarized than the actual opinion distribution across a broad range of initial conditions. These results hold cautionary implications for empirical research of online opinion polarization where the full range of social media users' true opinions is difficult to observe.

Simulating Downward Spirals of Intergroup Hostility in Empirical School Networks

<u>Alla Loseva</u>¹, Christian Steglich^{1,2}, Andreas Flache¹ ¹ICS / Department of Sociology, University of Groningen, the Netherlands; ²IAS, Linköping University, Sweden

As ethnic diversity increases in Western countries, concerns about negative outgroup attitudes and interethnic polarization are growing. In diverse classrooms, factors such as peer influence, homophily, and attitude-based selection contribute to changing outgroup attitudes. This study explores if and when individual attitude shifts driven by these processes might scale up to group-level polarization in empirical multiethnic school cohorts that initially have a rather positive interethnic climate. Using an agent-based model calibrated with longitudinal network and attitude data, we conduct a series of computational experiments to assess the effects of hypothetical macro-level "shocks," such as violent incidents or inflammatory political speeches. Our findings indicate that peer influence, when intensified by an external "shock," can magnify even small outgroup biases, rapidly leading to polarization. This dynamic occurs despite the presence of other behavioral or network mechanisms that might counteract it. We further provide a detailed analysis of how these results emerge from the empirical context and the interacting processes modeled.

Structural inequalities exacerbate infection disparities

<u>Sina Sajjadi</u>^{1,2,3}, Pourya Toranj Simin⁴, Mehrzad Shadmangohar⁵, Basak Taraktas⁶, Ulya Bayram⁷, Maria V. Ruiz-Blondet⁸, Fariba Karimi²

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Structural inequalities shape the trajectory of disease outbreaks by influencing exposure risks, access to protective measures, and the effectiveness of interventions. Wealth inequality and social segregation determine who can afford to take protective actions, who remains highly connected within transmission networks, and how rapidly an epidemic spreads through different groups. While empirical studies highlight these disparities, there is a need for computational models to systematically examine how structural inequalities drive infection patterns.

In this study, we develop a computational model that integrates epidemic dynamics, network structures, and behavioral decision-making to analyze how inequality affects disease spread. Our model demonstrates that:

(a) Limited self-quarantine ability among low-income groups widens the infection gap between socioeconomic classes, increasing overall disease prevalence.

(b) Social segregation amplifies transmission by restricting interactions across different socioeconomic status (SES) groups, reinforcing pre-existing disparities.

(c) A second wave of infection can emerge when medium- and high-SES groups develop a false sense of safety, leading to premature exposure and renewed outbreaks.

To validate these findings, we analyze empirical network and economic data from 404 metropolitan areas in the United States and examine infection disparities across ethnic and socioeconomic groups in the City of Chicago. Our results confirm that higher segregation is consistently associated with increased overall infection rates and greater inequality in disease burden.

These findings highlight that structural inequalities are not just passive background conditions but active drivers of epidemic dynamics. Reducing segregation and improving access to protective measures can mitigate disparities and

slow disease transmission, underscoring the need for policies that address inequality as a core component of epidemic preparedness and response.

OS-92: Structure, agency, and justice in research using social network analysis on Post-

Secondary Education Location: Room 125 Session Chair: Trevion Shamir Henderson Session Chair: Paris Wicker Session Chair: Michael Geoffrey Brown Session Chair: Carolina Banuelos

An inductive typology of university student service member/veteran egocentric networks

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Research indicates that social networks are particularly important to the university experiences of U.S. student military service members/veterans (SSM/Vs), a diverse population of adult learners. While these students bring unique experiences and skills to campus, their transitions into higher education are frequently complicated by service-related impairments, cultural conflicts between military and civilian life, and a strong sense of social isolation. Despite the importance of SSM/V social networks, few studies have investigated their characteristics nor how these characteristics may associate with military experience or beneficial outcomes. Using an analysis of survey data from 1,255 SSM/V and civilian students across four U. S. universities, this study creates an inductive typology of egocentric networks. Following a process established by previous researchers, we first use unsupervised Random Forest to develop several foundational egocentric characteristics-from over fifty compositional and structural variables-that iteratively delineate nine university student network types fitting nearly all sampled networks. Second, we test relationships between student network types and background characteristics, including military experience, to present a richer portrait of how SSM/V egocentric networks differ from those of civilian students as well as to gauge the typology's face validity. Third, we test whether network types associate with feelings of campus belonging, an important predictor of student university fit and success. Results are valuable to an emerging body of scholarship focused on the development and influence of marginalized college student social networks, as well as to literature centered on the sociocultural experiences of SSM/Vs in institutions of higher education.

Conceptualizing Race in Networks Studies: Context-Sensitive Categories for Mapping Socioacademic Relationships

Trevion Shamir Henderson, Clara Mabour

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Scholars studying postsecondary education are often interested in the antecedents, nature, and consequences of social relationships between agentic actors, such as students, faculty, staff, and administrators, in higher education. Decades of research have documented how sociodemographic characteristics, such as race/ethnicity, sex/gender, and socioeconomic status, inform students' experiences in the classroom and broader campus community. Moreover, theorists often posit that psychosocial elements, such as students' self-efficacy beliefs and their sense of belonging in the classroom and university community, are intertwined with sociodemographic influences on their learning experiences in higher education.

Recently, scholars have critiqued the ways that sociodemographic characteristics are conceptualized and measured in quantitative research broadly, and social networks research specifically. For example, some scholars have noted that racial groups are often conflated, such as studies wherein Black, Latino/a/x, and Indigenous students are categorized as "underrepresented" or "historically excluded" in STEM education research. Others have noted that race is often conceptualized using broad, binary categories that assume race is immutable. These critiques note that such categorization schemes risk essentializing within and across racial groups, where important social distinctions shape students' lived experiences. Moreover, other scholars posit that such categorization schemes are ill-suited for social networks research because they are often used as proxies for the very social processes that are at the center of social networks research.

Researchers have responded to these critiques in various ways. Notably, scholars frequently call for the disaggregation of broad racial categories into finer grained racial categories. However, conceptualizing race in

network studies, which are fundamentally about modeling social processes, is about more than disaggregating racial categories. Instead, researchers must ensure that models reflect context-sensitive, socially meaningful representations of the social context under examination.

The purpose of this research was to examine the relationship between students' socio-cognitive beliefs, such as their local sense of belonging in specific classrooms and/or course-specific self-efficacy beliefs, on their formation of socio-academic relationships in large-lecture courses in STEM. We also modeled sociodemographic characteristics, such as students' race/ethnicity, gender, and international student status, to understand the role of sociodemographic characteristics on students' socio-academic relationships. We found that sociocognitive elements, such as students' local sense of belonging to the classroom, were statistically significant predictors of students' formation of socioacademic ties in large lecture classrooms.

However, the central focus of this talk will be to discuss the theoretical foundations of our context-sensitive racial categorization scheme. Namely, we drew on qualitative data from a research study at the institution, as well as existing frameworks that reflect diasporic discourses to understand how elements of students' various racial, ethnic, and cultural backgrounds shape the ways students come to and experience higher education. We find that, without careful conceptualization of racial categorization schemes, our models failed to capture statistically significant racial homophily effects on students' formations of socioacademic relationships. We will discuss the implications of this for social networks research in higher education.

Keystone Agents: Peers who Facilitate Learning in a Network Ecology

Michael Geoffrey Brown

University of Michigan, United States of America

Using Network Ecology (Mcfarland, et al, 2014) and Campus Ecology Frameworks (Brown & Smith, 2024), I illustrate how students in informal socio-academic relationships make changes to configurational and categorical norms to facilitate learning in undergraduate education. Drawing on case studies (n=34 ego-networks) of undergraduate science classrooms, I conceptualize individuals engaged in significant bridging and bonding work to create space and time for learning interactions as central figures in ecological context. I draw on ecological theory to characterize these individuals as keystone agents. Keystone species in biological and cultural ecologies play an essential role in maintaining health and function of ecological arrangements. In campus ecologies, keystone agents maintain teaching and learning relationships among campus actors through emergent social organization strategies. These actors are different from Stanton-Salazar's (2011) conceptualization of institutional agents as they have informal roles in network ecologies, most often students supporting other students to cultivate time, space, and relationships through which learning and development interactions can occur. As a corollary, these students often possess significant institutional knowledge that they share with their peers to help with institutional navigation (including course selection, advice on how to engage with faculty, and strategies for coursework management). When these individuals exit an ecological context, the local network ecology often suffers (or even collapses) as a result. For example, in community colleges, when a keystone agent transfer, their role in the ecology changes and if other individuals do not step into the vacant space, relationships and routines often are abandoned. I present some defining features of what makes a keystone agent in learning ecologies and offer strategies for how institutions might cultivate and support these students, as well as approaches for supporting local ecologies after students depart.

The Alters that Support First Generation Latine University Student Retention

Carolina Banuelos

Colorado State University, United States of America

Despite efforts to support first generation (FG) students at large research universities in the United States, FG retention rates still do not keep up with the rates of continuing generation (CG) students. A FG student is one with neither primary parent/guardian earning at least a bachelor's degree. In 2021, it was reported that 20% of FG students completed at least a bachelor's degree compared to 60% of CG students. As prior research shows, students who come from families with prior university experience are more likely to attend a university and graduate. Part of this disparity stems from the lack of access FG students have to people who hold knowledge about higher education. As of academic year 2015-16, 56% of undergraduates nationally were FG college students, of which 25% are Latine students. With these statistics, it is critical for higher education to better understands FG Latine (FGL) student university experiences through a variety of analyses.

This paper shares results from a longitudinal (4-year) study that sought to broadly answer, how do first generation students' personal university networks impact their retention and success? More specifically, this paper reviews an

important result from a year three sample of FGL students (n=19). Analysis from this sample's data revealed high student affairs staff presence and details into the relationships they maintain with FGL students. Specifically, behaviors and support types that are necessary for supporting FGL students to and through graduation. By highlighting the important and different role student affairs staff achieve in retaining and supporting FGL students, we can better inform higher education institutions on how to enhance their student programming to include the FGL experience and voice; effectively leading efforts to decrease persistent inequities amongst the FGL student population.

OS-1: A digital perspective on healthcare ecosystems

Location: Room 202 Session Chair: Paul Expert Session Chair: Paola Zappa

A network analysis of intermedia influence patterns in the news discourse about the Mpox epidemic

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The Intermedia Agenda-Setting theory (IAS) posits that media outlets influence each other's reporting on what issues are covered by co-orienting journalists towards a specific agenda. In this work, we extended the IAS theory to framing, which is often dubbed as the second level of agenda-setting (or attribute setting). The proposed Intermedia framebuilding hypothesis asserts that media outlets influence each other on how an issue is covered. We studied patterns of influence in the coverage of Mpox between the national level news outlets in the United States. First, we identified the key attributes (emphasis frames) in the coverage of Mpox (agenda) and quantified their prevalence in news reporting via applied thematic analysis. Second, we derived individual time series for 16 news outlets over 6 months, signifying the proportion of published articles per day that emphasized on these attributes. Finally, we inferred networks of influence between these outlets using a methodological pipeline that combined Bayesian structure learning with Transfer entropy. In contrast to prior studies that found mainstream outlets such as the NYT as primary agenda-setters, we found that right-leaning, low-credibility outlets such as Breitbart and Blaze were central influencers. Surprisingly, such right-leaning outlets also exerted a strong cross-partisan influence on other leftleaning outlets, defying expectations of ideological silos. Thus, in addition to verifying the intermedia frame-building hypothesis, our study highlights the role of alt-right news outlets in shaping reactive patterns in public discourse during health controversies. We contribute methodological insights on inferring networks of intermedia influence to the agenda-setting scholarship.

Characterizing EHR communication network patterns and burden

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Cancer patients require complex care, involving 18 or more clinical disciplines. This is further exacerbated by comorbidities requiring additional specialties. The coordination and efficiency of information flow across these multi-team systems (MTSs) is essential for patient outcomes. Research has shown differences in communication flow between high- and low-performing teams, implying that patient outcomes may be improved by improving communication in cancer care MTSs. Electronic Health Records (EHRs) offer potential solutions to asynchronous intra- and inter-team communication, yet many challenges remain. First, little is known about the communication patterns of a patient's cancer care MTS and how they vary across patients. Second, clinicians face a high EHR burden, spending nearly half their time in clinic plus time outside clinic hours in the EHR.

The objective of our study was to characterize EHR communication network patterns and EHR burden in the information sharing process in roughly 10,000 lung, colorectal, and breast cancer care patients from two academic teaching hospitals. We assessed the relational nature of clinical notes in the EHR by examining the likelihood of a clinician reading a note based on author and focal patient characteristics. We also assessed the reading and writing burden by examining the number of notes written for each patient and the number of notes written by each healthcare professional per patient, and how these vary by patient characteristics. We identified certain comorbidities that significantly affected the information flow, as did cancer stage and site. Racialized groupings also significantly affected information flow, which may suggest health disparities.
Conceptualizing and measuring "personal healthcare networks": Reframing the structure of healthcare ecosystems through the eyes of the patient

Tyler Gaedecke¹, Kasey Jackman^{1,2}, Walter Bockting^{1,3}, Tara McKay⁴

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Purpose:

This presentation aims to describe an approach to egocentric network data collection in which patients list and describe their network of healthcare professionals (i.e., a "personal healthcare network") to assess patient perceptions of healthcare access, quality, and value. Preliminary findings from ongoing data collection among transgender and gender-diverse (TGD) adults will be presented.

Methods:

This mixed methods study surveys TGD adults (N = 130) recruited from a home nursing care program designed to support recovery immediately after gender-affirming surgery. In an online survey, name generators probe for participants' past-year healthcare professionals in physical, mental, or gender-affirming healthcare. Next, they respond to items describing the professional and relationship (e.g., role, type(s) of care, patient-provider identity concordance, setting, modality (virtual or in-person), visit frequency, wait time, missed or cancelled appointments, knowledge of TGD healthcare, relative significance to overall care).

Analysis will characterize network composition and function. We will also explore associations between measures at the ego, alter, and network levels and outcomes in self-rated physical and mental health. A subset (n = 24) will be recruited for individual interviews on the experience of creating and navigating personal healthcare networks.

Contributions:

Beyond building evidence on healthcare needs for TGD individuals after gender-affirming surgery, this study leverages the subjective nature of egocentric networks to resituate the patient at the center of their care teams and clinical processes. This approach may facilitate closer investigation of key variables driving the relationships between patient experiences and service outcomes across populations and health conditions.

Mapping collaboration and service integration in mental health sector: An Australian case study

<u>H Colin Gallagher</u>¹, Garry Robins¹, Philippa Pattison^{2,1}, Daniel Russo-Batterham¹, Noel Faux¹, Daniel Chamberlain³, Tegan Podubinski¹, Robyn MacNeil¹, Robyn Molyneaux¹, James Coutinho^{4,1}, Katie Jones⁵, Sarah Wilson^{5,1} ¹University of Melbourne, Australia; ²University of Sydney, Australia; ³LaTrobe University, Australia; ⁴NEAMI National, Australia; ⁵Victorian Collaborative Centre for Mental Health and Wellbeing, Australia

The importance of understanding regional mental health service systems as inter-organisational networks of service providers has been recognised for some time. Such networks are argued to be important in facilitating service access and coordination and hence to a more effective and client-centred model of care. However, despite a small but growing number of exemplary empirical studies of mental health and other health systems as inter-organisational networks, and an emerging theoretical conceptualisation of what makes such networks effective, recent systematic reviews have concluded that the current literature remains fragmented and inconclusive.

This presentation will describe the CANVAS (Collaborative Networks of the Victorian Mental Health Service System) project, a large-scale pilot applying social network analysis (SNA) to map the organisational landscape of mental health services in an Australian state undergoing major policy-driven reform. This baseline view of the network will inform an understanding of the existing state of the service system, including referral pathways and areas of collaboration. It will also suggest opportunities for improving referral and collaborative activity.

This talk will describe the progress of the project to date, and provide an initial update on the first round of data collection in two pilot regions of the state. Network data includes multilevel interorganisational data, as measured at both the organisational and team levels (e.g., information sharing, resource sharing, collaborative advocacy, similarity-based comparisons). A novel, purpose-built digital data collection platform enables real-time description of network data, allowing participating organisations and policymakers to utilise service descriptions instantly, and track evolving structures.

OS-22: Elite Networks

Location: Room 203 Session Chair: Tod Stewart Van Gunten Session Chair: Guillermo Romero Moreno

Power, influence and integra1on: Mapping Chile's Central Bank policy network through an event-based approach (2018-2024)

Ignacio Schiappacasse¹, Naim Bro², Matías Gómez¹, Alberto Anrique¹, Roberto Araya², Ismael Puga¹ ¹Universidad de Central de Chile, Chile; ²Universidad Adolfo Ibañez, Chile

Like other state agencies, the Central Bank of Chile (CBoC) operates not only under formal rules but also within social relationships that permeate elite circles. Granovetter (1985) refers to this issue as the problem of embeddedness: economic actors are embedded in concrete social structures, which might determine their decisions. Accordingly, we should expect various social groups to seek to influence the CBoC's decision-making. Despite this, there is a striking dearth in the literature regarding the power dynamics in which the CBoC is embedded. Little is known about the precise nature of the relationship between the CBoC and different actors with interests in its policy decisions. This study addresses this issue by implementing a novel methodological approach that combines relational and event-based strategies to reconstruct an elite network. We identified individuals who have participated in social events covered in the "society pages" of El Mercurio, the daily newspaper widely regarded as the voice of Chile's most influential sectors. Applying an automated data extraction method, we collected data from El Mercurio's digital edition. This research strategy allowed us to identify individuals featured in photographs along with their names and occupations. Based on this data, we reconstructed the web of ties and connections that constitute the CBoC policy network. This paper thus provides new insights into the structural underpinnings of the network in which the CBoC is embedded. We show how central characteristics -such as kinship ties and educational backgrounds- shape patterns of integration of the CBoC board within Chile's economic elite.

Networks and Contingency in Hybrid Regimes: Understanding Party Defections and Coalitions during Georgia's Colored Revolution

Julie George¹, Franziska Barbara Keller², Scott Radnitz³

¹Queens College and The Graduate Center, City University of New York; ²University of Bern, Switzerland; ³University of Washington, Seattle

What factors best explain how political leaders decide to defect or stay with fading ruling parties in hybrid regimes? This paper applies network analysis to understand the dynamics of ruling party breakdown in hybrid regimes. Whereas previous work on party collapse has looked at coordination dynamics and defection processes, this paper expands this approach by integrating social network analysis to study in depth a single case of party collapse in post-Soviet Georgia - the ruling "Citizen's Union of Georgia" (CUG) before and during the Rose Revolution in 2003. Relying on an extensive new database with the careers of all members of the Georgian parliament, we construct a network based on whether MPs have worked in the same location in the past. We find that the main leaders of the two camps - Eduard Shevardnadze and Mikheil Saakashvili - are not the most degree central figures in this network. In fact, Saakashvili, having spent most of his career elsewhere, has no connections to speak of. Instead, it is grey eminence Zurab Zhvania who emerges as one of the best-connected among potential leaders. Despite fine-grained temporal data on when individual CUG members decided to abandon the faction, we also find little evidence for cascading effects in a diffusion model. Direct connections to Shevardnadze also don't have any statistically significant effect on willingness to defect - but connections to Zhvania make a defection more likely. At the same time, none of the network measures or connections appear to explain why MPs would join the opposition factions. Information from semi-structured interviews with the actors involved confirm the importance of Zurab Zhvania as a king-maker, but also shed light on why he was not a viable patron, like Shevardnadze, and could not become a leader of the opposition, like Mikheil Saakashvili. Both his ethnic background and rumors about his sexual orientation made him a non-starter as electoral candidate and thus also not an appealing patron to form an alternative faction. But it still allowed him to orchestrate a process of withdrawing support from the current, but weakening patron, Shevardnadze. Our study's mixed methods approach - combining a contagion model that relies on the collection of extensive background information to construct social networks among all MPs with in-depth semi-structured interviews with the actors involved - allows us to paint a more complete picture of the elite politics leading up to and accompanying one of the central cases in the last wave of democratization.

Overlapping social circles in historical elite career networks: Using 'k-circles' as a minimal members decomposition approach

Anton Grau Larsen, Christoph Houman Ellersgaard, Jacob Aagaard Lunding Copenhagen Business School, Denmark

Studies of elites have long looked at network interlocks and career pathways. However, the link between these, the set of organizations through which elites accumulate the capital that lifts elites into the upper echelons of power and prestige - needs a common framework. In this paper, we propose to use biographies of elites to map the organizational overlap in CVs. In doing so, we show how it is possible to simultaneously identify the set of key organizations for the formation of elites and the set of elite individuals integrated by these organizations. By using Breiger's (1974) notion of the duality of persons and groups in two-mode affiliation networks, we expand and change existing methods for elite identification (Larsen and Ellersgaard 2017) to career networks.

We discuss how the CV can be used as a data source and propose analytical techniques and measures, the k-circles, that take their heterogeneity and incompleteness into account. We demonstrate that these measures are uniquely robust to systematic biases in missing data and omissions. We argue that a relational measure of centrality based on this, k-score, can identify key organizations and individuals that are close to the concept of the overlapping circles of power as conceptualised by C.W. Mills (1956). Using data from the Danish version of Who's Who, we then show that biographical data using the k-circles measures can allow us to identify a cross-sectional 'elite within the elite' on a year-to-year basis between 1910 and 2020. This elite is shown to be similar to an elite identified through contemporary affiliation network data, albeit with higher levels of the most inheritable form of capital, economic capital. We discuss how data on career networks based on biographical data to a larger extent than affiliation network analysis of current positions enables us to identify the key institutions for capital accumulation and mutual self-affirmation of status across this cross-sectorial elite.

We conclude the paper by discussing how k-circles can be applied to other two-mode networks enabling scholars to identify core groups of both individuals and organisations at the same time. Furthermore, we show the potential in the analysis of elites and key organisations by showing the historical changes for key elite individuals and the changing organizational landscape of the Danish corporate elite between 1910-2020. In doing so, we discuss the extent in which the k-circle measure provides a analytical framework capable of measuring changing elite dynamics in a uniform way across quite varied historical epochs and heterogeneous biographical records and suggest future possible applications for k-circles in the study of the duality of persons and groups.

The precious networks of the rich: How the wealthiest prevent progressive tax reforms.

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¹Princeton University; ²Tax Justice Network; ³Mannheim University; ⁴Central European University

The U.S. currently has the least progressive tax system in its history, allowing wealth to concentrate at the top while limiting resources available for public investment. This presents a paradox: despite public support for progressive taxation, such reforms consistently fail to pass in Congress. Research has identified two primary obstacles to progressive tax reform: institutional inertia favoring the status quo and strong political opposition from wealthy individuals (Page and Seawright 2023). The vast majority of multi-millionaires and billionaires oppose higher taxes on the wealthy, and empirical studies show that political outcomes disproportionately align with their preferences rather than those of the broader electorate (Gilens 2005, 2014). However, the precise mechanisms through which the ultrawealthy exert their influence over tax policy remain poorly understood.

This study investigates one potential avenue of influence: the social and institutional connections between the ultrarich and members of the U.S. Congress. We hypothesize that legislators who share educational backgrounds with billionaires—attending the same universities and programs during overlapping time periods—are more likely to oppose progressive tax policies. These connections may facilitate informal networks of influence, shaping political attitudes and decision-making in ways that privilege elite interests.

To test this hypothesis, we compile a novel dataset that maps the educational trajectories of U.S. Congress members and billionaires using publicly available records from the official Congress website and Forbes magazine. We identify overlap in higher education institutions, academic programs, and graduation years to construct measures of social exposure to the ultra-wealthy. Using roll-call votes on tax-related legislation as an outcome variable, we examine whether legislators with greater exposure to billionaires are systematically more likely to vote against progressive tax reforms. Our analysis controls for key confounders, including party affiliation, age, personal wealth, and university prestige, to isolate the effect of elite social ties.

Preliminary results indicate that legislators with stronger educational linkages to billionaires are significantly more likely to oppose progressive tax policies compared to their peers with weaker or no such ties. This finding provides

quantitative evidence that elite networks serve as a conduit for economic influence, potentially undermining efforts to implement policies aimed at reducing wealth inequality. By shedding light on this underexplored mechanism, our study contributes to a broader understanding of how economic elites maintain their privileged positions through social and institutional channels.

These findings have important implications for both scholarship and policy. They suggest that addressing economic inequality requires not only institutional reforms but also greater transparency regarding the social networks that shape political decision-making. Future research could expand on this work by examining other forms of elite connectivity—such as shared board memberships, professional affiliations, and philanthropic networks—as additional pathways through which the wealthy influence tax policy.

Social foundations of political nominations

<u>Elisa Klüger</u>

Aix Marseille Université, CNRS, LEST UMR 7317, 13626, Aix-en-Provence, France

This communication discusses strategies for combining social network analysis (SNA) and multiple correspondence analysis (MCA) in order to examine the social foundations of political nomination. It aims to detect if ties leading to political appointments connect individuals with similar social backgrounds and if their social proximity varies according to the environment in which they met. This question will be discussed throughout the examination of the answers of the Brazilian National Development Bank (BNDES) directors regarding the source of their nomination and the circumstances of establishing the relations that led to it. The data was gathered throughout 41 interviews with presidents, vice-presidents, and directors of the BNDES conducted between 2012 and 2016. These interviews also collected systematic data on their social origins, education, cultural practices, and political positions that were used to build a geometrical social space. The distance between the directors in each pair of axes of the MCA was measured when a tie between them is reported. As a result, it is possible to analyze how social homogeneity is expressed in these political appointments and to detect homophily among these political/expert elites. Next, the information on the origin of the ties was mobilized to discuss how homophily varied according to the environments where they met: banking, politics, academia, State bureaucracy, or mundane relations.

A Hypergraph Analysis of the European Commission Lobby Network

Amina Azaiez, Antoine Mandel

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Lobbying is often perceived as a tool for entities with large financial or social capital to influence policymaking, potentially sidelining ordinary citizens' interests. However, large-scale quantitative studies confirming or rejecting this perception are lacking. Indeed, most existing studies survey the actions and the interactions of small samples of stakeholders or policymakers. This paper leverages on a comprehensive dataset of face-to-face interactions between high level European Commission (EC) representatives and stakeholders to provide a detailed analysis of the EC lobbying network. More specifically, we examine whether there exist a highly interconnected core of actors that could dominate the network.

Indeed, network theory is particularly well-suited for studying power concentration in lobbying contexts. First, topological measures, like rich club coefficients, offers a concrete evidence for the existence of a hierarchical structure within the network. Second, it permits the identification of central actors and of the determinants of centrality. Third, integrating higher-order interactions offers insights into coalition formation and collaborative lobbying strategies.

Accordingly, we model these interactions by constructing a hypergraph where the nodes represent EC officials and stakeholders, and a hyperedge connects entities that participate in the same meetings. This hypergraphic perspective allows us to analyze both the micro and the macro structures of interactions. We apply this approach both to the full network containing stakeholders and policy-makers and to the network of stakeholders only. Our analysis highlights the presence of a robust core-periphery structure, with a few well-connected entities that occupy the center of the network and enjoy a stable integration in the EC policy-making process. Examination of the core composition reveals that companies and trade associations maintain closer relationships with the EC, while NGOs show increased core presence in the stakeholder-only network. This suggests different engagement strategies among stakeholder groups, with NGOs potentially focusing more on coalition-building and shared meetings. A regression analysis of company centrality identifies several determinants. The number of full-time equivalent staff dedicated to lobbying activities and company size are strongly associated with higher centrality. Companies with EU-based headquarters and those with global or European levels of interest also exhibit significantly higher centrality. These findings provide quantitative

evidence supporting the perception of lobbying as a tool dominated by well-connected actors, while also revealing heterogeneous lobbying strategies across stakeholder groups. Our findings can be used to assess the performance of the EU consultation process with respect to its objectives of increasing the legitimacy of the European policy process and of maintaining an open, transparent and regular dialogue with stakeholders.

OS-60: Paper Development Session in Networks and Business Management

Session Chair: **Yasaman Sarabi** Session Chair: **Matthew Smith**

Automated individualised pricing: A case study of ride-hailing platforms in India

<u>Neha Arya</u>

Indian Institute of Technology, Delhi, India

Digital platforms, focused on service delivery, are swiftly gaining popularity in urban India. However, automated mechanisms like algorithmic pricing deployed by such platforms raise concerns about algorithmic opacity, fairness, data privacy, regulatory difficulties, among others. This paper presents the first exploratory study examining pricing differential, if any, observed by different individual users of two popular ride-hailing platforms (namely, Uber and Ola) in India. Based on relevant global research and consumer experiences, it identifies certain factors and proposes a simply model to study algorithmic pricing in digital ride-hailing. This study uses data collected from a survey of 138 respondents, and finds substantial variation in prices quoted by ride-hailing platforms for the same ride. Besides expected factors, certain individual-specific characteristics (including, group identifiers) also statistically affect pricing. Overall analysis reveals that price determination on ride-hailing platforms is not a neutral demand-supply matching exercise. The study suggests policy measures and highlights the need for regulation regarding data privacy, and algorithmic audits, for ensuring fairness and transparency in the sector.

Political relations and the evolution of the multinational enterprise's network

Julian Rehazek, Tim Haarhaus, Christian Schwens University of Cologne, Germany

Although prior research conceptualizes the multinational enterprise (MNE) as a network of organizational units located in different countries, extant knowledge of how the MNE's network evolves is limited. Consistent with studies highlighting the important role of political relations for an MNE's decision to enter or exit a host country, we examine whether the political relations between countries in the MNE's network (rather than solely between the MNE's home and host country) influence the evolution of the MNE's network. We test our theory by analyzing data on the host countries of 1,126 Japanese MNEs with a stochastic actor-oriented model (SAOM). We find that the political relations of host countries in the MNE's network determine whether a focal host country becomes or stays part of the MNE's network. This study advances prior research which largely examines the role of the political relations between the MNE's home and a host country for an MNE's decision to enter or exit a host country, by showing that, in fact, it is the political relations between the host country and other host countries in the MNE's network which determine the MNE's network evolution. Without accounting for this effect, conclusions on how political relations affect an MNE's network evolution may be flawed and misleading. Methodologically, using a SAOM helps to overcome model misspecifications in current research because it allows for modelling interdependencies in an MNE's network evolution. These interdependencies are not accounted for in commonly applied regression models, leading to potentially biased estimates.

OS-69: Science dynamics : from reconstruction to social processes Session Chair: David Chavalarias Session Chair: Floriana Gargiulo

Project ARCH: Optimizing the Design of Virtual Scientific Ecosystems for Team Formation and Innovation

Emma Rosa Zajdela^{1,2}, Sodiq Abiodun Mojeed², Joan Kim²

¹Princeton University, United States of America; ²Santa Fe Institute, United States of America

The unprecedented availability of high-quality data has revolutionized industries from healthcare to transportation, ecommerce, and beyond. In this talk, I will discuss a series of studies based on longitudinal data from a decade of interdisciplinary scientific conferences. In our first study, we developed a nonlinear dynamical model inspired by the physics of catalysis to predict how scientists form teams based on their interaction at conferences and showed that this conceptually simple model performs surprisingly well at predicting which participants self-assemble into teams. In follow-up work, we showed that team formation driven by formal interaction is similar at in-person and virtual conferences, but virtual conferences connect communities about half as much as in-person conferences. We found evidence that these effects persist beyond the end of the conference and may have effects on teams years later. Then, we extend the notion of time-varying interaction in groups beyond pairs using hypergraph methods and assess the predictive value of adding information on higher-order interactions for team formation. The talk will conclude with a discussion of ongoing work studying the dynamics of communities in the ARCH, a new, digital platform for scientific collaboration. These activities are guided by the overarching question: how can we design scientific ecosystems to optimally promote the innovations needed to meet global challenges?

The robust-fragile duality of the ATLAS collaboration network

Rubén Rodríguez-Casañ, María Palazzi, Albert Solé-Ribalta, Agustí Canals, <u>Javier Borge-Holthoefer</u> Universitat Oberta de Catalunya, Spain

Big Science initiatives like the ATLAS experiment at CERN exemplify the scale and complexity of modern collaborative research. With thousands of scientists and institutions from over 40 countries, ATLAS represents a global effort to uncover fundamental aspects of particle physics. In this work, we investigate the evolving collaboration patterns within ATLAS by constructing and analysing bipartite networks of authors and countries linked to their publications. Through this dual perspective, we uncover structural features such as modularity at the author level, and a clear nested pattern at the country level, each reflecting distinct organizational dynamics: modularity highlights the formation of cohesive working groups, driven by bottom-up interactions and stabilized by institutional continuity. Nestedness, on the other hand, underscores the stratified contributions of nations based on resources and expertise, revealing both strengths and vulnerabilities in the collaboration. Using percolation analysis, we assess the robustness of these patterns to perturbations, finding that modularity ensures resilience to individual turnover, while nestedness reveals fragility to the loss of key contributors. These findings shed light on the interplay between structural organization and dynamical stability in large-scale collaborations, offering insights for managing and optimizing similar scientific endeavours.

The stagnation of a science

Ryder Gillespie Université de Montréal, Canada

Most research focuses on the dynamics of social phenomena. Taking an interest in sociology raises the opposite question, that of its stagnation. Modern sociology has been affected by this problem since its beginnings at the end of the 19th century, and sociologists regularly express it in the form of a 'malaise'. This expression is generally accompanied by a more precise questioning about the status of the discipline, about its capacity to be a 'science', and thus to find the terms of a unity around what makes its explanation. However, adopting a sociologists do not agree on such a question leads us to formulate a paradoxical question: can sociology explain why sociologists do not agree on their explanations?

In order to provide an answer to this question, my work focuses on the two central dimensions of its activity. Its aim: to respond to 'social demand'; and its means: to adopt both the norms and the achievements of science. My work shows that not only does such a choice deprive sociologists of their object, but that it justifies and normalise the state of uncertainty that characterises them. By re-examining the aims and means of sociological activity in the light of science, it is however possible to defend the idea that it is possible to explain sociological stagnation in terms of the sharing and justification of a shared definition of its activity, that is problematic in terms of the aim of science.

Do states make scientific fields?

Peter McMahan, Gabriel Lévesque McGill University, Canada

States regulate the institutions of science, govern the dynamics of professionalization in scientific disciplines, and set ethical, theoretical and empirical standards on scientists' work. They also orient research priorities through funding or the emulation of research in evidence-based policy. Through their expert bureaucracies, states also directly influence scientific knowledge through production, curation, interpretation and dissemination of research. Extant

research thus documents various mechanisms through which states shape the content of science. Yet, researchers have seldom looked at the role of states, and especially expert bureaucracies, in shaping the structure and boundaries of scientific fields. Do states indeed make scientific fields? We explore this question through an empirical study of the U.S. Centers for Disease Control (CDC), an agency that has outsized prominence in the biological sciences both within the United States and globally. Our project analyzes the impact that CDC-published scientific articles have on the structure and substance of the subfields to which they contribute. We derive a corpus of 16,069 CDC publications from OpenAlex and identify the subset of all publications within the same scientific domain as each of them. Our analysis uses time-series cocitation networks within each of these domains to identify the effects of CDC publications on subfield structure. Preliminary findings suggest that publications from the CDC incentivize scientists to synchronize the framing of subsequent publications to those of the CDC's articles, decrease the diversity of ideas in a scientific domain, and promote publications that are in line with the state-sponsored presentation.

Gender differences in scientific recognition: authorship and acknowledgment

<u>Yukie Sano</u>¹, Keigo Kusumegi², Daniel E. Acuna³ ¹University of Tsukuba, Japan; ²Cornell University, US; ³University of Colorado Boulder, US

Gender differences in scientific recognition remain an important topic. While authorship is a key form of credit, men and women may receive recognition differently. This study examines authorship and acknowledgment patterns across various disciplines to explore these differences. Our analysis shows that women are more often acknowledged than listed as co-authors, particularly in investigation and analysis roles. However, in collaborations between highly and less-cited researchers, highly-cited women tend to receive authorship more often than their male counterparts. These findings suggest that scientific credit is shaped by multiple factors, including gender, power, and perceived success. Understanding these differences can help promote fairer recognition practices in academia.

OS-161: Keynote Complex Systems: Alain Barrat Location: Auditorium

OS-163: Keynote Freeman Award: Per Block Location: Auditorium Session Chair: Per Block

OS-229: Hospitality suite (Zamansky Tower, Panoramic room, 120 persons, with rotation) Location: Hospitality suite (Zamansky Tower, Panoramic room, 120 persons, with rotation)

OS-45: Networks & Sustainability Session Chair: Christina Prell Session Chair: Paul Wagner

Haul-Outs and Hashtags: Unravelling Newburgh's Seal Scene

<u>Claire Stainfield</u> SRUC, United Kingdom

Geotagged social media data offer a valuable tool for identifying nature tourism hotspots and monitoring humanwildlife interactions. Previous studies have demonstrated the utility of hashtags in detecting popular tourist areas linked to wildlife, such as seal haul-out sites, both within and beyond designated Special Areas of Conservation (Mancini et al., 2018). Similarly, data mining techniques have been used to monitor recreational activities like fishing, providing insights into fisher behaviours and fish populations (Monkman et al., 2018). Integrating social media analytics with ecological monitoring presents a novel approach for assessing ecotourism's impact on charismatic megafauna, such as seals and seal tourism.

This study analyses georeferenced Instagram[©] posts from 2014 to 2023 within the Ythan Estuary catchment, Aberdeenshire. The area lies within the Forvie National Nature Reserve, a protected and ecologically significant coastal site in Scotland, adjacent to Newburgh Seal Beach, a popular recreational area. Using hashtag analysis and data mining techniques, we examine whether visitor motivations, personal significance, and proximity to the site can

be quantified from social media activity. Given the estuary's history of human recreation, its growing seal population, and its designation as a critical seal habitat, this location provides a compelling case study for evaluating the sustainability of seal tourism.

We specifically extracted posts referencing seals to assess their relationship with visitor motivations and proximity patterns. Temporal trends in posting behaviour were analysed to determine the impact of the 2017 seal haul-out protection measures and the 2020 COVID-19 pandemic on visitor activity and social media engagement.

A comparison of collaborative environmental stewardship networks across the US

<u>Selena Livas</u>¹, Nancy Sonti², Dexter Locke², Michelle Johnson², Lorien Jasny³, Lindsay Campbell², Rachel Dacks⁴, Jesse Sayles⁶, Michele Romolini⁵

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Much of the environmental movement in the US is shaped by grassroots organizations working alongside communities, research institutions, and governmental agencies. This creates localized networks for environmental stewardship across the country, which may be shaped by both shared national and international forces and also unique region-specific circumstances. This raises the question of how local environmental stewardship networks are different and alike. Are there phenomena that are unique to environmental stewardship networks and how do they resemble other more widely studied organizational networks? Here, we analyze eight different collaborative environmental stewardship networks, representing eight US cities and regions, within eight different US states across the country. We employ exponential random graph models (ERGMs) to model each network and compare and contrast the forces at play within each one. The networks range in size from 44 organizations to 1,313 organizations, with an average of 324. We use data collected through various rounds of the USDA Forest Service's Stewardship Mapping and Assessment Project (STEW-MAP), which has been conducted since 2007 and has been replicated in over a dozen cities globally. Preliminary results have shown a shared propensity for anti-preferential attachment and high mutuality, while cities differ on effects for both organizational focus and type. This work helps us understand local environmentalism broadly within the US context and can provide evidence for how environmental stewardship efforts scale with size, population, urbanization, and more.

A multimode network analysis reveals power in the Indonesian palm oil value chain

Yanhua Shi¹, Christina Prell², Christian Kimmich^{1,3}

¹Deaprtment of Environmental Studies, Masaryk University, Czech Republic; ²Faculty of Spatial Science, University of Groningen, the Netherlands; ³Institute for Advanced Studies, Austria

Power has increasingly been integrated into institutional analysis to explain behavior, interactions, and outcomes in environmental governance. Yet, actor-focused theories of power do not fully capture the influences, hierarchies, and power relations that span multiple decision-making situations, and the power that actors exert via powerful linked situations. Social Network Analysis (SNA) offers graph theoretic measures to quantify different relationships and examine power relations among nodes based on their structural connections. This paper leverages a multimode network approach and a nascent power typology from institutional analysis to theorize and assess interdependences between situations and actors as two forms of power: 'power-over' and 'power-to'. We describe 'power over' as situation-centered pragmatic, framing, and design power, manifested via AS linkages of biophysical transactions, information, and institutions, respectively. 'Power-to' is theorized as the capacity of actors to exert influences, determined by their involvement in situations (membership). We operationalize these NAS concepts via multimode motifs that assess the extent of 'power-over' situations and 'power-to' actors. The framework is applied to examine deforestation outcomes of the Indonesian palm oil value chain. Data sources include semi-structured interviews with 16 policy actors, supplemented by secondary datasets from peer-reviewed and media articles. Among 11 delineated situations, policymaking and certification situations exert substantial design power, whereas global market, discourse, and monitoring situations manifest significant framing power. We note the interplay between design power by the Indonesian policymaking and framing power by the global market, reinforcing the growth-centered expansion of oil palm plantations. Among 22 aggregated actor typologies, producing companies, NGOs, and the Indonesian government demonstrate high 'power-to', stemming from their participation not only in the greatest number of decision-making situations, but also the ones exerting substantial 'power-over'.

ISAAC HERNANDEZ, ARTURO BRISEÑO, JOEL CUMPEAN, OSVALDO GARCIA UNIVERSIDAD AUTONOMA DE TAMAULIPAS, Mexico

Scientific research on climate change emphasizes carbon performance (CP) as essential to sustainable management. The framework examines business greenhouse gas emissions from environmental restrictions and public expectations. CP has been explored for pollution monitoring and financial incentives like carbon credits, but sociological knowledge of corporate networks as sustainability advocates is lacking. This study examines CP through the lens of corporate centrality, defined as a company's position based on its connectivity and influence within a network. It analyzes different types of centralities in Mexican corporations, employing social network analysis (SNA) and metrics such as degree, closeness, eigenvector, and betweenness centrality. The research focuses on networks of shared board members (board interlocks) and the carbon emissions reported by these companies. Using a symmetric undirected matrix to account for board interlock connections, our findings reveal whether companies with higher centrality implement more effective sustainability practices, positioning them as key nodes for disseminating emission reduction strategies. Furthermore, the study aims to identify the challenges faced by peripheral companies, which, despite having less influence, exhibit greater flexibility to adopt innovative approaches. This research offers theoretical and practical frameworks to improve business sustainability plans and highlights the significance of network dynamics in advancing low-carbon economies. The findings enhance the domain of business management and sustainability, emphasizing the significance of collaboration and leadership in addressing climate change. The report provides pragmatic ideas for formulating public policies and business initiatives that enhance the role of core enterprises and promote sustainable development.

CEO Interlocks and Corporate ESG Compliance

<u>Beata Łopaciuk-Gonczaryk</u>¹, Mubashir Khan¹, Tom A.B. Snijders^{2,3} ¹University of Warsaw, Poland; ²University of Groningen; ³University of Oxford

We investigate the relationship between the interlocks created by CEO outside directorships and corporate ESG performance. We want to verify if ESG practices (or declarations of such performance) spread between interlocked companies.

We test the following hypotheses:

H1: The number of interlocking ties created by a CEO serving as a member of other companies' boards or committees is positively related to the focal company's ESG performance.

H2: (Influence) CEO interlocks between two companies leads to a higher similarity in ESG performance.

H3: (Selection) Similarity in ESG performance increases the probability of creation of interlocks by common directors.

H4: Companies, whose current CEOs share additional employment in at least one company other than the ones they serve as CEOs (are potential peers), become more similar in their ESG performance.

We study the development of the two-mode director interlock network of a set of large European companies and their ESG performance. For similarity in performance, we consider both overall ESG ordinal ratings in a given category (Environmental, Social and Governance) and compliance to the same particular ESG items (represented by a two-mode network: companies by a set of binary ESG indicators).

The sample covers the 150 biggest nonfinancial companies (selected based on Stoxx Europe 600). Data related to CEOs, their outside directorships, and companies' characteristics are taken from ORBIS and Boardex databases; ESG performance data are from EIKON DataStream. We utilize Stochastic Actor-oriented Models, estimated in RSiena, for coevolution of a two-mode board interlock network and ESG performance between 2018 and 2022.

OS-90: Social support and health

Session Chair: **Guy Harling** Session Chair: **Dorottya Hoor**

Understanding the Engagement and Interaction of Superusers and Regular Users in UK Respiratory Online Health Communities: Deep Learning-Based Sentiment Analysis

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Background: Online Health Communities (OHCs) enable people with long-term conditions to exchange peer selfmanagement experiential information, advice and support. Highly active "superusers" are essential in fostering community interaction and effective information exchange. This study examines the sentiment distribution and dynamics in posts from two UK respiratory OHCs, focusing on interactions between regular users and superusers.

Methods: Sentiment analysis was conducted with a fine-tuned BioBERT model on anonymized data from Asthma UK (AUK) and the British Lung Foundation (BLF). BioBERT was fine-tuned using the COVID-19 Twitter Dataset to categorize sentiment as positive, neutral, or negative. Superusers were defined as the top 1% most active users and via VoteRank (users with the greatest spreading ability). The sentiment of regular users' and superusers' aggregated posts was then calculated and analysed.

Results: The fine-tuned model achieved 96% accuracy. Posts were predominantly positive, with a trend toward increasing positivity over time. Superusers generally wrote shorter, more positive posts and superusers defined by posting activity or VoteRank largely overlapped, showing that users who posted the most were also spreaders. Threads initiated by superusers typically encouraged regular users to reply with positive sentiment. When replying to threads started by regular users with different sentiment, superusers tended to be significantly and consistently more positive than regular users.

Conclusions: Network and Sentiment Analysis highlighted the essential role of superusers in respiratory OHCs. They not only generate consistently positive posts but also stimulate similarly positive responses from regular users, thereby sustaining a supportive online environment.

The structure of institutional and emergent social support networks in long-term disaster recovery: A case of Hurricane Harvey

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In rapid-onset disasters, emergent networks become vital lifelines for individuals isolated from established relief sources. Actors improvise their collaboration, relying on altered roles and structures which are not pre-planned. While literature on disaster relief has emphasized emergent efforts (e.g., David, 2006; Wachtendorf, 2003), how they fill gaps within the broader relief network as well as the differential capacity of individuals to mobilize such support remains underexamined. This study examines the patterns of individuals' tangible, emotional, and information support ties during post-hurricane long-term recovery. We focus specifically on how residents' sociodemographic characteristics, along with broader community contexts, influenced the composition of social support ties involving established and emergent actors.

Survey data capturing long-term recovery experiences were collected in 2022 from five coastal counties in Texas affected by Hurricane Harvey in 2017. The analysis draws on data from 776 individuals regarding household, neighborhood, and community recovery. Respondents identified people, groups, institutions, or programs that offered support across eight different time points, ranging from three days post-landfall to 48 months later. In addition to established institutions including federal and local governments, national nonprofits, and emergency services (e.g., fire and police departments), respondents named a range of sources such as religious organizations, mutual aid groups, local schools, restaurants, and food pantries. Multi-level personal network analyses are used to examine the key predictors of support network composition and density. Further, Twitter data from the first month following Hurricane Harvey will be used to examine the emergent networks of improvised relief during the early recovery phase.

Social Networks, Food Insecurity, and Pulmonary Disease in Indonesia: A Gendered Perspective

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Food insecurity and pulmonary diseases, such as tuberculosis, COPD, and asthma, remain critical public health concerns in Indonesia. While food insecurity exacerbates respiratory disease risk, social networks may serve as a protective factor by influencing access to resources, health behaviors, and healthcare utilization. This study

investigates how social network diversity moderates the relationship between food insecurity and pulmonary diseases, with a focus on gender differences. Utilizing data from 27,288 adults in the Indonesian Family Life Survey, we assessed food insecurity via the Food Consumption Score and identified pulmonary diseases through self-reported physician diagnoses. A composite social network diversity measure captured household size and active ties across six social relationships, including spouse, parents, children, siblings, neighbors, and groups with and without religious affiliation. Gender-stratified multivariable logistic regression models, with interaction terms between food insecurity and social network diversity, examined moderating effects while adjusting for sociodemographic and health-related covariates. Results indicate food insecurity significantly increases pulmonary disease risk. A significant interaction effect was observed between food insecurity and social network diversity attenuates the adverse impact of food insecurity on pulmonary health. The moderating effect plateaus at moderate levels of social network diversity, while highly diverse networks show diminished benefits. Findings suggest that women benefit more from social support networks in mitigating the health risks associated with food insecurity. This study highlights the gendered role of social networks in health disparities, emphasizing the need for targeted, network-based interventions to improve health resilience in food-insecure populations.

Depression and Signed Social Networks in 176 Honduran Villages

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Depression has historically been the most common psychiatric illness worldwide and a significant contributor to the global burden of disease. An ongoing and steady increase in its prevalence (approximately 60% in the last three decades; Liu, 2024) has now positioned this condition as the top cause of disability globally (Friedrich, 2017; GBD Mental Disorders Collaborators, 2022; WHO, 2017). Depression raises risk of a wide range of physical and psychological illnesses (Harerimana et al., 2022; Monroe & Harkness, 2022; Netsi et al., 2018; Lawrence et al., 2010; Scott et al., 2016), including cardiovascular disease and cancer (Harshfield et al., 2020; Rajan et al., 2020; Scott et. al., 2016), as well as suicide (Mann et al., 2005; Miller & Campo, 2021; Ribeiro, Huang, Fox, & Franklin, 2018). Prior work has indicated the association of depression and the composition and mental health status of face-to-face community ties (e.g., friends, household members) (Bearman & Moody, 2004; Fowler et al., 2008; Rosenquist et al., 2011; Perkins et al, 2016), but this releationship is less explores in non-WEIRD settings. Our study uses a novel dataset (Airoldi & Christakis, 2024) that incorporates a large sample of 27,274 adults living in 176 villages in rural Honduras to model the associations of signed (friends and adversaries) network features on symptoms of depression and also specifically postpartum depression, controlling for demographic and socioeconomic factors. Our study includes a subsample of prospectively observed postpartum parents and negative ties, an unusual feature of social network studies addressing depression. We estimate several models by gender and explore uncommon structural traits such as triadic network structures (e.g., the positive-negative balance of triads). We find that women in more intransitive friendships were more likely to be depressed (in keeping with past work), while the same association was not found for men or postpartum parents. We observed in both genders a higher prevalence of depression among individuals whose friends had adversarial relationships ("negative triads"), as compared with those whose friends were friends ("balanced triads") or those whose friends had no relation ("incomplete triads"). Our findings reinforce the importance of social network structure and psychological health beyond dyadic associations, especially in high-risk settings (LMIC, rural villages).

Kinetic Networks: How Discussions Matter to Discussion Networks and Depression

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Extensive sociological research illustrates the value of personal networks for individual outcomes, highlighting that discussions are crucial for managing personal issues. However, our understanding of what occurs within discussion networks remains limited. To address this gap, I developed a novel method that captures problem-specific networks and measures their overlap. Utilizing originally collected data on the personal networks of emerging adults, I assess discussion patterns and their links to depression. There are three principal findings. First, problem networks form around primary appraisals rather than content domains. Second, the extent of overlap among discussants varies according to primary appraisals. Challenges (potential for gain) consist of specialized and segmented discussants, whereas threats (potential for loss) and harms (actual harm) are found in overlapping networks. Third, larger social responses to problems—with more discussants—are correlated with less severe depression. These findings indicate that discussion practices that match rather than provide access to, resources are an important mechanism that links

discussing problems with mental health. The benefits of personal networks for mental health in emerging adults may primarily operate through a matching mechanism driven by cognitive appraisals with specialized and segmented discussants. Theoretically, network structure arises from social interactions; consequently, an instrument based on these interactions is essential for evaluating structure. By overlooking social interactions, our capacity to characterize mechanisms is restricted, especially as digital technologies, namely social media sites, afford new ways for young adults to organize their personal networks.

OS-62: Personal Networks across the Life Course

Session Chair: **Marlène Sapin** Session Chair: **Claire Bidart** Session Chair: **Guillaume Favre** Session Chair: **Michel Grossetti** Session Chair: **Béatrice Milard**

The Impact of Major Life Events on Personal Social Networks

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Major life events (MLEs) can have substantial impacts on people's social networks. Deaths, illnesses, job changes, and life-course transitions can alter people's personal social networks. In this paper we explore the effects of MLEs on college student networks at an elite 4-year U.S. residential university. Do MLEs lead to changes in who is in a person's networks (turnover) while the overall structure (size, clustering, modularity) remains the same? Alternatively, are there also structural changes and if so, are these changes temporary or permanent? We begin to answer these questions by looking at the impact of MLEs on turnover and one important network property, ego network size (nodal degree). Using time-stamped communication event data collected during the NetHealth study of 600+ first year college students over 2-4 years, we construct for each day a student's personal network. From these networks we compute daily measures of degree, and counts of new, dead and active ties which are used to construct turnover and growth measures. Most students experience an MLE during their college tenure, with the most frequent MLEs being deaths, breakups and illnesses/surgeries. Using a quasi-experimental before-after design, we compare those who experienced an MLE to those who did not by looking at turnover and network size changes from the semester before, during and after an MLE. We examine whether MLE effects are more prevalent within certain demographic groups and for various types of MLEs (positive vs. negative, individual vs. familial, illness vs. relationship breakup).

Changes of ego-centric networks over 3 decades - what can we learn from cross-sectional surveys?

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Having studied the interpersonal networks of the Hungarian adult population over the past three decades, we would like to provide a brief overview of our results, overwhelmingly based on cross-sectional data, which unfortunately do not permit the examination of individual-level changes. However, we have plenty of information collected with the same methods regarding the core discussion networks, the number of friends and weak ties and also several waves of interviews, especially regarding friendships – and the impact of the Covid-19 pandemic. In our presentation we would like to discuss what kinds of conclusions can we possibly have, based on such data series.

A parallel kinship universe? Using Dutch kinship network data to replicate Kolk et al.'s (2023) demographic account of kinship networks in Sweden

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By analyzing Dutch kinship network data from Statistics Netherlands, this study provides a detailed enumeration of kinship ties to grandchildren, children, nieces, nephews, siblings, cousins, parents, aunts, uncles, and grandparents in 2018. In doing so, it replicates the recent work of Kolk et al. (2023), who examined Swedish kinship networks. However, empirical assessments beyond the Swedish context are complicated by exceptionally high data requirements. This study examines whether Kolk et al.'s (2023) Swedish findings are generalizable to another demographically advanced population, the Netherlands, and whether differences in cohort fertility patterns and

divorce rates affect the frequencies of different kin types. First, we identified large similarities, supporting the idea that the patterns observed by Kolk et al. (2023) may indeed be generalized to other demographically advanced (Western) contexts. Second, we observed a trickling down of demographic differences—resulting from the Dutch baby boom—from one generation to the next. Third, other family-related behavioral changes, particularly separation and divorce, play an important role in shaping kinship networks and contributing to cross-national differences in their composition. Our replication highlights the importance of empirically validating kinship statistics derived from microsimulations and aggregate demographic data. Further research is needed to track these dynamics over longer time spans and to explore a broader range of cultural and demographic contexts.

Adolescents' support networks and suicide awareness: A cross-sectional personal network analysis

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¹University of Bern, Switzerland; ²FORS, Switzerland

Background and objectives: Suicide awareness is a critical aspect of primary suicide prevention, especially among youth. Suicide awareness includes key characteristics such as knowledge, attitudes, and behaviors related to suicide. Despite its importance, there is limited understanding of how perceived suicide awareness is associated with adolescents' support networks. This cross-sectional personal network analysis examined the composition of the adolescents' support network and tested the association of this support network with suicide awareness.

Methods: This study used baseline data from a nonrandomized, cluster-controlled trial designed to evaluate the effectiveness of a universal suicide prevention intervention implemented in secondary schools in Switzerland. The study focused on secondary school classes in the French-speaking region of the country, involving a total of 194 adolescents aged 14 years and older. We assessed perceived suicide awareness (measured by the Perceived Suicide Awareness Scale, PSAS-9), support networks (suing name generator), and sociodemographic details. Data were analyzed using factor analysis to identify support network dimensions and linear regressions.

Results: Our findings showed that support networks are organized with 4 factors. On the first factors, parents have high loadings; on the second factors, grandparents have high loadings, on the third factor, uncles and aunts have high loadings, and on the fourth factor, friends have high loadings. Controlling for sociodemographic factors, factors three and four were significantly associated with a higher suicide awareness (b=0.87, p=.044 and b=1.71, p=.003), while factors one and two were not significantly associated with suicide awareness (b=0.68, p=.148 and b=-0.57, p=.162).

Conclusion: This study showed that perceived suicide awareness in adolescents is significantly associated with specific components of their support networks. These findings suggest that peer relationships and certain extended family connections may play a more influential role in adolescents' suicide awareness than immediate family relationships. Future suicide prevention initiatives should consider the differential impact of various support network components, particularly focusing on extended family members.

Between the family, the market, and the state: exploring how Swiss young adults achieve welfare under different institutional and network configurations

Javier Fernandez-Garcia

University of Geneva, Switzerland

This paper investigates territorial variation in youth transitions by providing an exploratory analysis of the welfare mix of young adults (the set of institutions they depend on to establish their means of living: family, state, and market). It examines the ties to a complex social system shaped by multilevel interactions between socioeconomic stratification, personal networks, and welfare state contexts.

The paper analyzes the ch-x dataset, a cross-sectional survey of 79,896 Swiss young adults, concerning both a comprehensive mapping of their networks and socio-demographic indicators on them and their alters. It uses Multiple Factor Analysis (MFA) to map the structure of cantonal youth policy programs, to holistically characterize the social capital of respondents, and to trace relationships to specific welfare mixes.

Preliminary results indicate that under similar policy environments, the welfare mix of young adults is related to their network characteristics. In contexts of high welfare effort and academically oriented education systems, exclusive dependency on parents is related to larger networks and higher career support from alters. Both co-dependency on parents and the market, and exclusive market dependency, are linked to more kin-based and dense networks. Nonetheless, network indicators are not tied to a specific welfare mix in cantons where youth policy is structured around vocational education, as co-dependency between parents and the market is predominant.

The study highlights the relevance of holistically addressing social network indicators to operationalize social capital, as well as considering institutional contexts in shaping the relations between the meso- and micro-levels.

(The contribution is part of an ongoing PhD thesis at UNIGE co-supervised by Eric Widmer and Jean-Michel Bonvin)

OS-156: Organizational Networks 4

Session Chair: **Spyros Angelopoulos** Session Chair: **Francesca Pallotti** Session Chair: **Olaf Rank** Session Chair: **Paola Zappa**

Networking for Information - An Experimental Study Using Sociometric Badges

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In this study we ask how individuals search for experts at networking events. Building on the intuition that individuals' propensities to engage in certain search actions, as well as their effectiveness in locating experts, will depend on the quality and salience of the metaknowledge they have about others, we conducted an expert search game as a field experiment in which we randomly assigned participants – researchers in a multinational corporation – to one of three treatment conditions, reflecting varying degrees of search planning. Based on data from sociometric badges, we derive a taxonomy of the micro-decisions individuals make at events. We find that letting others approach yields more referrals than taking the initiative in starting conversations, and that planning increases the tendency to maintain such initiative even when doing so is ineffective – a possible manifestation of the Einstellung effect.

To further bolster our two main results, we plan to run two additional experiments using sociometric badges. The first will focus on the effect of reciprocity on referral yield, and the second on how the Einstellung effect may distort rational search efforts.

Return on team moves

Olivier Godechot Sciences Po, France

Recruitment and mobility are generally seen as individual phenomena, driven by individual factors, especially human capital. In the classical labor market framework, the exit option reveals the individual market value of a worker. What if labor mobility is not only individual, but could have a collective dimension? Indeed, this is what happens when a firm poaches a pre-formed team from another firm. In such a case, the output of the whole counts more than the sum of the human capital of the individuals. Therefore, team movements challenge the classical individualistic approach to the labor market.

Previous work (Lazega, 2001, Groysberg, 2010, Godechot, 2017) has shown that team moves seem to be crucial for the functioning of the labor market in a number of upper-class occupations, such as law firms and finance. However, beyond this seminal research on team moves, we don't know much about their magnitude and underlying mechanisms. When and where do we find such team moves? Who are the leaders? How are they connected to their followers? How profitable are these moves?

Previous qualitative research in finance suggests that such moves are more likely to occur in immaterial industries, where firm boundaries are not well guarded and immaterial assets are easier to move. The leadership of such teams is likely to depend on a combination of formal hierarchy, seniority, and proximity to team members. Long experience of working together and homophily may be at the core of these close-knit teams. The moves should be profitable not only for the leader who organizes them, but also for other team members.

To test preliminary hypotheses emerging from field observations, we rely on interviews and three data sets: UK financial market based on the register of Financial Service Authorities (n=300,000); Linked-in profiles of lawyers in the top 300 French law firms (n=30,000); and the Paris region labor market for managers and professionals based on the exhaustive French social security wage dataset (DADS n=17,000,000 worker*year observations).

The data also allow us to test the effects of team moves. Using staggered diff-in-diff and first-difference methods, we show that team moves lead to significant wage increases. Team movers enjoy a 10-12% wage premium over stayers

and a 3-5% wage premium over solo movers. The team move premium is even larger in the financial sector, with a 20% wage increase relative to stayers and a 10% premium relative to solo movers. Thus, team moves play a role in the reconfiguration of capitalism by allowing groups of (highly skilled) workers to use their collective power to undermine the boundaries of the firm and appropriate some of the capital for their own interests.

Rhythm and Poetry? Modeling Innovation Diffusion through References in HipHop

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The question of how innovation diffuses across networks has been a driving force in research on organizational networks for decades, with much research being done on the interorganizational level and through assessing the role of specific network structures. Yet, multiple facets of this process have remained largely unexplored: (i) the cadence and frequency at which innovation diffuses, (ii) the role of culture, or (iii) how innovation may overcome regional boundaries. Using a unique dataset of time-stamped data that depicts lyrical references between rap songs, we tackle these research gaps. More precisely, we interpret genre adoption in music as evidence of innovation diffusion and model this process via a bipartite DyNAM that spans the 100 most popular rap songs each year across two decades.

In so doing, our study contributes to research on innovation diffusion in multiple ways: First, we explore how the success of innovations – i.e., commercial success as indicated by billboard charts – influences the speed at which innovation diffuses. This is particularly relevant because music is a fast-moving space with potentially infinite competing products. Second, we highlight the role of cultural proximity in innovation diffusion, which has so far been virtually missing from extant literature. And third, given that many musical genres start – and often stay - in geographical pockets, we leverage our dataset to investigate the role of geographical proximity in innovation diffusion and how an innovation's success moderates the likelihood of said innovation becoming a supra-regional phenomenon.

Shifting logics of exchange in crisis? Mutual credit transactions during the covid pandemic

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Many forms of economic exchange don't take place in 'pure' markets, but instead are socially embedded into communities where they are guided by social logics of exchange in addition to economic ones. In this presentation, we investigate the degree to which the reliance on such social or community logics increases in times of crisis. In crisis, social embedding can be argued to serve both as a mechanism for uncertainty reduction as well as a selection mechanism when previous levels of transactional activity cannot be maintained. Our empirical case consists of a large scale mutual currency system in Italy with a dataset of more than 2 million transactions that have occurred before, during, and after the covid-19 pandemic. Based on this dataset, we use relational event models to study the degree to which exchange structure varies in line with social and community-based logics of exchange between periods of normality and periods of crisis.

Social Support Networks in Primary Care Teams: Impact on Job Satisfaction, Burnout, and Turnover Intentions

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Purpose. We assessed the relationship between social support networks in primary care clinics and clinician and staff job outcomes (i.e., job satisfaction, burnout, and turnover intention).

Methods. We conducted a social network survey (2021-2022) in 23 primary care clinics in two U.S. states—New York (14) and Pennsylvania (9). All clinicians (e.g., physicians and nurse practitioners) and staff (e.g., nurses, social workers, administrators) in each clinic received an online survey, in which the respondents identified their team members and reported who they seek out for work-related support. They also answered questions about job outcomes.

In total, 626 respondents completed the survey with a response rate of 52% (range: 21-82%). Social network analyses (SNA) evaluated respondent-level degree centrality and betweenness centrality, and clinic-level attributes, such as density. Regression models examined the relationships between support network SNA metrics and job outcomes.

Results. Respondents from clinics with denser support networks, indicating higher levels of interaction, reported lower burnout (B=-0.12, p-value=0.028) and had lower odds of turnover intention (OR=0.53, p-value=0.004). Respondents with greater betweenness, indicating they more often served as a bridge between colleagues, were more likely to report greater job satisfaction (cumulative OR=1.09, p-value=0.09) and lower burnout (B=-0.06, p-value=0.07) with marginal significance.

Contribution. The U.S. is facing challenges to primary care delivery and workforce shortages driven by burnout, job dissatisfaction, and turnover. Our findings indicate that when team members are connected and can seek out work-related support, they report better job outcomes. Clinic-level interventions to promote teamwork and support sharing are needed.

OS-84: Social Networks in Childhood, Adolescence, and College

Session Chair: René Veenstra Session Chair: David R. Schaefer Session Chair: Carolyn Parkinson

The network structure of leadership behaviours among Taiwanese children

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Leadership naturally emerges in group settings, with certain individuals driving goals, decision-making, and coordination. While research has advanced our understanding of leadership traits and interpersonal contexts, most studies focus on adults, and childhood leadership is primarily examined through self-reports in contemporary, industrialised societies. To expand current knowledge, we analyse leadership behaviours in children in a rural, historical setting. Using 1.677 written records of naturalistic observations from an ethnic Han village in Taiwan collected by Arthur P. Wolf between 1958-1960, we conducted behavioural analyses and extracted quantitative behavioural codings. We focus on the network structure of leadership behaviours and other theoretically-relevant 'positive' (e.g., prosocial) and 'negative' (e.g., aggressive) behaviours. For each of these behaviours, we construct 14 socio-centric networks that contain observed behaviours (N behaviours=6,711) between all children (ages 0-12) in the village (N_individuals=214). We apply a multiplex generalisation of the social relations model, designed to estimate network structure, and the associations between networks, for unevenly sampled data. Our findings show that leadership behaviours are typically followed by group members, and that leaders decide who can join groups during play. Leaders exhibit a distinct behavioural profile: they are dominant, engage in teasing, scolding, and verbal aggression---challenging assumptions that leadership is solely rooted in prosocial behaviour. These rich analyses of rare, naturalistic observations of children's social life in a rural, non-Western, historical setting provide unique insights into the developmental nature of leadership, highlighting its complex interplay with social behaviours in early life.

The network structure of adverse childhood experiences (ACEs) and depressive symptoms in a population of adults in rural Uganda

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Background: Adverse childhood experiences (ACEs) are pervasive in resource-limited settings and exert consequences on mental health across the lifespan. Studies from rural Uganda have shown robust associations between ACEs and adult depression symptom severity, major depressive disorder, and suicidality. The ACEs "sum score", however, obscures our understanding of the pathways linking ACEs and depression. The network approach

to psychopathology provides a framework to disentangle the mechanisms driving associations between external risk factors and mental health symptoms.

Methods: We conducted a population-based social network survey of all adults in a rural parish in southwestern Uganda (91% response rate; N=1,566). ACEs were elicited with an adapted version of the Adverse Childhood Experiences-International Questionnaire. Current depressive symptoms were measured with the Hopkins Symptom Checklist for Depression. We used a culturally adapted name generator to identify network ties in five life domains. Using the Ising model, we estimated the co-symptomatology network of depressive symptoms and ACEs and identified the most salient nodes in the network.

Results: Of the nine ACEs, "sexual abuse" had the highest bridge strength, defined as the sum of the absolute value of all edges between a node and nodes outside its community (depressive symptoms). Exposure to family violence and neglect also had direct connections to current depressive symptoms.

Discussion: Findings highlight specific ACEs as key pathways to adult depressive symptoms, informing intervention targets in this resource-limited setting. Our next steps involve re-estimating the ACEs-depression co-symptomatology network stratifying by social network characteristics (e.g., isolates vs. non-isolates; high vs. low reciprocity).

The co-evolution of friendships, team partner ties and physical ability in grade 5 physical education

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Building positive peer relationships in adolescence is associated with many positive outcomes (e.g., academic achievement, physical activity). Physical education (PE) is considered to have a unique potential to promote peer relationships, although negative peer relationships and conflicts are often described, particularly between athletic and non-athletic students. Recent studies have confirmed the connection between high physical ability and peer relationships in PE using social network analysis, but no longitudinal studies have been conducted. To examine this, 292 students from 11 grade 5 classes were surveyed at three points during the school year. Students were asked to identify best friends, preferred team partners in PE, and high and low ability peers. The ability nominations were combined into a peer score for each student. Stochastic actor-oriented models were used to model the co-evolution of friendship, team partners and peer-perceived physical ability.

Initial results show that friendships are formed based on similarity, while team partners are chosen primarily on high performance. Also, boys are more likely to be chosen as team partners than girls. Additionally, the results show that team partners develop into friends and vice versa.

The results illustrate the differences in social integration in PE between athletic and non-athletic students and between boys and girls. Meanwhile, the positive development of team partners into friends shows the potential of PE to promote friendships in the classroom through PE. To improve the social inclusion of non-athletic students and girls, PE lessons could emphasize cooperation instead of competition to highlight other aspects of sport.

Social Factor Influence on Performance in Statistics Course

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In a study of 72 introductory statistics students at a college in California, we measured the effect of several social factors on performance in the class. We hypothesized that students who are more afraid of math and statistics will do worse in the class, but also that the fear factor can be mitigated by becoming more integrated into the class. We also hypothesize that students who are more integrated in the class will perform better than those less integrated. Furthermore, we hypothesized that feelings of belonging will predict performance. Finally, we hypothesize that belongingness will be highly correlated with network characteristics, specifically in- and out-degree.

We administered pre- and post-semester surveys to two statistics classes at a western US college. Some 72 students completed validated measures of extroversion, belongingness, and fear of statistics. Sociometric network questions were included and allowed students to name up to 12 other students in class they knew by name with rosters preloaded and an autocomplete capacity.

We test whether becoming integrated into the class moderates the relationship between fear of statistics and course performance.

Signs of Friendship? How Visual Identity Cues Shape Perceptions of Social Networks

Evangelos Dimosiaris¹, Tobias H. Stark¹, Johan Henrik Koskinen²

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School classrooms are one of the primary contexts in which friendships between adolescents are shaped by homophily. However, whether adolescents rely on similarities in others' characteristics when forming their perception of social networks remains unknown. This question might be especially relevant in ethnically diverse settings as these perceptions contribute to students' social isolation or exclusion. For instance, native Dutch adolescents might assume that their female classmates with an immigration background who wear hijabs primarily befriend each other and do not want to engage with non-Muslims. Such perceptions might reduce the prospects of future interactions. To understand how network perceptions are formed in school classes, we investigated the role of homophily in visible identity cues. In a multilevel framework, we examined how perceivers' characteristics (e.g., majority or minority group membership) and four visual identity cues of classmates-religious symbols, national symbols, high-status clothing, and skin tone-shape perceptions of who is friends with whom. We collected unique friendship network and cognitive social structure (friendship perception) data from more than 1,500 adolescents (aged 16+) attending low-diversity high schools or highly-diversity vocational schools in the Netherlands. As a methodological advancement, our study is the first to employ two-layer multilevel Exponential Random Graph Models (MERGM) (cognitive social structures nested in friendship networks) to assess perceived homophily based on visual identity cues and perceivers' characteristics within classrooms. By introducing this innovative approach, our research contributes to the growing literature on networks of networks, offering new insights into the perception of individuals and social networks.

OS-2: Advanced Mathematical and Statistical Network Methodology

Session Chair: Martin Everett

Comparing the performance of regularized maximum likelihood and maximum pseudolikelihood estimation methods for ERGMs

<u>Alexander James Gordon Murray-Watters</u>, Carter Butts University of California, Irvine, United States of America

Although alternatives exist, the primary methods for parameter estimation for exponential family random graph models (ERGMs) are maximum pseudolikelihood (MPLE) and approximate (Markov chain Monte Carlo) maximum likelihood inference (MCMCMLE). Both approaches have been quite successful, with MPLE typically used in modern settings as an effective initializer for MCMCMLE. Challenges, however, remain. As is well-known, the MLE does not exist for data sets whose observed statistics are sufficiently "extreme" relative to the set of possible statistics (the convex hull problem), requiring inelegant workarounds that lead to serviceable but non-optimal simulation behavior. Other challenges arise in high-dimensional models, for which optimization becomes difficult and accidental collinearity or near-collinearity of predictors can become a risk; this occurs most notably for models with sociality, expansiveness, or popularity terms, individual-level fixed effects that can be difficult to estimate in practice. Among the solutions proposed to the above challenges is regularized inference, where the likelihood and/or pseudolikelihood is penalized (typically by the sum of squared (L2) or absolute values (L1) of model parameters) during inference. Prior work has also suggested the potential for regularization to improve the performance of the MPLE, which often has good first order properties but which is sometimes unstable and/or poorly calibrated. Here, we examine the behavior of regularized MPLE and MCMCMLE estimators for ERGM model parameters, introducing a "pesudo-cross validation" strategy for calibration of the regularization parameter. We compare regularized and non-regularized estimators both in conventional, low-dimensional settings, and in cases with individual-level fixed effects. Based on these observations, we suggest practical guidance and useful directions for ERGM inference in challenging circumstances.

Distinguishing Notions of Centrality in Directed Networks

<u>Gordana Marmulla</u>, Ulrik Brandes ETH Zurich, Switzerland

An ever-growing number of centrality indices is proposed, but more often than not they are constructed ad-hoc. Consequently, the interpretation and comparison of centrality indices is generally based on intuition built from their definition. For undirected graphs, the preservation of the neighborhood-inclusion preorder has been identified as the core axiom shared by centrality rankings. This has recently been extended to directed graphs by defining three vertex preorders based on directed neighborhood inclusion. The preorders formalize the rather conceptual notions of radial, medial and hierarchical centralities and can be used as criteria to discriminate between them. In this presentation,

we differentiate common centrality indices according to which of the criteria they do or do not preserve. The findings illustrate effects that are highly relevant when centrality indices are applied in practice. These include, for example, implications of the choice of a specific index, the concrete functional form of an index, the symmetrization of networks, and potential issues when substituting seemingly related indices.

Expert Surveys: Optimizing Snowball Elicitation

Dimitris CHRISTOPOULOS^{1,2}, Alex Jose¹, Marta Campi³

¹Heriot Watt University, United Kingdom; ²MU University, Vienna; ³Institute Pasteur, Paris

Eliciting expert opinion often relies on sampling small populations among those who possess specialized, experiential, or privileged knowledge. Traditional recruitment methods for expert opinion or judgment are susceptible to significant selection and response biases. This has the potential to compromise data validity and reliability. This paper presents a quantitative framework for optimizing snowball sampling to minimize such biases in expert recruitment. Through systematic simulation experiments across different network structures (Erdős-Rényi, Power Law, Scale-Free, and Small World), we evaluate critical methodological parameters including the number of seeds, number of waves, and sampling termination criteria. Our analysis determines a means to capture a statistically significant fraction of the underlying expert population while maintaining representativeness. Our results demonstrate that sampling efficiency varies significantly with network topology. We validate our findings using Kolmogorov-Smirnov tests on the distribution of expertise. We conclude by offering practical guidelines for researchers employing snowball sampling in selecting experts. This methodology can extend beyond expert surveys to other hidden or partially hidden populations, including stakeholder analysis, identifying elite members, and recruiting members of peripheral social networks, offering a robust framework for a sampling design in partially hidden populations.

Latent Variable Models for Clustering Network and Nodal Behavioural Data

<u>Isabella Gollini</u>, Alberto Caimo

University College Dublin, Ireland

We propose a latent variable model for the joint analysis of network structure and nodal information. We extend latent space and stochastic block models by introducing a framework that captures both latent group memberships and continuous nodal positions in a latent space. Each node is assigned to a latent group via a multinomial process, influencing both its network connections and its observed behaviour. The network structure is modelled using a combination of within- and between-group connectivity parameters, alongside a distance-based latent space representation. Simultaneously, nodal information is governed by group-specific and individual-level parameters, allowing for flexible clustering. The model naturally accommodates missing data by leveraging the latent structure to impute unobserved values. Crucially, the ability to jointly model nodal attributes and network structure makes this approach particularly well-suited for scenarios where data are missing or only partially observed. Depending on the nature of the nodal data, the model can be applied to attribute information or relational interactions, offering a unified approach to latent structure exploration in complex systems. To enable scalability, we develop a fast inferential approach based on variational inference.

OS-28: Globalisation and Network Analysis

Location: Room 114 Session Chair: Matthew Smith Session Chair: Yasaman Sarabi

Assessing the resilience of international medical instruments trade - a network analysis

Matthew Smith, Yasaman Sarabi

Heriot-Watt University, United Kingdom

This study examines the international trade network of four component groups in the medical instruments sector: disposables, medical & surgical instruments, therapeutic devices, and diagnostic/imaging equipment. We examine the structure of the trade network before and after the outbreak of COVID-19 and assess whether the global structure of the industry has remained resilience to the shock that the pandemic posed. We apply Temporal Exponential Random Graph Models (TERGMs) to examine whether the process of forming trade ties has changed following the outbreak of COVID-19.

Analysing inter-state communication dynamics and roles in the networks of the International Institute of Intellectual Cooperation

Rubén Rodríguez-Casañ, Elisabet Carbó-Catalan, Albert Solé-Ribalta, Diana Roig-Sanz, Javier Borge-Holthoefer, Alessio Cardillo

Open University of Catalonia (UOC), Spain

The International Institute of Intellectual Cooperation (IIIC) was an international organisation created under the League of Nations (LoN) to promote intellectual relations for global peace. As UNESCO's direct forerunner, it functioned between 1925 and 1946, with a hiatus during World War II, playing a central role in coordinating intellectual cooperation globally. Despite its significance, the IIIC has been largely examined through qualitative methods, with limited data-driven research exploring its networks and interactions. However, the digitisation of archival records has revolutionised access, enabling new computational approaches to reassess historical narratives.

In this study, we employ network analysis to examine two subsets of digitised IIIC letters, focusing on administrative and artistic/literary correspondence. By analysing sender-receiver pairs and their geographical origins, we reconstruct international networks, shedding light on the structure and function of intellectual exchanges. Our findings indicate significant differences between administrative and literary communication. Administrative correspondence exhibits a relatively egalitarian distribution of interactions, incorporating a broad range of countries, including those from Latin America and Eastern Europe, challenging traditional Eurocentric perspectives. Conversely, literary exchanges reveal a more exclusive network, with prominent participation from Western European countries such as Belgium, the United Kingdom, Italy, and Spain, reflecting geopolitical influence attempts and reinforcing established cultural hierarchies.

These results invite a reassessment of the IIIC's geographical organisation and intellectual cooperation during the interwar period, highlighting the value of computational methods in uncovering hidden patterns and revising historical interpretations. By combining qualitative and quantitative approaches, we aim to contribute to a more nuanced and globally inclusive understanding of intellectual cooperation.

Is the Higher Education sector really flat? A brokerage analysis of International Branch Campuses

Riccardo De Vita¹, Stefano Ghinoi^{2,3}, Katharina De Vita¹

¹Manchester Metropolitan University, United Kingdom; ²University of Modena and Reggio Emilia; ³University of Helsinki

International Branch Campuses (IBCs) are one of the most evident manifestations of the globalisation of the Higher Education sector. Despite a large amount of studies in this field, prevailing discourse tends to simplify the analysis of globalising phenomena, or remain limited to specific case studies. Framing IBCs as Foreign Direct Investment, this paper maps the global diffusion of IBCs since the 1990s. Through the identification of brokerage roles played by different countries, the study not only quantitatively demonstrates the emergence of educational hubs, but provides a more nuanced analysis of the different roles countries can play in the global IBCs network. Results show how political objectives pursued by different countries result in specific network positions, leading to implications for both managers and policy makers. The paper builds on an original dataset and, to the knowledge of the Authors, it is the first attempt to use SNA on IBCs data.

Looking for a 'Trump Effect': Analysing the International Trade Network with Dynamic Blockmodeling

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The transformation of international trade dynamics under the Trump administration (2017–2021) has reinvigorated debates on globalisation, trade policy, and networked economic relations. This paper examines whether and the extent to which these policy shifts—characterised by trade wars, renegotiated agreements, and an emphasis on economic nationalism—have altered the structure of the International Trade Network (ITN). Using dynamic blockmodelling (BM), a clustering technique that has historically informed world-systems analysis but has since fallen out of favour, we propose methodological guidelines for its application to weighted, directed, and dynamic trade networks. Our analysis highlights the advantages of BM in detecting structures in the patterns of trade, policy-induced trade realignments, and the evolving topology of the ITN. We compare different dynamic BM approaches, assessing their suitability in capturing longitudinal trade patterns amidst exogenous shocks such as tariffs and

sanctions. Given the ITN's scale-free properties and heterogeneities in relational capacities, we address critical methodological challenges, including data normalisation, state succession, and exogenous covariates (e.g., tariffs, exchange rates). By bridging social network analysis and international trade theory, this study not only provides an empirical reassessment of whether there was a 'Trump Effect' on international trade but also revitalises BM as a valuable tool in trade economics and global network research.

Network Analysis to Understand the structure and evolution of Global Supply Chains along the Project Life Cycle

Jose David Meisel^{1,2}, <u>Laura Patricia Carranza²</u>, Carlos Antonio Meisel¹, Juan Jose Betancourt¹ ¹Universidad Nacional Abierta y a Distancia; ²Universidad de Ibagué

The aim of this research is to understand the collaborative relationships and assess the influence of contributing factors in shaping the collaboration network structure in projects developed in Global Supply Chains (GSC), considering each stage of the project lifecycle and the nature of the project. The study employed a case analysis methodology to eight global projects executed by a prominent Austrian company specializing in intralogistics solutions. Two approaches were applied in the network analysis at each stage of the project lifecycle. First, a visual and descriptive analysis was conducted to outline structural aspects of the network. Second, a stochastic network analysis was used to assess how contributing factors influence the structure of the collaboration network. The results of this study indicate that, depending on the nature of the project, there is a stage in the project lifecycle where characteristics and attributes are more prominent. Additionally, the importance of the project manager's role is highlighted, as their presence facilitated collaboration between the Project Team Roles (PTR) in high and medium complexity projects, resulting in increased collaboration intensity. Finally, the methodology used in the research allowed for the identification of the PTR with greater centrality and prestige in each stage of the project lifecycle. This research provides a framework to identify key actors and contributory factors that shape collaborative relationships in GSC at each stage of the project lifecycle. The findings could be used to support the decision-making process and formulate strategies for effective collaborative relationship management in GSC.

OS-111: Agent-based modelling and social networks 4

Location: Room 116 Session Chair: Federico Bianchi Session Chair: Filip Agneessens Session Chair: Károly Takács

The evolution of global production networks after extreme weather events: an out-of-equilibrium approach

<u>Camilla Pelosi</u>, Antoine Mandel Université Paris 1, France

Introduction and motivation

The adverse effects of climate change on economic systems and human communities are becoming increasingly evident, manifesting through more frequent and severe extreme weather events (IPCC 2022). This has prompted a growing body of literature to explore how these impacts propagate through socio-economic networks (Barrot 2016, Carvalho 2021). However, while these studies typically consider how climate shocks propagate based on existing economic structures, they do not address how such shocks may influence the evolution of production networks themselves. This research addresses this gap by adopting a bottom-up approach to assess the dynamic impacts of extreme weather events on supply chain structures.

Methodology

We develop a multi-sector disequilibrium agent-based model with buyer-seller relations between agents located in different regions. Extreme weather events are represented as realizations of a stochastic process that directly impact the supply of labour and capital services in the affected regions, with propagation effects influencing the global economy. More specifically, extreme weather events are simulated with plant-level resolution, based on known frequencies for each simulation step. Using vulnerability functions derived from the literature, the direct economic impact on production facilities is calculated. The propagation of these impacts through supply chain disruptions is then tracked, enabling firms to seek alternative suppliers when their existing ones are affected by environmental hazards. The key idea behind the substitution mechanism is that when the production levels of suppliers of

intermediate inputs decline, their clients experience shortages. If these shortages surpass a specified threshold indicated by missed deliveries—clients will actively seek out alternative suppliers.

(Preliminary) results

Preliminary results from simulations highlight two key findings. First, there is no direct correlation between output behaviour and the trend of direct losses. Although direct losses stabilize over time, output continues to decline steadily throughout the simulation period. This discrepancy indicates that factors beyond direct losses—such as propagation mechanisms, market dynamics driven by myopic expectations, and feedback loops—play a significant role in influencing output.

Second, relying solely on average values for risk assessment can lead to underestimating the actual risks. Averages tend to smooth out extreme variations and fail to capture the full extent of potential catastrophic scenarios. Similarly, the distribution of direct losses per firm shows that while most firms experience small to moderate losses, some face disproportionately higher losses. These extreme cases, combined with the fat-tailed nature of extreme weather distributions (Weitzman 2011; Pindyck 2013), underscore the need for a more nuanced approach to risk assessment that accounts for the full range of possible outcomes, rather than relying on averages alone.

Expected contributions

This research makes two key contributions. First, it elucidates how substitution dynamics following environmental shocks influence the evolution of input-output networks, projecting how global value chains may spatially reconfigure in response to climate-related disruptions. Second, by aggregating the effects of disruptions across production nodes, the study develops a bottom-up metric to assess the impact of extreme weather events on global GDP and production, providing a more granular understanding of economic vulnerabilities within supply chains.

Ties that talk up the actors: mechanisms of reputation-driven network evolution

Jan Majewski

Univerisity of Warsaw, Poland

Specific mechanism regulating the spread of gossip on social networks remains an unsolved puzzle, but an early formulation of 18 undirected relational situations indicates, that many of those configurations have a freezing effect on talking about absent others. This paper turns to agent-based modeling to attempt to work out a directed version of this mechanism and test it against longitudinal data of ties changing in organizations. Gossip is a triadic mechanism (sender-receiver-target) that requires actors to consider both: the emotional charge of their message and the valences of ties within the triad. Because of that, it is reasonable to employ a signed and labeled triad census, yielding 486 configurations exhausting all possible situations within gossip triad. This census is then implemented to an agent-based model, where synthetic agents connected by an empirical social network talk to each other and modify their perception of others based on what they hear, which is then translated to their tie composition. Our goal is to find out which of those 486 candidates are best fitted to empirical data. To this end, we estimate statistical properties of empirical networks with SAOMs and compare this with the ABM output. Because of complexity of this approach, we need to control for typical network evolution effects, network balance, exogenous processes occurring simultaneously, as well as NP centralities of individual actors. This approach blends SNA methods with the inverse Generative Social Science to formulate predictions for empirical verification.

Assessing effects of residential density and public space on resident social networks and social capital using an agent-based model

Alexander Petric

University of Waterloo, Canada

Over half of the world's population now lives in urban areas, and while cities can foster outsized social collaboration, they can also be sites of social isolation. Housing and the built environment are factors influencing one's social network and social capital (access to resources embedded in social networks), which spurs interest in how urban planning can affect these social outcomes. Residential density (dwelling units per unit of residential land) and social infrastructure—like public spaces —have emerged as relevant factors in urban social network formation. However, previous work finds varied—even conflicting or non-linear—effects of residential density on social networks and social capital measures.

I present an agent-based model to assess impacts of public space amenities and different housing densities on social networks and social capital. Agents move and interact within a landscape of residences, workplaces, and public/third spaces, with variation in population, housing density, population dispersal/urban sprawl, and public spaces. Agents

have upper limits on network sizes, and they form strong, weak, and invisible ties depending on repeated proximity with each other, with homophilic tendencies (preferences toward people socially similar to oneself). Agents' existing social networks also influence their movement in space and their future tie formation. I present results for how residential density and public spaces influence social connections, including agent-centered and network-level metrics like connection count distributions and small-world metrics, and I discuss implications for social capital formation. I also outline next steps to compare and contrast model findings with in-field survey and interview data.

Behavioral Adaptation and Epidemic Control in Structured Populations

Hsuan-Wei Lee¹, Vincent Li²

¹Lehigh University, United States of America; ²National Taiwan University, Taiwan

This study introduces an agent-based SIS (Susceptible-Infected-Susceptible) model on a square lattice to investigate how voluntary quarantine strategies influence epidemic dynamics in a structured population. Each agent is categorized into four states—Susceptible-Quarantined (Sq), Susceptible-Non-Quarantined (Sn), Infected-Quarantined (Iq), and Infected-Non-Quarantined (In)-and updates both health status and behavioral strategy over discrete time steps. Evolutionary game theory underpins agents' decisions, with each individual weighing the perceived costs of quarantine against the risk of infection. Disease transmission occurs through contacts with immediate neighbors, with infection and recovery rates modulated by quarantine adherence. Agents evaluate their payoffs-incorporating the burden of quarantine and health risks-before potentially switching to alternative strategies based on a Fermi function. Spatial clustering and correlations among compartmental states are quantified through Moran's I, enabling a detailed exploration of how local interactions shape global outcomes. Simulations reveal that parameter configurations, notably recovery rate and infection rate, strongly affect the equilibrium distribution of quarantine adoption. For instance, when the recovery rate falls below 0.04, more than 99% of agents eventually choose to guarantine. Conversely, achieving over 99% uninfected individuals demands not just a low infection rate or high recovery rate but also collective cooperation. These findings highlight the critical interplay between adaptive behaviors and epidemiological factors, offering insight into how voluntary guarantine measures can mitigate disease spread in structured populations.

Brain mechanisms engaged in social network interactions

Jean-Claude DREHER CNRS

CNRS, Institut des Sciences Cognitives, France

Social networks play a crucial role in creating links between individuals and in informal transmission of information across society. Although the brain computations engaged in social learning have started to be investigated in dyadic interactions and in very small groups1-6, little is known about the mechanisms used by the brain when individuals interact in social networks. First, I will present a taxonomy of different types of computations used by the brain for learning and inferences made during social interactions. I will illustrate how this taxonomy is useful to understand the computations underlying social interactions. In particular, I will present recent model-based functional MRI results showing how the human brain adapts to fluctuating intentions of others when the nature of the interactions (to cooperate or compete) is not explicitly and truthfully signaled.

Second, I will present a new study revealing the cognitive mechanisms underpinning the assessment of information veracity. The ambiguous nature of news contents fosters misinformation and makes news veracity judgments harder. Yet, the mechanisms by which individuals assess the veracity of ambiguous news and decide whether to acquire extra information to resolve uncertainty remain unclear. Using a controlled experiment, I will show that two characteristics of news ambiguity lure individuals into mistaking true news as false: the higher the news content imprecision and propensity to divide opinions, the greater the likelihood that news are assessed as false. Individuals' accuracy in estimating veracity is independent from their confidence in their estimation, showing limited metacognitive ability when facing ambiguous news. Yet, the level of confidence in one's judgment is what drives the demand for extra information about the news.

Third, I will present recent findings showing how the brain decides whether to share extra information with others, depending upon one's own confidence about the reliability of information and upon our beliefs concerning the preferences of receivers.

Fourth, I will show that a variant of the classical DeGroot learning rule, captures transmission of information in social networks. This rule, which states that an agent updates beliefs by making weighted averages of neighbors' opinions as an integrated snapshot, accounts for information propagation in an experimental game played in network, better than a sequential error-driven process using successive weighted update of one's neighbors' opinions.

Finally, I will show how Agent-Based modeling can be used to account for the dynamic formation of a social network in a behavioral economic experiment called the linking game. In such game, self-interested agents aim to balance maximizing their connectivity with minimizing the number of links they maintain. Our model accounts for the temporal dynamics (frequency of actions) observed in this game better than other models (eg. best response model).

Together, these results pave the way to develop a mechanistic understanding of how the brain makes inferences in social networks and decide to spread information through them, providing a multilevel comprehension of information transmission, integrating the brain system-level and the levels of individual and collective behavior.

OS-75: Social Movement Organizations and Policy Networks

Location: Room 125 Session Chair: David Benjamin Tindall Session Chair: Mario Diani

WHO DRIVES THE GAME? THE ROLE OF POLICY BROKERS IN THE PUBLIC POLICY PROCESS, THE CASE OF NIGER

<u>Juliette Schlegel¹, Thibaud Deguilhem^{1,2}, Alain Piveteau³, Jean-Philippe Berrou⁴, Djibo Ousmane⁴</u> ¹LADYSS, France; ²LEREPS, France; ³IRD, France; ⁴LAM, France

Public policy-making provides fertile ground for exploring the power of actors and coalitions in coordinating governance networks through the management of ideational conflicts and control over resource flow (Sabatier, 1988; Ingold, 2014). Our research looks at the structural and cognitive conditions that make it possible to identify key actors in policy processes using a significant case study: the Direction Nationale de la Planification et de la Gestion des Crises Alimentaires (DNPGCA) in Niger. This multi-actor system aims to implement the country's food, nutrition and pastoral security strategy program. The network under study brings together about fifty actors, such as international donors and NGOs, government bodies, civil society actors and private sector, whose objectives may differ, making it an ideal field of study for analysing the policy process, considering power relationships. Our analysis mobilises sociometric data on the relationships and resources exchanged in the governance network and information on the policy beliefs held by actors. Using these data, we propose to analyse the influence of policy brokers by looking at the articulation between these two worlds (resources and ideas) interacting through the actors. Drawing on the work of the Advocacy Coalition Framework and Resource Dependence Theory, we propose the hypothesis that a policy broker is all the more relevant if he occupies a position of intermediary in the resource network but that he is also a broker of ideas capable of promoting compromise between conflicting coalitions. Through this demonstration, we argue that the power of the policy broker can only be assessed with regard to these two interconnected levels.

How do Alliances Form and Fail? Power Imbalance in Social Movement Coalitions

Steven Bao

The Ohio State University, United States of America

Social movements rely on orgnizational coalitions to help mobilize large numbers of people. Yet, power imbalance within coalitions can affect the success of movemnet. While larger organizations provide essential resources—such as funding, visibility, and political connections—that enhance a coalition's capacity, this concentration of power can create challenges. Smaller organizations may become dependent on these resources, limiting their autonomy and influence. Additionally, larger organizations often prioritize their own strategic objectives, which may not align with the missions of smaller groups.

This study explores how power imbalances between larger and smaller organizations shape coalition stability and movement outcomes. It argues that while such coalition structures can facilitate movement formation by providing essential support at the initial stage, they may also introduce tensions over time. As these imbalances persist, they can lead to conflicts that weaken coalition cohesion and, in extreme cases, contribute to its dissolution.

To examine these dynamics, this study draw data from the Dynamics of Collective Action (DOCA) dataset to map event-based coalitions in the U.S. from the 1960s to the 1990s. By analyzing how power asymmetries influence coalition stability, this study sheds light on the internal dynamics of social movements and the role of coalition structure in shaping movement success and long-term viability.

New insights into social movements from temporal network analysis Bastien LEGAY, Matthieu LATAPY

LIP6 - CNRS - Sorbonne Université, France

Protests are the most common means of activism. Whether in a public (demonstration) or private (strike) context, it is seen as one of the most widespread methods of expressing disagreement in social, political and environmental contexts. When people protest, they may go to great lengths to organise actions that involve significant time, material and ultimately economic costs for the organisers. But what about the impact? Whether it is civil disobedience or the most typical and classic demonstrations, we all know the media impact of these actions. The psychological impact is even studied. But what about the material impact on the infrastructures themselves ?

This is what we aim for, and we do it using real data and tools from network science.

To this end, we introduce link stream differentiation using link streams, a model for temporal graphs. Inspired by classical differentiation and combined with a clustering method to highlight the most disrupted connected component, it allows us to analyse the temporal and structural extent of disruptions in real networks as well as their return to equilibrium.

We apply this method to analyse the ILWU dockworkers' strike in the US West Coast ports in 2002 and the social unrest related to the pension reform in France in 2003, in order to gain deeper insights into these events and their impact on the network. We use data on the maritime trade network from Lloyd's List and data on traffic on the Paris road network from OpenDataParis.

The Role of Civil Society Organizations in Marginal Areas: A Network Approach

Stefano Ghinoi^{1,4}, Giorgia Trasciani², Ludovica Piergiovanni³

¹University of Modena and Reggio Emilia, Italy; ²Aix-Marseille Université; ³Polytechnic University of Milan; ⁴University of Helsinki

Civil society organizations (CSOs) play a crucial role in providing services, advocating for social causes, and represent diverse interests. These organizations are also 'adversarial' vis-a-vis government as they often deal with issues that are politically difficult, such as supporting migrants. While their role in providing social services - often compensating for the lack of public offer - has been examined in depth in the literature, there is a shortage of studies investigating how CSOs develop local strategies based on networking for achieving their targets.

To address the above research gaps, this work explores the strategic behaviour of CSOs in supporting migrants in Milan's San Siro district - in response to public agencies' failure to provide adequate social support. Indeed, these organizations often operate with limited resources, prompting the need for strategic collaborations and innovative solutions via informal channels.

Using a mixed-method approach, we combine social network analysis and content analysis - using primary data from interviews and questionnaires - to investigate actors' relational patterns. Our findings from the exponential random graph models and the themes detected in the interviews highlight both strengths and limitations of the informal networking system developed by CSOs. Local organizations tend to diversify their offer by relying on diverse actors, but they also show similar strategies when it comes to reaching their targets. These findings underscore the need for institutional recognition, sustainable funding mechanisms, and policy frameworks that enhance collaboration between formal and informal actors.

A Network Perspective on Actor Influence with Supply Chain Due Diligence in Canada

Rachel S Friedman, Emma Bowick, Sophia Carodenuto

University of Victoria, Canada

When we settle in for a nice cup of coffee, or enjoy a rich piece of chocolate, the environmental impacts of producing those items often don't cross our minds. However, deforestation and habitat loss, not to mention social injustices, continue to plague food supply chains, particularly when they involve international trade. In response, countries are increasingly enacting legislation to curb the environmental and social harms tied to food commodity supply chains. But the policy process is complicated by multiple and competing interests that impede the progress of corporate accountability policy instruments. To better understand the landscape of influence in these policy actor networks, we examine the case of emerging supply chains through the passage of Canada's Modern Slavery Act, efforts to address environmental impacts of global supply chains appear to have stalled. This raises important questions about which actors hold influence in the initiation and development of due diligence policy in Canada, and whether certain interests have been marginalized. As part of an iterative consultation process, we ask organisational representatives about their involvement in the policy process and their interactions with others in relation to due diligence. We

measure degree, betweenness, and eigenvector centrality to assess direct influence, reach, and strategic connection within the network. Understanding this network of influence can not only help diagnose barriers to establishing due diligence policy, but can also lay the foundation for dialogue that could lead to consensus around a path forward.

OS-11: Community-Engaged Social Network Analysis

Location: Room 202 Session Chair: Jennifer Lawlor

Characterizing typologies of power using egocentric social network analysis of local food justice leaders

<u>Emily Suzanne Nelson</u>, Owusua Yamoah, Darcy A Freedman Case Western Reserve University, United States of America

Purpose: We adapted egocentric social networks as an approach to evaluate the impact of a community-driven systems-level intervention designed to bridge community power with organizational power to root and grow a local food system that works for all. The intervention is informed by Lin's (1999) theory of social capital and by Lukes' theory of multidimensional power (2021). Both highlight that change, including at the system level, is a relational phenomenon accelerated or delayed by access to power. This analysis examines baseline social networks and existing power relationships among local food justice leaders participating in the intervention.

Methods: This analysis is based on 38 egocentric social network maps collected from food justice leaders between September 2022 and January 2025 in Cleveland, OH, USA. We conducted a latent profile analysis of seven key social network metrics for each participant, including measures of size, density, and centrality. Descriptive analysis of different types of power within the food system and access to powerful actors related to local food systems change were analyzed for each typology described in the latent profile analysis.

Contributions: To our knowledge, results provide the first description of power structures shaping local systems change necessary for realizing nutrition equity. Findings highlight variability in perceptions of power influencing local food systems. The social network typologies identified will serve as a foundation for examining how initial network attributes change over time and influence access to power sources (e.g., decision makers, gatekeepers, people with resources, influencers) among local food justice leaders innovating transformative change.

Cartographies of Collective Memory: Collaborative Visual Ethnography of Social Media and Offline Practices

kıvılcım zafer teoman

İstanbul Medipol University, Turkiye

The shift from traditional media into the digital media brings into question how collective memory will be shaped in the digital environment, social media platform as space where people meet, exchange and interact become not only a vehicle of communication but a vehicle for recognition transformative power to easily change traditionals ways of communication can help shaping our collective remembering. The process of these exchanges are in a fluid flow, traversing the digital and seamlessly spilling into the physical, where they continuously relate and reshape both

individual and collective memory. This is a process not linear but one of continual nature which blurs the boundaries between the virtual and corporeal to facilitate an unceasing re-territorialisation of memory: thus estranging all static contiguity points.

Memory, in this sense, emerges as a multiplicity-perpetually in motion and flux.

Personal narratives with transitional layers are deeply connected to other narratives such as family histories, news, politics, and sports. These interactions create a dynamic composition that includes multiple nuances, rhythms, and patterns by happening on several levels. The parts interact continuously, creating complex and fluid mixes that

represent the complexity and interconnection of lived experiences that are the result of a future-oriented present and past experiences that influence the present through ongoing processes of forgetting and remembering.

Thus, utilizing a map enriched with visuals from a three-year, long-term collaborative ethnography with Turkish university students aged 18 to 23—who inhabit social media not as outsiders, but as natives of its realm—this research goes beyond mere analysis of governance frameworks or the influence of technology on collective memories. It looks into the complexities of collective memory in the digital age, not by strictly categorizing social

structures, technology, or the actors who shape or challenge collective narratives, but by examining these topics through the lenses of proximity,

relationships, and transitions within these categories. It addresses a multifaceted set of questions related to security, home, family, love, success, violence, power, and responsibility to understand not just the formation of memory but to trace its underlying patterns and connections which is related to social media. It engages in a nuanced exploration of how people employ complex ways and subtle maneuvers to forge connections in online and offline spaces in order to maintain safety and authenticity in social and political contexts where trust and accuracy are compromised, and how these connections are intertwined with remembering and forgetting, shedding light on the broader implications for collective memory formation and disruption.

Connecting for Care: Weaving Western and Indigenous lenses in the interpretation of network visualizations in a community-engaged child health social network analysis study

<u>Stephanie Glegg</u>¹, Mary Wilson², Symbia Barnaby³, Carrie Costello³, Anton Santos¹, Emma Haight², Helen Harvie², Sophia Sidi¹, Kristy Wittmeier²

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Background and Aims: Connecting for Care is transdisciplinary social network analysis (SNA) study in Canada. It examines ties among families, health care providers, researchers and other key groups involved in child development and rehabilitation. This presentation describes our team's research co-design and co-production process, emphasizing our SNA data interpretation approach, which integrates Western and Indigenous knowledge and perspectives.

Methods: Contributions of our community team members (family and Indigenous partners) at every stage of the research process shaped our study design, data gathering, analysis, interpretation and knowledge mobilization significantly. Indigenous team members supported the interpretation of network visualizations using cultural symbolism.

Results: Overlays of our conventional network visualizations were transformed into symbolic network images. Participant groups' nodes were converted into symbols from nature (e.g., flowers [love], juniper [medicine], branches [growth]). The peripheral network structure represents the outer support circle surrounding children with exceptionalities and their families. The core structure represents protection [cedar bed] where Bear [caregiver] and Cub [child] have a soft place to land. This imagery echos themes from qualitative interviews, which identified relationships and trust as key to strong knowledge exchange for families. Overall, the Indigenist network graph symbolizes possibility, which is created when individuals come together to share and apply knowledge for a collective good.

Conclusion: Weaving together diverse viewpoints allowed us to represent and share our findings in a meaningful way for non-SNA experts while highlighting the study's key findings. For sense-making, the symbolism's foundation in nature makes it relatable/accessible to many cultures around the world.

Drawing the network together: A participatory modelling approach to increase community energy initiative participation through SNA.

Dennis Nientimp, Jacob Dijkstra, Anreas Flache

University of Groningen, Netherlands, The

Community energy initiatives (CEIs) throughout Europe struggle with low participation numbers, hindering the attainment of sustainability goals and exacerbating socioeconomic divides. While research attending to community and social network characteristics seems promising for designing intervention strategies (Geskus et al., 2024; Goedkoop, 2021; Middlemiss et al., 2024; Nientimp et al., 2024), translating findings into practice remains challenging. Current research lacks stakeholder input, leaving local insights underutilized so that stakeholders often feel that intervention strategies are imposed on them, reducing effectiveness. To address this, we collaborated with three Dutch CEIs to start learning communities organized in four sessions:

1: Discuss the socioeconomic composition of the community and reflect on initiators in relation to the rest of the community.

2: Map the local social network.

3: The research team conducts an empirical network and survey study. Collectively, the empirical results are compared to the outcomes of the first two sessions.

4: Insights are turned into an intervention strategy.

The participatory modelling process is constantly evaluated by both researchers and initiators, and everything is captured in a protocol accessible to other community energy projects. Hence, this study promises to boost participation and offers valuable insights for other communities. Comparing initiators' perceived (cognitive) networks with empirical data can reveal biases in network perception and their impact on participation and collective action. We will report on the outcomes of the project relating to the literature on stakeholder engagement in environmental SNA, literature on social network perception and direct policy implications.

Unpacking the Conditions Driving Heterogeneity in Collaboration Networks on Social Media Using Exponential Random Graph Models

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¹University of Science and Technology of China; ²The University of Texas at Arlington, USA

Creators on social media platforms are increasingly engaging in collaborative content creation. Given the importance of integrating diverse perspectives and expertise from different domains to foster innovation, this study aims to explore the conditions that drive heterogeneity in collaboration relationships, particularly in the form of cross-domain collaboration relationships. Specifically, we investigate how content-related and influence-related factors, such as content diversity and influencer status, affect the formation of cross-domain collaboration relationships. Our data were collected from Bilibili, one of the largest Chinese video-sharing social media platforms, which offers a joint submission feature allowing multiple creators to publish their collaboratively generated videos. We employ exponential random graph models (ERGMs) to analyze the formation of a collaboration network comprising 2,499 creators. The findings indicate that creators from different content domains are less likely to form collaboration relationships than those within the same domain. Furthermore, creators with greater content diversity are more inclined to form cross-domain collaboration relationships. Interestingly, creators with individual influencer status are more likely, while creators with institutional influencer status are less likely, to conduct cross-domain collaboration compared to those without influencer status. While previous research emphasizes the homophily effect in network formation, this analysis deepens our understanding of the conditions that promote heterogeneity in social networks and paves avenues for future research on the effectiveness of these heterogeneous relationships.

OS-26: Gender and Social Networks

Location: Room 203 Session Chair: Elisa Bellotti Session Chair: Michelle Nadon Bélanger

Tracing the Historical Trends of Indian Women Emigration to GCC Countries: A Sociological Perspective

Rajesh Kumar

Parul University, Vadodara, Gujarat, India

This article investigates the historical trends of women's migration from India to GCC (Gulf Cooperation Council) countries, as well as the obstacles they confront in their destination countries. Indian women's migration to GCC countries has surged in recent years from a variety of states, including Kerala, Tamil Nadu, Andhra Pradesh, Telangana, Uttar Pradesh and Bihar etc. This migration trend is driven by job opportunities in various area such as hospitality, domestic work, healthcare and other manual work. Migrant women meet a variety of obstacles, including social and vulnerability, as they navigate a work environment marked by low wages, limited labour rights, exploitation, and controlled mobility in host countries. The migratory pattern also addresses gender issues, such as disparities in safe working conditions and equal treatment. Despite these issues, remittances sent by women migrants play vital role in supporting their family back home and have made a considerable contribution to local micro-economic development. The primary goal of this paper is to examine the remittances sent by women migrants to their families. It also highlights potential policy solutions provided by government institutions that can help to improve the experience of women migrants and their rights.

Allyship as a Catalyst? Network-Based Research on Gender Inclusion in Organizations

<u>Freya Grimme</u>, Marie Ritter, Simone Kauffeld Technische Universität Braunschweig, Germany Gender is one of the first characteristics recognized in social interactions, making networking a gendered practice. Despite greater access to key positions in organizations, women's network positions still differ from men's. Networking is often perceived as a male-stereotyped behavior, making women less preferred networking partners, particularly in informal settings. In formal settings, where competencies are emphasized, women may temporarily overcome these stereotypes. Considering networking as a gendered practice, the behavior of male colleagues who support women (male allies, MA) during networking may lead to greater inclusion of women in favorable network positions. This study examines how women's positions shift across formal and informal networking phases and whether male allies facilitate their integration into central positions.

A social network analysis was conducted among 54 members (40 men; 14 women) of a male-dominated interorganizational research network in the STEM university sector. The network was assessed before, during, and after a daylong symposium, including an informal get-together. Additionally, self-reported MA behaviors were analyzed

No significant gender differences in centrality emerged during formal phases of networking. However, women's centrality declined significantly in the informal phase, where they were also nominated far less frequently as contacts. Male allies, in contrast, maintained their central positions throughout.

These preliminary findings suggest that women integrate well into formal networking settings but become less favored network partners in informal contexts. While male allies remain central in both phases, they do not actively facilitate women's inclusion in informal networking, highlighting the need to strengthen allyship beyond structured environments.

The gender stratification in the Indian indie music industry networks

Lalitha Suhasini Vakkalanka

FLAME University, India

The paper examines music networks in the Indian independent music industry and how attitudinal discrimination and sexist structures within them work against women.

Between 2000 to 2024 the Indian indie industry, which caters largely to an English-speaking

urban audience, has witnessed an economic recession in 2008 and a pandemic in 2020. Despite these odds, the Indian indie networks have witnessed significant growth in terms of resources, infrastructure and opportunities with digital streaming and social media platforms extensively widening the scope of the community to reach global audiences.

Yet, a massive disparity exists within music networks because of various types of bias

including gendering that has led to objectification of women, harassment and an unequal wage system. The Indian indie music industry is an informal sector with no organizational structures that legitimize wage structures, hierarchical positions and growth of individuals. So personal networks and social following become all the more crucial in determining the role of music professionals.

While the focus of this paper is women in the performance space, it is significant to note that women music music professionals across the industry including artist managers, tour managers and crew among others are faced with gender inequality especially with regard to employment opportunities, moving up the ranks and an increase in pay scales.

The paper analyses how network structures can shift to transform the industry and how women can gain agency to not only overcome these challenges but also demand equity.

Am I expected to be more empathetic than a male leader? Breaking Barriers: Women and Respectful leadership

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According to extant literature, respectful leadership style is one of the theoretical constructs that better captures empathy, collaboration, and social responsibility associated with women leadership. Despite possessing these qualities, women continue to face challenges in fully expressing their leadership potential.

Building on the Stereotyped Content Model, in this paper we investigate women's perceptions of respectful leadership and the associated challenges. Specifically, we seek to understand the gap between the expectations placed on women in leading respectfully and societal factors (i.e. confidence, societal expectations, or organisational barriers) that may hinder the adoption of this style.

To this end, we interview 44 female leaders from Italy and the UK. We employ Leximancer to map the key themes and concepts around respectful leadership style and women's perceptions. We obtained a semantic network that visually identify the relationship between concepts, providing insights into the interconnected nature of leadership practices and social expectations.

Preliminary results show that women value respectful leadership for organisational success and relationships with employees. However, organisational context may hinder the adoption of this leadership. Our results provide empirical evidence on the complex roles women play in organisations and the barriers they face in fully expressing their identities and asserting their leadership.

Analyzing Co-Authorship Networks: Gender and Academic Group Size

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Gender diversity may play an important role in shaping academic collaboration, career advancement, and access to mentorship opportunities. This study investigates whether gender diversity in different researchers' settings (large and small) influence the professional development of researchers by analyzing co-authorship networks in the field of network science over the past nine years.

We identified research teams and collaboration patterns across academic disciplines by building attributed temporal weighted co-authorship networks. Our analysis seeks to uncover patterns and trends in academic collaboration groups, providing insights into how and in which way they succeed/evolve focusing on gender diversity.

OS-49: Networks in Trade and Finance

Location: **Room 204** Session Chair: **Raja Kali** Session Chair: **Zhen Zhu** Session Chair: **Anastasia Mantziou**

Does the service sector stimulate economic growth? A novel approach with machine learning using US Input-Output data.

santiago Picasso Universidad de la República, Uruguay

A stylized fact in modern economies is the more developed a country is, the greater the weight of the service sector. In this sense, the study of economic complexity through the standar measure of complexity index presents an increasingly relevant omission to understand the economic process and its growth. This paper proposes a new methodology to retrieve information on economic complexity in services. For this purpose, the US input-output matrix is used. This work is novel because, thanks to the structure of the data as a network, it is possible to infer the missing information of complexity of services at a level of disaggregation that is strikingly higher than in other works. Using the k-NN method is possible to learn 146 services sectors complexity index. The index recuperated by this method are consistent with previous works and this index is highly correlated with the GDP of States and US economy.

Battle of currencies in the world trade network: an opinion formation model approach

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We extend the opinion formation model to study the global influence of economic organizations, particularly through currency preferences in international trade. Using data from the United Nations Comtrade database, we construct the world trade network for the years 2010–2020. The model simulates the competition between currencies, focusing on two core groups: five Anglo-Saxon countries that predominantly trade in US dollars (USD) and the 11 BRICS+ nations that prefer a hypothetical currency, BRI, pegged to their collective economies. Countries' currency preferences are

determined using a Monte Carlo process, influenced by their direct trade transactions. Our results indicate that, starting in 2014, the majority of countries would have preferred to trade in BRI rather than USD. The Monte Carlo simulations converge into three distinct groups: one favoring USD, another favoring BRI, and a third group that swings between the two currencies based on initial conditions. We further analyze a scenario with three currencies— USD, BRI, and EUR—where the EUR currency is pegged by the core group of nine EU countries. We show that the countries preferring EUR are mainly the swing countries obtained in the frame of the two currencies model. Additionally, we investigate the competition between USD, the Chinese yuan (CNY), and OPE, a currency pegged to major OPEC+ economies, to assess their economic influence. We also describe the reduced Google matrix of the trade relationships between the Anglo-Saxon countries and the BRICS+, offering insight into the shifting balance of power in international trade currencies.

Ecuadorian Firm-level Production Networks

Diana Beltekian¹, David Jacho-Chávez², Santiago Montoya-Blandón³, Linh Phan², Leonardo Sánchez-Aragón⁴ ¹Kiel Institute, Germany; ²Emory University; ³University of Glasgow; ⁴ESPOL

This paper maps Ecuadorian firm-to-firm domestic and international trade linkages from 2016 to 2023. This novel longitudinal dataset is constructed from granular transaction data compiled following the introduction of electronic billing in Ecuador in 2014. Based on this data, we contribute along several dimensions to the literature on firm productivity, networks and trade. First, we explore whether trade patterns and the structure of the production network obtained in the small, developing, and open economy context of Ecuador match the stylized facts documented in the literature. The firm-to-firm trade network induces upstream and downstream network spillovers, presenting a major challenge for estimating firm-level productivity that is not accounted for in standard approaches. Our second contribution is to use state-of-the-art techniques to estimate firm-level productivity, where we account for dynamics, sectoral clustering, and firm-level observables. To do so, we employ a control-function approach that exploits properties of the bilateral network along with finite mixture methods that allow us to control for unobserved firm heterogeneity. Third, we compare our estimates to standard approaches to quantify the magnitude of the network effect. Finally, with these productivity estimates in hand, we study whether existing tax policies target any specific segment of firms along the productivity distribution, and to what extent the policymakers' observed targeting behavior aligns with competing theories. The recovered productivity distribution can also inform optimal targeting of firms for the design of industrial policy instruments, for example, through leveraging tax rebates or direct subsidies.

Mapping Global Production Networks Research: A Data-Driven Literature Review

Zhen Zhu

University of Kent, United Kingdom

This paper presents a data-driven review of research on global production networks (GPNs) using data science methodologies. A dataset of 1,431 journal articles published since 1984 was collected from OpenAlex (formerly Microsoft Academic Graph). Through bibliometric analysis, natural language processing, and network analysis, this study examines the evolution of research trends, key contributions, and patterns of scholarly collaboration in the field. The findings highlight the increasing integration of network science in economic research, revealing methodological shifts and interdisciplinary engagement. Additionally, the paper identifies underexplored network tools that offer new opportunities for advancing GPN research.

Network Stability and International Finance: Master Stability Function (MSF) Analysis of Trade and Portfolio Investment

Katsushi Tabata¹, Tatsuya Torikoshi²

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This study visualizes topological structural changes in international finance by analyzing interactions between trade and portfolio investment networks. Using Master Stability Function (MSF) analysis with intra- and inter-layer matrices, we quantify each country's impact on financial markets. Results indicate that market stability depends on network interdependence, with key countries acting as hubs. This research lays the groundwork for a new field: the "architecture of international finance."

OS-85: Social networks in migration and migrant incorporation: new developments and

challenges Location: Room 206 Session Chair: Raffaele Vacca Session Chair: Miranda Jessica Lubbers

The role of organizational networks in the social and political integration of migrants

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In the aftermath of the 2008 economic crisis, civil society organizations (CSOs) have played a crucial role in responding to the growing needs of vulnerable groups, including migrants. Their goals have focused on promoting social inclusion, creating employment opportunities, fostering local economic development, and reducing poverty. Through strategic actions in the public sphere, these organizations continue to provide migrants with alternative ways to navigate political and social exclusion. However, the organizational aspects of migrant life remain underexplored.

This article examines the networks and activities of migrant organizations in Geneva. As key sites in migration studies, cities have garnered significant attention through network and relational approaches, which emphasize how local contexts can offer supportive relational opportunities for migrants. These opportunities foster both bridging and bonding ties, challenging exclusion. Given the extensive range of contacts migrant organizations establish in host countries, we argue that networks connect different migrant actors with forms of doing together, involving both "horizontal and vertical" dynamics between migrant and non-migrant organizations, as well as their connections to the policy arena.

In analyzing the vertical and horizontal patterns of interaction among 91 migrant issue-oriented organizations in Geneva, we first describe the network "patterns" that migrants establish with other civil society actors and institutions. Second, we show how these patterns converge into subgroups that are not defined by the common divide between social movement organizations and civil society organizations, but by their strategies aimed at the labor and social integration of migrants.

Egocentric networks as determinants of health inequalities in adolescence

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This study explores the role of egocentric social networks in mediating or moderating the relationship between migration status and adolescent health in Europe. Specifically, we aim to answer the question: Do ego-network characteristics shape the health disparities between migrant and non-migrant adolescents? We test four hypotheses using longitudinal data from the Children of Immigrants Longitudinal Survey in Four European Countries (CILS4EU, n = 15,977). First, we examine whether friendship ties are more likely to form among peers of the same migrant generation (H1). Second, we assess whether migrant adolescents exhibit better health outcomes than their native peers, which aligns with the immigrant health paradox (H2). Third, we analyze whether homophilous friendship networks mediate the association between migration status and health outcomes, offering protective effects for migrants (H3). Finally, we test if homophilous networks amplify the health advantages of migrant youth, acting as moderators (H4). Employing multilevel regression models with bootstrapped standard errors, we find support for H1, indicating strong generational homophily in adolescent friendships, and H2 suggesting that migrant youth report better health outcomes across multiple indicators. Preliminary results provide partial support for H3, with friendship homophily mediating the relationship between migration status and alcohol consumption. H4 receives mixed evidence, suggesting that homophilous networks may reinforce migrant health advantages but with variations across health outcomes. By integrating social network analysis with migration and health research, this study offers new insights into the relational mechanisms that contribute to health disparities in adolescence.

Ethnic Networks and Cultural Identity Across The Life-Course

Elaine Lynn-Ee Ho, Vincent Chua

National University of Singapore, Singapore

This presentation focuses on how immigrants navigate the tension between the desire to maintain cultural identity and the pressures of migrant incorporation. In this context, we examine three dimensions: "want to", "forced to", and

"get to". First, "want to" refers to the strong desire among many immigrants to retain their ethnic culture. Second, "compelled to" involves scenarios where some immigrants are compelled to hold on to their cultural practices by their co-ethnics, who enforce norms of ethnic identity preservation. Third, "get to" highlights the extent to which national structures—particularly multicultural policies—support ethnic culture retention. Ultimately, we argue that minority groups are proactively preserving their cultural identity through strategies like establishing ethnic social networks. We further develop these contemplations through discussion of empirical findings from a research project on Indian and Chinese ageing immigrants in Singapore, illustrating how they navigate migrant incorporation dynamics across the life-course.

How Much Homophily Tells Us About Ethnic Segregation in Schoolfriend Networks

Till Hovestadt², Georg Lorenz¹, Mathis Ebbinghaus²

¹Utrecht University, Netherlands, The; ²University of Oxford, United Kingdom

Much ethnic homophily research builds on school and classroom data, where complete social network data can be collected more easily than in other contexts. Such data enabled network scholars to first demonstrate the pervasiveness of ethnic homophily among adolescents. Earlier research also provides valuable insights into causes and moderators of ethnic homophily within schools. Ethnic homophily research speaks to the overarching social issue of ethnic segregation. What remains unknown is how much ethnic homophily within schools contributes to ethnic gross segregation. This study examines the relative consequences of school composition (affected by upstream mechanisms, such as residential choice) and ethnic homophily within classrooms on the ethnic segregation in friendship networks. We use data from the Trends in Student Achievement study 2018, comprising information on 25,573 students in 1,141 complete friendship networks. Permutation tests decompose gross ethnic segregation into a component attributable to classroom composition and another attributable to remaining factors, including ethnic homophily. Our results reveal that classroom composition accounts for 95 percent of ethnic gross segregation in the examined networks. Counterfactual simulations based on ERGMs suggests that less than one percent of ethnic gross segregation in students' friendship networks is due to ethnic homophily. We will present subsample analyses for classrooms with different levels of ethnic diversity and discuss implications for intergroup contact research.

Immigrant Integration and Friendships: Youth Network Differences in Two U.S. High Schools

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¹Pennsylvania State University, US; ²University of California Irvine, US; ³Harvard Graduate School of Education, US

Friendships play a crucial role in adolescent psychosocial development, yet research shows that immigrant youth develop distinct friendship patterns compared to their peers with U.S.-born parents. Specifically, they tend to demonstrate stronger ingroup homophily and are more likely to experience social isolation, which may negatively affect their social integration and psychosocial well-being. However, the underlying reasons for these differences remain unclear. Building on prior research, this study employs social network analysis to explore variations in network-dependent friendship characteristics between immigrant and nonimmigrant youth, and to examine how ethnoracial background, school activities, and family context shape these characteristics. Using individual and friendship network data from the 2017-2018 Teen Identity, Development, and Education Study (N = 4,370)—a longitudinal survey of students from two U.S. high schools—we assess not only friendship quantity and ingroup homophily but also their relative positions in the broader school friendship network. We anticipate that immigrant and nonimmigrant youth will differ on these key measures, with variations shaped by ethnoracial background, social activity participation, and family socialization.

OS-173: Networks & Sustainability 2

Location: Room 105 Session Chair: Christina Prell Session Chair: Paul Wagner

Fostering Good Governance for Sustainability in Marine and Coastal Socio-Ecological Systems

<u>María Semitiel-García</u>, Lourdes Molera-Peris, José Antonio García-Charton, Pedro Noguera-Méndez, Gema María Díaz-Toca, Amelia Cánovas-Muñoz

University of Murcia, Spain

This research advances our understanding of the structural barriers that hinder the application of good governance principles in Marine Protected Areas (MPAs) as socio-ecological systems. Drawing on our experience in European projects since 2012 and focused on the Spanish case since 2018, we have identified, through both primary and secondary data, various barriers that impede progress towards an efficient marine governance. These insights led us to develop a methodology for evaluating MPA governance efficiency based on stakeholder perceptions, implemented in our OGMAR platform (Observatory of Marine Governance), which covers 858 Spanish MPAs (marine and coastal-marine areas). In this proposal, we apply our methodology to define a typology of management models derived from good governance principles, formulating hypotheses on which groups of actors are most likely to perceive each model. We then test the framework against data collected via OGMAR, incorporating network analysis to construct bipartite actor-governance model networks, identify clusters of actors with shared perceptions, and perform a multilevel spatial examination of governance patterns. By contrasting the theoretical framework with empirical data from Spanish stakeholders, we identify structural barriers that undermine good governance. Further exploration of these challenges through OGMAR data highlights opportunities to strengthen management efficiency and stakeholder participation in decision-making. Ultimately, this study contributes to improving environmental and marine governance by demonstrating how the proposed methodology, combined with network analysis of stakeholder perceptions, can help design interventions that advance the sustainability of socio-ecological systems and foster sustainable human development.

Inter-Organisational Networks for Post-Disaster Recovery. An Integrative Review.

Lavinia Damaschin, Francesca Giardini, Rafael Wittek University of Groningen, Netherlands, The

This paper examines the characteristics of inter-organisational networks in post-disaster recovery, focusing on their ability to adapt and remain effective over time. While extensive research has explored such networks during the preparedness and response phases, their role in long-term recovery has received less attention. Unlike the response phase, recovery is a multi-year process involving the sustainable restoration of the physical, economic, social and psychological well-being of affected communities.

The existing research landscape is fragmented, with scholars from different disciplines applying different empirical and theoretical approaches to different disaster types and networks. To provide a more systematic basis for studying the sustainability of inter-organisational networks, this study conducts an integrative review, synthesising knowledge across research traditions to identify common themes.

A keyword search was conducted in major academic databases, including Scopus, EBSCOhost and Web of Science. The selection process involved screening of titles and abstracts, followed by a full-text review based on pre-defined inclusion criteria, resulting in 17 papers using a network approach. Inductive coding was combined with deductive coding based on the collaborative resilience framework, covering diversity of actors and resources, trust and reciprocity, leadership, community buy-in and structure.

Preliminary findings reveal five core factors impeding the sustainability of inter-organizational networks: bureaucratic constraints, power imbalances, fragmented responsibilities, unclear goals and organisational turnover. Additionally, the study finds that most networks are initially centralised, facilitating coordination in the early stages. However, over time, these networks tend to decentralise as recovery efforts progress and responsibilities become more distributed.

Managing Forests, Managing Connections: Social-Ecological Alignment in State Forestry

Theresa Klara Loch

University of Freiburg, Germany

The increasing complexity of environmental challenges highlights the need for a deeper understanding of socialecological systems. However, conservation efforts often fail due to misalignment between ecological processes and the social, political, or institutional structures governing these ecosystems. Sustainable governance approaches should therefore account for the specific ecological conditions.

Given these complexities, forest management provides a particularly relevant context for examining social-ecological alignment. Forests are dynamic systems where ecological and social processes interact across multiple scales, requiring coordinated management strategies. Multifunctional forests face increasing demands as they must balance ecological, social, and economic objectives sustainably. In Germany, state forest management is expected to serve as a role model in addressing these objectives. However, this requires cooperation and collaboration among forest district managers, particularly for conservation efforts spanning multiple jurisdictions.

To examine these connections, we investigate the horizontal interactions between forest district managers and their alignment with ecological conditions. Specifically, we ask:

(i) To what extent do forest district managers within a state forest enterprise engage in horizontal cooperation and collaboration?

(ii) How do patterns of cooperation and collaboration among forest district managers align with ecological patterns?

(iii) How does the alignment between cooperation and collaboration patterns and ecological structures influence selfassessed performance?

We address these questions through a social-ecological network analysis, combining social network data from an online survey with ecological data on species distribution. The survey, completed by 20 out of 21 district managers, captured self-reported cooperation and collaboration patterns. Ecological patterns are understood as the abundance of species of higher management and societal concern (capercaillie, golden jackal, lynx, wolf, wildcat, partridge, and bark beetle) in the districts.

By integrating social network analysis with ecological patterns, this study provides a frame for assessing how well governance structures align with ecological conditions to support sustainable forest management. Understanding these network interactions is essential for identifying opportunities to strengthen cooperation and collaboration, potentially contributing to more resilient and and sustainable management practices.

Networking Legitimacy: How Social and Environmental Safeguard (SES) Experts Establish Authority in Global Governance

Marine Gauthier

Graduate Institute, France

This article examines the mechanisms through which social and environmental safeguard (SES) experts establish legitimacy in global governance, emphasizing the role of professional social networks in shaping and consolidating this emerging field of expertise. Over the past 10–15 years, SES expertise has developed at the intersection of international organizations (IOs), policy frameworks, and consultancy markets, yet its boundaries and professional norms remain fluid. Drawing on Bourdieu's field theory and social network analysis (SNA), this study explores how SES professionals—both internal officers and external consultants—mobilize social, cultural, economic, and symbolic capital to gain recognition and authority. Through a mixed-methods approach—interviews with 25 SES experts and computational analysis of 200 LinkedIn profiles—the research uncovers patterns in professional trajectories, network formation, and reputational signaling. By analyzing how SES professionals leverage their affiliations, credentials, and digital visibility to navigate institutional hierarchies, this study sheds light on the evolving nature of expertise in development governance and the role of social networks in structuring professional legitimacy.

Networks in Water Governance. A cross-disciplinary scenario approach

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Global temperatures are rising and recent summers have seen more droughts, falling groundwater levels, and forest loss. This has increased awareness about preparing for climate change's effects on water management. A variety of actors is involved in the management or governance of water resources, including representatives from the private sector (e.g., farmers or industry associations), non-governmental organizations (NGOs) (e.g., environmental groups), water providers, governmental agencies or political actors in legislative or executive institutions. To achieve water security, civil society, communities, political decisionmakers, water managers and all other actors involved have to be included. Research on water issues is carried out both in the environmental sciences, more specifically hydrology, but also increasingly in the social and political sciences. However, cross-disciplinary research is still rare and underdeveloped. To address the uncertainty of future developments, scenario analysis has become state of the art in research and policy advice. We contribute with a cross-disciplinary study using cross-impact-balance (CIB) analysis. We analyse governance networks and complex policy decision-making processes combined with storylines for future climate scenarios to find efficient strategies for water resilience, adaptive capacity building and carbon reduction to support informed decision-making.

OS-202: Social support and health 2

Location: Room 106 Session Chair: Guy Harling Session Chair: Dorottya Hoor

A Comparative Study on Family Interaction and Health Among Asian Americans from a Social Network Perspective

HSUEH-CHIEN CHIANG.

National Chengchi University, Taiwan

This study explores the impact of family interaction and family structure on self-rated health among Asian Americans from a social network perspective. Using data from the American Time Use Survey (ATUS), we analyze how different family structures shape individuals' social connections and health outcomes. We further examine family interaction frequency and time as key mechanisms influencing health. We hypothesize that stronger family networks and more frequent interactions provide greater social support and emotional resources, leading to improved self-rated health. However, certain family structures or culture may introduce caregiving burdens or role strain, resulting in complex health effects. Employing an Ordered Probit Model, we control for socioeconomic status, age, gender, disability status, Asian subgroups, and cultural background. This study contributes new empirical evidence to the intersection of social networks and health research, highlighting the critical role of family networks in promoting well-being among Asian American communities.

A socio-situational approach to acute health emergencies: The influence of situation structure on delayed hospital arrival during stroke.

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Health emergencies are situational (Alonzo 1979). Social responses to bodily changes emerge from diverse social situations, including time, place, and people, influencing pathways to healthcare. Current network approaches, however, overlook real-time situations, focusing instead on stable personal networks that estimate responses during acute health emergencies. Consequently, specifying the social mechanisms affecting health inequality, particularly healthcare access, remains challenging. To increase specificity, we examine the momentary social situations of individuals who arrived at the hospital facing an acute health emergency-stroke. A survey of 246 individuals (egos) used novel situation-based name generators and identified two types of responders (alters) involved during responses: local (physically proximate alters) and remote (physically distant alters). There are four principal findings. First, 95.27% of individuals had responders involved, and among these, 48.09% reported a remote responder. Second, among the responders identified, remote responders were significantly more likely to be perceived as knowledgeable about stroke (49.71% versus 32.61%, p = 0.0034) and were medical experts (41.71% versus 17.39%, p < 0.0001) than local responders. Third, remote responders were significantly less likely first to notice symptoms than local responders (28.57% versus 52.90%, p < 0.0001), suggesting deliberate activation as a mechanism for gaining novel information during responses. Fourth, net of individual factors and social settings, remote responder involvementsituational structure-was significantly associated with an increased risk of delayed hospital arrival (>2 hours). A socio-situational approach reveals that the structural characteristics of situations are related to healthcare access, specifically the involvement of physically distant responders.

Do Social Costs Make Chronic Conditions More Depressing? Evidence from the German Ageing Study

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Past research has shown that chronic conditions tend to increase depressive symptoms. However, research on the moderating role of social networks has been largely asymmetric. Despite substantial interest in the positive aspects of relationships to provide social resources for coping with health changes and buffering depressive symptoms, less is known about how adverse aspects of social relationships and networks can be detrimental to coping efforts and amplify the mental health consequences of chronic conditions. To test whether and to what extent social costs may make chronic conditions more depressing, I use a national sample of adults aged 40 and above, the German Ageing Study (DEAS). Analyses evaluated the relationship between changes in chronic conditions and depressive symptoms and whether this association was exacerbated by social network costs. A structural equation modeling approach using dynamic panel models with fixed effects and full information maximum likelihood estimation adjusts for the
effects of social resources, specific time-varying characteristics, and earlier depressive symptoms. This approach also improves confidence for causal inference into the moderating role of social network costs by accounting for missing data and confounding based on stable unobserved covariates. Results suggest that certain dimensions of social negativity amplify depressive symptoms following changes in chronic conditions, underscoring the detrimental impacts of social costs on mental health. With multimorbidity becoming increasingly prevalent across the adult life course, the double-edged nature of social relationships has the potential to substantially impact the mental health profile of aging populations.

Family Networks and Prenatal Distress

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Prenatal distress affects a significant proportion of pregnant individuals and can lead to adverse outcomes for both parent and child. While research has identified various risk factors, the role of family support and stress remains understudied, particularly regarding specific structural and qualitative dimensions of family networks. This mixed methods study examines the relationship between family dynamics and prenatal distress using data from the Family Matters Study (n=436). Pregnant participants were recruited from a North Carolina health system between 2023-2024 and completed virtual survey interviews using EgoWeb 2.0. A subset of the survey respondents (n=59) also participated in follow-up semi-structured interviews. In the survey, prenatal distress is measured using nine items from the Revised Prenatal Distress Questionnaire (NuPDQ). Using a social network approach, we examine whether structural features of family networks (size, density, transitivity) and qualitative aspects of family relationships (proportion of positive, negative, and ambivalent relationships) are associated with prenatal distress levels. We combine these results with an analysis of the qualitative data to better understand the ways that families induce or ameliorate stress during pregnancy. Unlike previous research that often focuses narrowly on partner support or uses broad measures of family support that hide the ambivalence common to family ties, our approach captures the complex nature of family networks during pregnancy. This research contributes to a more nuanced understanding of how specific family configurations and relationship qualities relate to psychosocial well-being during pregnancy.

Leveraging Social Networks to Improve Rural Maternal Health in the Southeastern United States

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Closures of obstetrics units in rural hospitals lead to maternity care deserts and a cascade of poor maternal health outcomes among underserved communities in the United States. Little is known about pregnant women's social networks as drivers of care engagement under these dire maternal care circumstances.

This study uses social network analysis (SNA) to examine how social relationships influence health decisions among rural women during pregnancy and childbirth. Specifically, this study employs a mixed-methods approach, combining SNA with qualitative interviews, to assess the role of network size, density, centrality, and support quality in pre/postnatal care decision-making. Participants include pregnant and recently postpartum women from rural communities in Tennessee, recruited through local healthcare centers and community organizations. We investigate strong social ties as drivers of engagement with formal healthcare services, the extent to which prenatal misinformation exists within networks, and the role of network support in mitigating barriers to care. By mapping and analyzing the structure, strength, and composition of women's social networks, we explore how family, friends, healthcare providers, and community members shape prenatal care utilization and birth choices.

Forthcoming findings will contribute to our understanding of how rural women's social networks shape health decisions and inform the design of interventions to enhance positive social influences, strengthen healthcare provider-patient relationships, correct misinformation, and improve maternal health outcomes in rural areas. Understanding these network dynamics can inform policies to address rural health disparities by leveraging community-driven, network-based solutions for maternal health.

OS-180: Personal Networks across the Life Course 2

Location: Room 107 Session Chair: Marlène Sapin Session Chair: Claire Bidart Session Chair: Guillaume Favre Session Chair: Michel Grossetti Session Chair: Béatrice Milard

Beyond Adolescence: Exploring Value Similarities Between Parents and Adult Children

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Researchers have been interested in value similarities across family members for decades focusing specifically on the similarities between parents and their adolescent children. Adolescence, however, is a relatively short period of time strongly affected by changes and transitions; therefore, similarities observed between teenagers and their parents should not easily be assumed to persist throughout adulthood. To address this research gap, I inspected value similarities of parents and their adult children using data from multiple rounds of the German SOEP. To provide more details concerning the similarities, I inspected the similarities separately for mothers and fathers. I focused on values from three areas: material success, family life, and pro-social behavior. The preliminary results show that differences between mothers and their children, as well as fathers and their children, were the smallest for the importance of being there for others. At the same time, they were largest in terms of the importance of having children. Overall, on average neither parent seemed to be more similar to their child than the other. For some values, like the importance of a successful career, the differences were smaller for fathers; in others, such as the importance of owning a home, they were smaller for mothers. To provide an even wider overview, future analyses might also include intragenerational value similarities, meaning the value differences between parents and between the adult child and their siblings. This will allow additional insight concerning differences due to generational differences in society.

Disruptive life events, conflicting temporalities and social support mobilization processes: Peruvian teachers in times of pandemic.

Martin Christian Santos

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Social life consists of an interweaving of times (Rochabrún, 2021; Bidart, 2013) and relationships between human beings imply time exchanges. In this sense, the COVID-19 pandemic led to a reorganization of daily life, in particular, to a reconfiguration of the spatiotemporal relations between work and family. Thus, there were tensions and complementarities between work time and family time. In this context, teachers, central actors in educational systems, found themselves "between two fires": they had to face the tension between the new needs and demands of work and family, which included the occurrence of unexpected biographical events (deaths, illnesses, anxiety, depression, among others).

The present study investigates the links between the temporalities of work and family, and their consequences on the mobilization of personal networks of Peruvian secondary education teachers during the COVID-19 pandemic. The methodological design was of a mixed nature (sociometric and qualitative). Two basic forms of relationship between teaching time and family time were found: confluence with displacement and confluence with complementarity. These forms of relationship led teachers to mobilize their personal support networks, which involved mobilizing the time of the members of these networks. This mobilization of time required coordination, but also gave rise to tensions between multiple times: the time of teachers, their partners, their children, their students, and their students' parents. These results add to the literature on the relationships among personal networks, social support mobilization processes and time.

Ego-centric female networks of male refugees from Syria and Afghanistan: romantic potential

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Forced migration disrupts refugees' social networks and complicates partnership formation, especially for young refugees at an active partnership-forming age. These challenges are often heightened by skewed sex ratios among co-ethnics. In the absence of network data, little is known about the availability of social networks with romantic potential and the factors shaping such connections. We utilized newly collected ego-centric PARFORM data from

Germany (2022–2023) to examine the presence of women in the networks of young male Syrian and Afghan refugees who arrived unmarried between 2014-2018, and whether these connections have the potential to develop into romantic relationships (N=1,139 egos; N=1,655 alters). We employed OLS and linear probability models to explore how the presence of up to three female contacts and potential romantic preference is shaped by three factors: 1) cultural, socio-economic, and personal characteristics of refugees and female contacts, 2) the availability of opportunity structures to meet women, and 3) societal expectations. Findings reveal, first, that male refugees with at least one woman in their social network were, on average, more educated and less religious. They had greater opportunity structures, such as a higher share of male friends and relatives in Germany. Second, among female network contacts—both among co-ethnics and German residents—refugees strongly preferred culturally endogamous women for potential partnerships. To achieve this, they sought online contacts and family advice. These findings suggest that whereas both cultural and socio-economic factors matter for access to female contacts, cultural factors outweigh socio-economic ones in shaping refugees' romantic preferences.

Family networks in the transition to parenthood: A predictive machine learning approach

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Erasmus University Rotterdam, Netherlands, The

Family networks are a valuable source of information and support influencing the parenting strategies of first-time parents, especially when it comes to arranging childcare. How family networks shape childcare strategies depends on the complex interplay between the gender, lineage, education, employment, and geographical proximity of available kin, among other factors. However, previous work studying how family networks shape childcare choices focuses on a few of such factors at a time, and often considers only relationships with close kin. We undertake a much more comprehensive empirical test. We adopt a machine learning perspective where we quantify the relevance of family networks in terms of their ability to make out-of-sample predictions of whether first-time parents use formal childcare services in the Netherlands. We leverage population-scale network data for over 200,000 first-time parents derived from administrative registers that allows us to trace the family relationships between all registered residents of the country in 2021. We construct the ego-networks of couples including step- and extended kin, and measure their composition and structure considering the availability of specific types of kin (e.g. maternal aunts), the existence of specific triads and higher-order motifs (e.g. grandmother-aunt-cousin), the generational structure of the network, its geographical dispersion, the educational and employment status of alters, and their care needs and burden. We model the relationship between childcare choices and this large set of predictors using random forest models with bagging and boosting to prevent overfitting, avoid multicollinearity, model non-linearity, and account for interactions between all predictors. By carefully analysing the results, we provide a comprehensive population-scale test of how close and extended kin matter in the transition to parenthood and subsequent childcare arrangements.

Patterns of Resources and Strains in Personal Networks of Young Adults and Mental Health

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This research examines, cross-sectionally, the patterns of resources and strains in personal networks and psychological adjustment in a general population sample of 4000 young men and women in Switzerland, considering the different social markers of the transition to adulthood. We investigated the patterns of support and conflict interdependencies using a typological approach of structural interdependencies, jointly considering both structural features of support and conflict relationships within young adults' networks. Six patterns of positive and negative interdependencies were identified, with some reflecting bonding and/or bridging types of network-based social capital, which certainly feature the availability of relational resources. However, other patterns, mixing supportive and conflict relationships, reflect more stress and strains than resources. A pattern also features the presence of sparse supportive and conflicting relationships. Our results showed that young adults embedded in personal networks featuring some bonding social capital had lower levels of distress. On the other hand, those integrated in patterns of interdependencies where stressful relationships are over-represented, or those in a pattern of sparse interdependencies, expressed high levels of distress. Our results showed that patterns or resources and strains matter for the mental health of young adults. We also assessed the extent to which such patterns of support and conflict interdependencies related to the social structure and some transition markers. Our results have policy implications in the current context where the increasing complexity of society makes the transition to adulthood increasingly challenging for a significant part of young people.

OS-157: Organizational Networks 5

Location: Room 108 Session Chair: Spyros Angelopoulos Session Chair: Francesca Pallotti Session Chair: Olaf Rank Session Chair: Paola Zappa

Strategic Minds in Organisational Networks: Centrality as a Predictor of Systems Thinking

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The structural positioning of individuals within organisational social networks plays a pivotal role in shaping cognitive processes, yet its influence on systems thinking remains insufficiently examined. Systems thinking, defined as the ability to recognise interdependencies, feedback loops, and emergent patterns in complex environments, is critical for effective decision-making and problem-solving. However, the extent to which an individual's network position enhances or constrains systems thinking remains unclear.

This study addresses this gap by employing Social Network Analysis and the Systems Thinking Scale developed by Davis and Stroink (2016) to assess how four centrality measures - degree, closeness, betweenness, and eigenvector centrality - affect systems thinking capabilities. Data were collected from 114 employees in knowledge-intensive firms, capturing workplace interactions and evaluating systems thinking through a Likert-scale survey.

Findings indicate a positive relationship between network centrality and systems thinking ability. Eigenvector centrality emerged as the strongest predictor, suggesting that individuals embedded within well-connected, influential clusters develop superior systemic insights. Closeness centrality also demonstrated a notable effect, highlighting the cognitive benefits of rapid access to diverse perspectives. In contrast, betweenness centrality had a weaker predictive effect, indicating that while brokers facilitate information flow, they may lack sustained engagement in systemic thought.

These findings highlight the critical role of social network structure in shaping individual's systems thinking. Organisations can enhance strategic decision-making and innovation by identifying and leveraging individuals in key network positions. Future research should explore causal mechanisms and longitudinal dynamics to further elucidate how social connectivity fosters the development of systems thinking over time.

Team leadership roles: a structural approach

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Literature on team leadership tends to focus predominantly on individual attributes that make effective leader or on relational strategies that leaders should employ in order to get desired outcomes. Much less attention is paid to social relationships in which leaders are embedded. Following the classical structural approach, leadership is viewed as a role that is constrained by the structure of social relationship in the network. To explore these ideas, we used the data from a survey of teams and team leaders from Slovenian and Finnish organizations using a whole-network survey method. For each of the 23 teams in the sample the survey obtained complete network data for advice and socializing networks. We calculated network density, different measures of centrality and range and used the network properties in exploratory cluster analysis obtaining four distinct clusters. The analysis suggested that team leaders had four different types of networks indicating four different leadership roles with further implications on team performance. The key contribution of this paper is in the departure from standard analysis of "leadership styles" that leaders can pick at will, showing instead that leadership roles are based in the structure of social relationships that constrain and define their role as leaders.

What are the obstacles and enablers for participation in open strategy?

Steven Brown

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While corporate strategy has traditionally been perceived as an exclusive and relatively 'closed' activity, recent research shows a shift towards more open approaches to strategy work. Benefits include the leveraging of expertise of a wider range of actors, enabling the creation of better strategies, as well as allowing the distribution of valuable

strategic knowledge across different levels of a firm, facilitating strategy implementation. The scale of the open strategy literature is still relatively small, but the pace of publication is increasing.

The purpose of this project is to focus on the obstacles and enablers for participation in open strategy settings. In support of this, a systematic literature review and thematic analysis has been conducted; themes identified in this review focus on issues around inclusion, participation, transparency and technology. From a methodology perspective, the intention is to apply a mixed-method approach to gather data via a longitudinal study at a corporate organisation (access already secured). The intended methods are a mix of qualitative (semi-structured interviews/focus groups), quantitative (surveys collecting data on participation, inclusion, transparency and technology), and network data (to capture data on relational dynamics over time, largely missing in open strategy research to date). This combination of methods, network analysis in particular, is new in the open strategy literature.

The aim is to provide a response to calls from the literature for more empirical work on participation in open strategy; this research will also be of interest to organisations seeking to open up their strategizing processes.

You are the Company You Keep: Investigating the Effect of Communication Ties on Social Loafing Disparities

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This study investigates the role of communication ties in shaping the synchronization of social loafing behaviors among employees. While prior research has documented various antecedents of social loafing, the impact of social networks remains relatively underexplored. Grounded in social influence theory, this study examines how the existence of communication ties between dvadic pairs influences the disparities in their levels of social loafing. Furthermore, we differentiate the effects of strong and weak communication ties on social loafing and explore how these effects are contingent on age disparity. Our data were collected from all employees in a Chinese technology company. Communication ties were assessed using a roster-based survey, where participants identified colleagues they communicate with and reported the frequency of communication to characterize the strength of communication ties. Dyadic pairs were categorized as having no communication ties, weak communication ties, or strong communication ties. Our results reveal that dyads with strong communication ties exhibit significantly smaller differences in social loafing levels, while the presence of weak communication ties exhibits insignificant effects on differences in social loafing between dyads. Additionally, our findings show that age disparity negatively moderates the effect of weak communication ties, suggesting that larger age gaps may hinder the influence of weaker ties on the convergence of social loafing. However, age disparity does not significantly moderate the effect of strong communication ties. This study advances our understanding of how to leverage communication dynamics between employees to mitigate social loafing and enhance collective productivity within organizations.

OS-196: Social Networks in Childhood, Adolescence, and College 2

Location: Room 109 Session Chair: René Veenstra Session Chair: David R. Schaefer Session Chair: Carolyn Parkinson

Harnessing Metacognition, Modeling and Collaboration to Enhance Adolescents' Socio-Emotional Competencies and Social Connectedness

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This presentation provides a theoretical and empirical perspective on how metacognitive approaches can be tapped to boost students' functioning in peer contexts. The presentation draws on existing literature on metacognition linked to social cognition and socio-emotional learning to distill key insights that can guide the formulation of approaches that tap on metacognitive strategies to facilitate the development of students' pro-social skills such as empathy, emotional regulation, perspective-taking and conflict resolution. The second part of the presentation elucidates the results of a socio-metacognitive intervention that aimed to enhance students' ability to form and maintain friendship relations. The intervention included metacognitive strategies such as reflection and prompts, along with other socio-cognitive strategies (i.e., modeling and collaboration), to enhance students' awareness of the thoughts and emotions of oneself and others, awareness of the nature of friendship and friendship formation, awareness of one's strategies to manage conflict, managing negative thoughts or mind traps. The study followed the equivalent group pretest-posttest experimental research design. Surveys on students personal peer networks and socio-emotional

competencies were administered before and after the intervention. Semi-structured interviews were conducted on 29 students after they participated in the intervention. Thematic analysis was carried on students' interview transcripts indicate the following key themes: (1) awareness of overthinking and mind traps; (2) self-regulation to manage and reduce mind traps; (3) awareness of beliefs and attitude towards relationships; (4) awareness of other's thoughts and intentions within social settings. The students also self-reported an increase in their personal friendship networks and closeness with friends. The results of the study underscore the potential role of metacognition as a component of socio-cognitive interventions in enhancing the students' socio-emotional competencies and social participation.

Student Sociability in French Higher Education

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The COVID-19 pandemic has highlighted the importance of student sociability and young adult isolation in public discourse. However, these phenomena remain understudied in France, particularly from a quantitative, national-level perspective. While sociology has extensively examined selection mechanisms, segregation, and social disparities in higher education, limited research has investigated how these inequalities affect social relationships during a pivotal period often described as a relational peak in biographical trajectories.

This research aims to provide an initial measure of student sociability in France while examining its variations within a heterogeneous educational system. Drawing on personal network sociology and taking a "supply-side perspective" of social relationships influenced by Peter Blau and Scott Feld, we strive to analyze how higher education segmentation impacts students' sociability opportunities and forms. Our central hypothesis posits that diverse study environments and modalities (institutions, disciplines, material and organizational conditions) follow differentiated levels of sociability and relational configurations, challenging the assumption of uniform student sociability.

To test this hypothesis, a mixed methodology was chosen. The latter is based on a series of in-depth semi-structured interviews, supplemented by a detailed mapping of the personal network using specialized software, allowing a precise visualization of personal networks. In parallel, an online questionnaire uses a new approach to self-assessment of personal networks, adapted to the constraints of collecting relational data over the Internet. Data collection will begin in February 2025, this presentation will thus provide an opportunity to share and discuss both the initial empirical results and the ad hoc methodology developed.

Being a friend and being around: Situational variation in school network and its association with adolescents' mental health

Srebrenka Letina, Mark McCann, James Allen

University of Glasgow, United Kingdom

Adolescence is a critical period for lifelong mental health, when peers' influence is particularly important for individual mental health outcomes. But, both – peers and mental health may vary across situations. However, most studies rely on unsituated (not situation specific) school friendship data and mental health measures, overlooking how stability of social ties across different situations relates to mental health outcomes. This study, part of the SOCial sITuational Systems (SOCITS) project, explores this gap through methodological advancements in understanding influences on adolescent mental well-being.

Conducted in two Scottish secondary schools (N = 338, three school years), students reported on their friends, negative ties, but also on "who is usually around them" in four school situations: school's courtyard, library, canteen and having lunch elsewhere in the school. They also reported on both general (unsituated) and situation-specific (situated) mental health (depression, loneliness, anxiety, and stress) in those four situations.

To understand the effect of network stability on measures of mental health, we will classify students into groups based on their ego-network stability across situations, using various metrics of differences between friendships and situated networks. These groups will be compared on general mental health measures and their situational variation to examine how changes in social networks across school contexts relate to individual mental health.

We will employ multiple analytical strategies, including various ego-network difference metrics, classification methods, and group comparisons. Finally, we will discuss how these findings could inform school-level interventions aimed at improving adolescents' mental health.

Contextualizing the STEM Gender Gap: Friendship Networks, School Context, and Gender Differences in STEM Interests

<u>Clara Englert</u>, Hanno Kruse University of Bonn, Germany

Despite similar academic performance, girls exhibit significantly lower interest in STEM subjects than boys. Beyond early socialization processes, the school environment plays a key role in shaping students' STEM interests: On the one hand, friends' and classmates' adherence to gender-normative beliefs can affect adolescents' STEM interests, as gender-atypical interests may be socially sanctioned. On the other hand, organizational and structural factors at the school-level can influence the development of gendered STEM interests. In this study, we conceptualize the gender gap in STEM interests as a relational phenomenon that varies across different educational environments. By bridging two previously separate research strands—one examining peer dynamics as a universal amplifier of gender disparities and the other exploring school-level variations in STEM interest gaps—we provide a more nuanced understanding of how locally specific, gendered STEM peer cultures emerge.

Our empirical analyses are based on the German Trends in Achievement 2018 study, which contains data on the friendship networks of over 44,000 ninth-graders across 1,462 schools in Germany. First, we quantify and model gendered STEM peer cultures using exponential random graph models. Second, we apply variance decomposition methods to determine the contextual levels at which gendered STEM peer cultures emerge. Finally, we inductively identify the institutional and compositional school features that predict the development of these cultures. By taking a relational and contextualized approach, our study provides both theoretical and practical insights into the key conditions shaping the emergence of gender disparities in STEM interest.

Exploring Community-Level Childcare Social Networks: A Comparative Mixed Methods Study of South Korea

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Children are raised in a community. Nonetheless, the vast majority of existing studies have explained childcare primarily through socio-economic characteristics. While a growing body of research acknowledges the role of interpersonal relationships, empirical evidence on childcare relationships at the community level remains limited. We explore the role of community-level social networks in shaping childcare experiences, focusing on two South Korean cities with contrasting fertility rates: Sejong and Seoul. We employ a mixed-methods approach, including semi-structured interviews (N=18) for qualitative approach and social network analysis using a name generator survey for quantitative approach. The interview findings reveal that Sejong City, with higher fertility rates, fosters a strongly bonded childcare community, leading to more satisfying childcare experiences compared to Seoul, which has lower fertility rates. Social network analysis further indicates that networks among children and parents are larger in Sejong than in Seoul. Additionally, while casual networks for children's playdates are present in both cities, these relationships associate with deep networks of parents primarily in Sejong. By shifting from individual- to community-level analysis, we highlight the significance of cohesive social networks for childcare satisfaction, offering valuable insights into addressing fertility and childcare challenges in low-fertility contexts.

OS-105: Advanced Mathematical and Statistical Network Methodology 2

Location: Room 112 Session Chair: Martin Everett

Multilevel Multiplex p2 Model: A Hierarchical Extension to Mixed-Effect Social Network Modeling

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Social systems often exhibit multilevel structures, such as multiple classrooms, firms, or groups. These structures are assumed to be independent but share a common structure. Within each group, social actors are interconnected through various social relationships, such as friendship and bullying networks. Analyzing repeated observations of these multiplex relations across different groups allows for more generalizable results and addresses group-level research questions.

We propose a hierarchical extension to the multiplex p2 model, a mixed-effects model for cross-sectional binary multiplex network data. This multiplex multiplex p2 model allows for dependency modeling at the actor, dyad, and

group levels. At the actor level, ties sent and/or received by the same actors are dependent across different relational dimensions as fixed and random effects. At the dyad level, ties between two actors are dependent across different relational dimensions as fixed effects. At the group level, multiplex relationships in each group share common structures across groups, meaning the fixed effects parameters in each multiplex network are correlated between groups. The model also incorporates group-level covariates, such as class size, in addition to actor and dyad-level covariates.

Compared to fitting each multiplex network separately and aggregating by meta-analysis, our approach estimates parameters more efficiently through pooling. The degree of pooling, which controls how much information is shared between groups, is determined by the data and a prior on the amount of pooling. We demonstrate the utility of the multilevel multiplex p2 model through an original study on gossip, as perceived by gossip senders and targets, and their differing perspectives. The study is based on data from 34 Hungarian elementary school classes.

Network Models under Heteroskedasticity: Estimators and QAP-Tests

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Network data consists of dyadic observations. In contrast to monadic data, which observes aspects on an individual level, network data have two indices at a minimum. Furthermore, the two sets of indices are self-referent, i.e. they are sets of labels pointing to the same objects. For example, consider a classroom of 10 students. Each individual student receives a unique label, say i\in\left\{1,2,\ldots,10\right\}. Observing ages of the students could be represented as a monadic data variable, A_i. However, the dyadic `Friendship' relation between all pairs of students is represented in the dyadic variable F_{ij}, where i,j\in\left\{1,2,\ldots,10\right\}. This immediately shows the inherent dependence of observations, as each student is involved in 18 observations (9 sending and 9 receiving), for example, the observations in the subset {F_{1j}, F_{i1} \forall \i, \lnot 1} all are dependent on the friendship behavior of student with the label "1". Classical statistical tests will lead to underestimation of parameter variance under such conditions. A remedy against such dependence is to use permutation tests, that relabel the network, hence generating a random data set with equal dependence, under the null-hypotheses. This approach is very succesful, but subject to stringent conditions. For example, multicollinearity and skewed distributions require specific adaptations of the permutation approach. Another less studied issue is due to heteroskedasticity which violates the basic assumption of permutation tests, namely the exchangeability assumption. Depending on its source heteroskedasticty can be dealt with through HC-consistent estimators, but also through specific permutaion schemes. A more persistent issue lays in the fact that some non-linear models, such as the logit model inherently induce heteroskedasticity. In this paper we study how different estimators (Maximum Likelihood, GMM) exacerbate the problem of heteroskedasticity with network data. Furthermore, we present a permutation test for the presence of heteroskedasticity, which may prevent overuse of remedies.

Social influence on multivariate dichotomous data

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Consider for example the determinants of the choice to buy an electric vehicle (EV) or to use modern contraceptives (MC). Your choice of EV will be influenced by your concern for the environment, economic sensibilities, etc, but also the opinions about these things of your friends. Your choice of using MC will depend on whether you think it causes conflict, whether you think others approve, and whether it is important to you that others use MC but, in a small village, the opinion about these things of the people you spend your free time with will also be important. We propose a multivariate autologistic attribute model (MALAAM) for studying the social influence on multiple binary outcomes simultaneously for cross-sectional data. This MALAAM has a regular graphical model for contingency tables as a special case. Furthermore, setting some interactions to zero yields a product ALAAM, where independent ALAAMs are estimated jointly for multiple outcomes. We demonstrate a Bayesian inference procedure for obtaining the posteriors of the model parameters and a Bayesian model selection approach using DIC. Applying this modelling framework to data on MC use in a Kenyan village we find that there are different types of social influence on different outcomes and that the social dependencies confound associations that would be inferred using a regular graphical model.

Testsing in Restricted Multigraphs: Balance Correlation

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Understanding structural balance in signed graphs is a central challenge in network science, with applications in social networks, international relations, and organizational structures. One emerging approach to quantifying balance behavior is through balance correlation, a measure that captures the extent to which triadic relations follow balance theory principles. However, existing statistical tests for balance correlation rely on the expected degree distribution, which imposes strong assumptions about the underlying probability distributions. These assumptions can lead to inefficiencies in generating random graphs and, consequently, a loss of statistical power.

Our study introduces a new Fixed Degree Test for assessing balance correlations in signed and multigraphs. Unlike the expected degree distribution test, which generates random networks under more restrictive conditions, our approach preserves the observed degree marginals while allowing for more flexible network structures. Through extensive simulations, we demonstrate that the Fixed Degree Test improves the power of balance correlation significance tests, ensuring more reliable detection of balance-driven behavior in real-world networks.

Our results indicate that the expected degree test, while widely used, may over-constrain network structures, leading to misleading conclusions about balance prevalence. In contrast, the Fixed Degree Test provides a more accurate baseline, making it particularly useful for studying balance in networks with heterogeneous tie distributions. Beyond balance correlation, we will also explore how this test generalizes to other network statistics, offering a versatile framework for analyzing signed and multigraph structures.

By refining the statistical toolkit for signed network analysis, our work contributes to a more robust and flexible approach to studying balance theory in complex networks. We invite discussion on its applications across disciplines and its potential integration into broader statistical models for network dynamics.

OS-140: Globalisation and Network Analysis 2

Location: Room 114 Session Chair: Matthew Smith Session Chair: Yasaman Sarabi

Of centers and peripheries: Explaining the polycentric structure of book translation flows in Europe

Matthias Kuppler University of Siegen, Germany

Purpose: Literature is exchanged across nations and languages. The exchange is very unequal, however, and prioritizes a handful of mostly Western countries. Existing research is split over the question of whether these inequalities are driven by the prestige of national literary traditions, economic infrastructures, political support, or cultural proximity. To advance the debate, this presentation leverages newly collected data on N = 147,443 translations of literary works to reconstruct the network of translation flows between 32 European countries for the time period 2018 to 2020. *Methods:* The effects of literary prestige, economic infrastructure, political support, and cultural proximity on translation flows were estimated with a combination of Generalized Additive Models (GAMs) and the Quadratic Assignment Procedure (QAP). Data on over 10,000 writers were compiled from eight encyclopedias of world literature to construct a comprehensive measure of literary prestige. Flexible P-splines were used to control for nonlinear effects of country size that otherwise pose the risk of confounding analyses of ecological units such as countries. *Results:* Countries with a prestigious national literature and a powerful publishing industry were found to have more out-translations but fewer in-translations. Surprisingly, countries with higher state investment into culture generated fewer out-translations. Countries with higher cultural proximity did not exchange more translations. *Contributions:* This presentation contributes significantly to ongoing research on the factors that (re)produce the unequal representation of national cultures in transnational exchanges, showing that symbolic status orders and unequal economic infrastructures contribute to asymmetric cultural exchange.

Statecraft and Affinity Among Nations – How Complex Interdependencies Shape Global Sanctions Dynamics

<u>Zhengqi Pan</u>

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Why do some countries impose sanctions while others refrain, even when faced with similar geopolitical pressures? This paper critically examines how affinity, broadly conceptualized across political, economic, and cultural dimensions, influences the likelihood of sanction imposition. While extant research focuses primarily on direct material and strategic interests, this paper posits that deeper, structurally embedded ties shape the likelihood of sanctioning. Countries with stronger affinity through political preferences, economic links, or cultural bonds are less likely to impose sanctions on one another due to inherent preferential attachment and the cost of disrupting these interdependencies. Methodologically, this paper applies an advanced statistical network analysis method called the Temporal Exponential Random Graph Model (TERGM) to assess how affinity structures shape sanctions over time. The TERGM enables a rigorous analysis of how sanctions evolve within broader geopolitical and geoeconomic systems, capturing the role of affinity in mitigating coercive statecraft. By integrating affinity as a multidimensional factor into the study of global sanctions, this research advances theoretical debates on statecraft, interdependence, and international coercion, offering new insights into how structural ties moderate geopolitical contestation and influence the stability of international cooperation.

OS-112: Agent-based modelling and social networks 5

Location: Room 116 Session Chair: Federico Bianchi Session Chair: Filip Agneessens Session Chair: Károly Takács

Connecting agent-based opinion dynamics with large scale political opinion data with mean-field approximations

Duncan Cassells^{1,2,3}, Pedro Ramaciotti^{4,3,2}, Lionel Tabourier¹

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Mathematical modelling of political opinions and societal change has been used as a tool to simulate populations and address questions concerned with the polarization of society and other phenomena of concern. However, the development of opinion dynamics has typically been in separation to that of social sciences, dealing with artificial agents governed by pairwise interaction and abstractions of reality that are inspired by complex physical systems rather than social cognition and perception, which presents us with an important area of research to connect the fields.

Here we present work that addresses the challenge of the empirical gap within opinion dynamics, or how do we link these models to reality? For data, we use multi-dimensional political positions that are inferred from a large number of social media users, by leveraging behavioural data traces (e.g., what politicians users follow) on platforms. With traditional agent-based modelling there is then a problem of how to overcome the computational complexity incurred by simulating large populations which requires significant resource. In order to overcome this obstacle, we employ mean-field theory to approximate behaviour and model distributions - rather than agents - with the finite volume method.

The result is an approach to understanding how population-level multi-dimensional distributions of opinion might develop, and what modelling conditions maintain populations in states of polarization (low or high) that are encountered in the real world. The multi-dimensional aspect of modelling also points towards analysis of the dimensionality of opinion space and relevance to European contexts.

Network Formation with Local Benefits: Theory and Simulation

Qingchao Zeng

University of Fribourg, Switzerland

We consider a non-cooperative model of network formations where agents decide on whom

to form costly links to. Links are unilaterally formed and payoff flows one way to the active

side. We study discontinuous information flows where agents only receive benefits from other agents that are at a distance of two in the network. For the static game, we show that the set of strict Nash equilibria encompasses a multiplicity of core-periphery network structures. We further study a noisy best response process to obtain long-run predictions. Doing so, we find that the set of stochastically stable states retains a multiplicity of network structures, many of which are not efficient. In addition, our simulation results from MatLab suggest that when there is a small

probability that agents make mistakes, core-periphery networks are uniquely stochastically stable in the perturbed evolution.

OS-216: Social Movement Organizations and Policy Networks 2

Location: Room 125 Session Chair: David Benjamin Tindall Session Chair: Mario Diani

Spread the Word - Spatial Dynamics of Information Diffusion in Antifascist Telegram Networks Janine Schröder, Daniel Matter, Jürgen Pfeffer

Technical University of Munich, Germany

Instant Messaging (IM) services have become crucial for Social Movement Organizations (SMOs), enabling activist coordination, information distribution, and mobilization for protest events. While previous research highlights the reduced importance of local dependencies due to digital communication, many left-wing SMOs continue to rely on decentralized local action as a core organizational principle. Antifa exemplifies this dual structure, leveraging Internet Communication Technologies (ICTs) and instant messaging to combine localized direct action with an (inter)national activist network. Existing case studies suggest that local demonstrations remain vital for antifascist groups in European cities. However, the role of spatial proximity in information diffusion and mobilization within these networks remains understudied. This study examines how spatial proximity influences information dissemination among German antifascist groups and channels on Telegram over time, considering their strong reliance on IM services and localized offline protest behavior. Using transportation time by car and bus as a proxy for spatial proximity, we analyze event-driven communication patterns. We extract topics from (forwarded) messages and mentions in German antifascist Telegram groups and channels linked to direct actions, constructing a longitudinal network dataset to track information diffusion over time. Stochastic Actor-Oriented Models (SAOMs) assess how transportation time affects information diffusion dynamics. Additionally, we test the role of ideological and topical similarity in shaping dissemination patterns. By integrating natural language processing and network analysis, this study provides empirical insights into the structuring impact of spatial proximity on mobilization in a fragmented yet interconnected digital antifascist landscape.

OS-121: Community-Engaged Social Network Analysis 2

Location: Room 202 Session Chair: Jennifer Lawlor

Using hybridised weighted centrality measure to identify cliques and subgraphs of a community structure

AMIDU AKINPELUMI GBOLASERE AKANMU

DELTA STATE POLYTECHNIC, OTEFE-OGHARA, Nigeria

Identification of key nodes in complex networks is the driving force that controls or informs of the situation of such a network. Most real-world network systems are shown to be graphs of weighted networks (i.e. networks with link-weights and/or node-weights). In this paper, considerations are given to the weighted traditional centrality measures of degree, betweenness and closeness of graphs and their shortcomings identified/addressed in comparism with hybridised centrality measures which combined isolated centrality (with the traditional centralities), for the purpose of identifying the most influential nodes. This has a good impact on the dissemination of information and helps with the identification of the subgraphs/cliques and in turn the community structure. However, despite some few disadvantages of these hybridised centrality methods, such as high cost of computation and reliance on tuning parameters, the new method is seen to have an improvement of close to 50% over the traditional methods.

Advancing Methodology of Chosen Family and Kinship in Social Network Analysis for LGBTQ+ Health Equity

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Purpose: This study employs a novel, theoretically-driven social network analysis methodology to capture the complex, non-traditional kinship experiences of queer and trans adults. We examine how chosen family ties may

differ from other relationship ties regarding closeness, social support, and mental health among queer and trans individuals.

Data: We use two egocentric network datasets: (1) Queer and Trans Vietnamese American Advocates Network (QTVAAN; N=38 egos, 628 alters), and (2) LGBTQ+ Social Networks, Aging, and Policy Study (QSNAPS; Wave 3; N=981 egos, 13,412 alters).

Methods: We use descriptive statistics to identify group differences in closeness, relationship length, and social support across chosen family, family of origin, and friend only relationship ties; and multi-level mixed-effects negative binomial regression models (alter-level characteristics nested within ego outcomes) to assess the impact of percent of chosen family ties within a network on mental health.

Findings: In both datasets, "chosen family" ties represent ~10% of all ties and were predominantly co-identified as "friends"; they were long-term, averaging 15-20 years. Egos in both datasets reported the highest proportions of feeling close to chosen family alters (at least 70% of these ties considered very close). There were no differences in providing instrumental support by relationship type in both datasets. Mixed-effects model results showed non-significant associations between percent of chosen family ties in network with ego distress, social anxiety, and social well-being among QTVAAN respondents. Despite the null effects on mental health outcomes, there are underlying social dynamics of long-term closeness among chosen family ties that warrant further investigation.

OS-134: Gender and Social Networks 2

Location: Room 203 Session Chair: Elisa Bellotti Session Chair: Michelle Nadon Bélanger

Artistic Brokerage in Personal Networks: How gender shapes inequality in Spain

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This paper analyses the role of artistic brokerage in Barcelona, arguing for the importance of taking a gendered view. The artistic market is increasingly individualized and based on a monopoly of legitimate culture by mediators. Such figures are key producers of social capital in terms of providing job opportunities, artistic recognition and reputation building. Studies from the Spanish music market and artistic residencies show how artists strategically build social capital to receive commissions and recognition through networking. Moreover, previous studies reveal the existence of patterns of epistemic and symbolic injustice that shape the distribution of cultural and social capital among professional artists. We hypothesize that gender homophily of the artists' personal networks reproduces objective forms of inequality in the job market. The glass ceiling and leaky pipeline ought to come with gaps in female powerful brokers in the network such as curators, gallery owners or funding commissioners. We look at the composition of 30 visual artists' personal networks within four different disciplines in Barcelona as part of video-aided ethnography research using a mixed methodology, by combining semi-structured interviews, observation, participatory photography and SNA. The results obtained from centrality and compositional measures with Egonet lead us to consider that gender homophily has a dual effect on artistic careers and reputations. While female contacts provide positive role models for artists, upscale recognition, visibility and legitimacy depends specifically on close access to female artistic brokers.

Beyond Family: How Support Networks Shape Urban Women's Work Participation in India

Aditi Bhagwat Prasad, Aparajita Chattopadhyay

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It takes a village to raise a child: women's labour force participation is not just a function of their personal choices or economic conditions but also the strength and quality of the support systems that surround them. This study investigates the role of support networks in shaping the labour force participation of young mothers in urban India, focusing on the intricate dynamics between kin and non-kin support systems. Drawing on data from 193 women aged 25-35 with at least one child aged five or younger across the National Capital Region of India, the research combines bivariate and multivariate analyses with qualitative insights from 30 in-depth interviews.

The study hypothesizes that stronger and more diverse support networks enable higher workforce participation among women. We introduce a multidimensional framework to understand support, categorizing it into density, source, type, and intensity. Density refers to the number of support systems available, while source distinguishes between kin (e.g., family) and non-kin (e.g., domestic workers, community services). Type examines the kind of support provided, such as housework or childcare, and intensity reflects the frequency and depth of assistance.

Key findings reveal that higher support density correlates with increased workforce participation. Women with five or more support sources are nearly four times more likely to engage in paid work. Additionally, the type and intensity of support are pivotal. For instance, high-intensity housework support from domestic workers (OR=7.28) and childcare support from mothers-in-law (OR=6.02) significantly enhance labour participation. Conversely, limited support or adverse family dynamics, such as minimal spousal involvement or restrictive in-laws, create substantial barriers.

The qualitative narratives highlight the dual nature of support systems. Positive examples include women whose inlaws or domestic workers facilitate career continuity by assuming significant household responsibilities. However, other accounts underscore the constraints imposed by conservative family norms or unreliable external childcare. Women often express mistrust toward daycare facilities, emphasizing the necessity of dependable family support.

The findings underscore the critical role of comprehensive and reliable support networks in enabling young mothers to balance work and domestic duties. While joint families and domestic workers often provide this support, the study also identifies gaps where traditional norms or a lack of external resources hinder women's professional aspirations. These insights suggest the need for policy interventions to expand access to affordable domestic help and high-quality childcare while promoting equitable household responsibilities within families.

By shifting the focus beyond individual agency or household size, this research contributes to a nuanced understanding of how social structures influence women's labour force participation. It calls for a re-evaluation of support systems, emphasizing quality and functionality over mere availability, and advocates for inclusive strategies to dismantle systemic barriers faced by urban mothers. This study offers a comprehensive lens to understand the intersections of gender, labour, and support systems, laying the groundwork for future research and policy aimed at fostering gender equity in the workforce.

Bridging Knowledge Gaps: The Role of Female Star Inventors in Post-M&A Integration

Yen-Chen Ho, Kuan-Yu Tseng

National Chung Hsing University, Taiwan

This research examines the role of female star inventors in the post-merger integration (PMI) of technology firms, focusing on the acquisition of ATI Technologies by Advanced Micro Devices (AMD). While prior studies highlight gender disparities in technology industries, this study explores how female lead inventors impact social network structures and knowledge integration. Utilizing patent data from the USPTO, we reconstruct inventor collaboration networks and analyze the effects of relational stars—connectors and integrators—on group cohesion and knowledge exploration. Findings suggest that female connectors significantly enhance group cohesion by fostering collaborative ties, aligning with gender role expectations of communal and relational behaviors. On the other hand, both male and female integrators exhibit greater engagement in knowledge exploration, leveraging their network centrality to access diverse resources. Despite stereotypes limiting female participation in technology, our results indicate that female star inventors play a critical role in bridging knowledge silos and improving post-merger collaboration. These findings contribute to the literature on gender dynamics in innovation-driven M&As, emphasizing the influence of social-relational dynamics on firm knowledge dynamics.

Collaborative Networks as Gendered Relational Opportunity Structures in Global Science Networks

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Gender clearly informs women's and men's collaborative profiles and career activities, yet the research on these is conflicted. Some cases find parity, while others find women's network positioning to be qualitatively different or cumulatively disadvantaging. Further, prior studies often focus on single disciplines or countries, and/or invoke cross-sectional snapshots, and large-scale analyses have been limited to less computationally-intensive network measures.

Using Scopus data (2009-2023), we construct global co-authorship networks for authors in 20 region-subject pairs across two periods (2009-2013; 2014-2018) and measures of downstream productivity and citations. We hypothesize that gender affects social capital, with women receiving differential benefits from network positioning on future activity. Our independent variables include measures of (normalized) brokerage and aggregate constraint, and their interaction with gender, as well as controls for gender homophily and interdisciplinarity, for region, subject, and publication experience.

We find that network benefits are contingent on gender, with variation across regions and subjects. Women's future productivity benefits more than men's when in network positions rich in brokerage opportunities, yet does not reach parity at any level of normalized brokerage. Yet for constraint, the largest predicted differences are between men and women who are least constrained. All else equal, the gender "discount" for women ranges between 5-7% (high brokerage, high constraint) and 14-18% (low constraint, low brokerage). Conversely, there is more equity in reward for brokerage and constraint on citation count (5% or less). We discuss these, as well as important nuances of considering gender disparity across time and globally.

Effective Networks Structures of Positively Enacted Masculinities in Schools <u>Dean Lusher</u>¹, Ray Swann², Peng Wang¹, Ali Hassani³ ¹Swinburne University of Technology, Australia; ²University of Melbourne; ³SNA Toolbox Male violence causes enormous health, social, political and economic problems internationally. At an interpersonal level, efforts to reduce violence have recognised that narrowly defined views of masculinity contribute substantially to this problem. From the perspective that gender is socially constructed, relationships with others are exceptionally important and hence a social network perspective to this issue is highly applicable. This paper presents a theoretical framework and network metrics on what positively enacted masculinities (i.e., pro-gender equity and non-violence endorsing) might look like. We present such theory and metrics in relation to a case study of a boys-only secondary school in Australia to show how network structures, node-level attributes, and exogenous features may impact on enacted masculinities were present in a school on a range of different types of networks and then use exponential random graph models (ERGMs) to test for their presence within our case study. We discuss the implications of our findings and the need for greater theorizing of social mechanisms relevant to positive and non-violent masculinities.

OS-178: Networks in Trade and Finance 2

Location: Room 204 Session Chair: Raja Kali Session Chair: Zhen Zhu Session Chair: Anastasia Mantziou

Relational effects on the clock: Exploring the influence of partner similarity and interaction experience on relational effect speeds in the EU Emission Trading System (ETS)

Maksim Sitnikov, Remco Mannak, Leon Oerlemans, Nuno Oliveira

Tilburg University, The Netherlands

Recent years have seen several calls to take time "seriously" in organization and management studies. This also applies to the field of interorganizational relationships (IORs) and networks (IONs), where attention needs to be devoted to network change, co-evolution of network and actor attributes, and relational events (i.e., sequences of discrete actions between actors, such as economic transactions). While relational (i.e., network) effects such as repetition and reciprocation shape these events, the speeds at which they unfold remain largely underexplored. Addressing this research gap, we argue that relational effect speeds hold substantive meaning. Studying them can provide insights into IOR functioning and dynamics. To better understand the variance in relational effect speeds. we introduce a computational algorithm rooted in relational event modeling methodology that accounts for effect censoring. Applying this algorithm to compute the speeds of relational effects guiding emission allowance exchanges in the EU Emission Trading System (ETS), we find that their variance is non-random and systematically differs within and between pairs of transacting firms. Exploring the possible sources of observed variability using survival analysis, we find that country, industry, ownership similarity, and the number of prior transactions among organizations play a determining role in the speed of transaction repetition, transaction reciprocation, and transactions with partners of partners. With this, we advance the currently limited understanding of relational effects speeds, specifically their antecedents, paving the way for future empirical research while further enriching social network theory with a dimension.

Reshaping Supply Chains in the Ecological Transition: European Trade Trends in the Battery and Automotive Markets

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¹ISTAT, Italy; ²UniPG, Italy

The global transition towards sustainable energy has significantly impacted the European trade landscape for battery and automotive products. This study analyzes official European trade data (Comext) from 2020 to 2024, focusing on the evolution of supply relationships in response to the ecological transition.

Regarding automotive, the findings indicate a significant drop around early 2020, likely due to the impact of the COVID-19 pandemic. This is followed by a strong recovery and fluctuating but generally stable volumes between 2021 and 2023. In late 2024, a sharp increase indicates a surge in trade activity. Meanwhile, the battery market shows an overall steady growth, with cyclic behavior including a strong dip in early 2020 and 2023, followed by a recovery phase in 2024.

These trends suggest a dynamic restructuring of supply chains, likely driven by the accelerated adoption of electric vehicles and related technological advancements. The observed fluctuations may indicate market stabilization or shifts in trade policies and regional production strategies. Using network analysis to assess the centrality and the strategic significance of nations within the trade network, this study provides deeper insights into the evolving structure of European trade. It highlights the ongoing transformation of trade patterns in response to the global ecological transition and underscores the need for continuous monitoring of these supply relationships.

Reversing the Nearness-Complexity Trade-off: How Countries Have Transformed Their Export Baskets

Taylan Yenilmez

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The literature on product space and economic complexity suggests that countries are more likely to begin exporting new products closely related to those already in their export basket. Complex products, in turn, foster economic development by paving the way for new capabilities and a broader range of exports. However, for developing countries, the products closest to their existing export baskets tend to be less complex. Recent research indicates that certain countries have managed to transform their export baskets in ways that reverse this negative correlation between nearness and complexity. In this study, I investigate how these countries overturned the negative correlation, enabling complex products—initially located far from their export baskets—to move closer. To do this, I decompose the positive shift in the correlation between nearness and complexity into three components: complex products moving closer to the export basket, nearby products becoming more complex, and products both moving closer and becoming more complex. My findings show that in past cases of successful export transformation, the dominant factor was the movement of complex products closer to the export baskets. By tracing the network links among products, I identify the connections that enabled these countries to export increasingly complex products.

Revisiting the Formation of Trade Agreements with Dynamic Network Actor Models

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A key focus of international trade literature is understanding the formation of trade agreements. One major challenge lies in capturing the fact that country pairs form treaties based on bilateral characteristics and in response to the broader web of agreements. This interdependence between agreements violates the assumption of independent observations. Empirical studies have adopted proxies and modelling techniques to mitigate multicollinearity and address endogenous processes, identifying key determinants across economic, institutional, geographical, and political dimensions. Foundational papers have explored political economy theories, such as the domino effect—where signing agreements may lead to new ones—and path dependence, emphasising how past agreements shape future decisions. While these studies provide valuable insights, they fall short of capturing the complexity of today's interconnected trade landscape. They focus primarily on predicting dyadic agreement formation. Recent efforts have effects. However, these models fall short of incorporating all dimensions previously identified as determinants in tiebased models.

In this paper, I build on insights from trade literature by employing a Dynamic Actor Network Model (DyNAM) to study trade agreement formation. This allows me to test how political economy theories hold under models that fully account for relational dependencies and endogenous processes. I analyse over 600 treaties notified to the World Trade Organisation spanning 1948-2023, complementing this with country- and dyad-level data from well-established trade databases. Finally, I assess the model's predictive power by evaluating whether its calibration aligns with ongoing trade agreement negotiations.

Social Network Initiation: Status Competitions in an Influencer Economy

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Current models of status competitions in online, networks-supported markets (aka influencer economies) are meritocratic: they emphasize the superior skills of influencers as preceding network initiation. As a consequence of displaying better skills, influencers receive requests for connections and form networks of followers. Alternative to these models, we highlight the role of network initiation as an informal mechanism of competition control and in attaining influencer positions. Using a dataset with over 51,000 ties from an influencer economy, we explore how participants control competition for status by initiating link requests. Participants initiate ties and seek competitions following a change in performance. They have a higher likelihood of accepting ties after improved performance. Status competitors are more likely to accept ties from senders who perform worse and rank lower in their networks. The outcomes of this initiation dynamic are multiple networks in which members maintain ties with those performing worse than them. Members performing less well repeatedly seek new ties and are more likely to receive link requests from others. We argue that status competitions lead to multiple networks (instead of a unique one), within which influencers would dominate, performance-wise, a group of followers. Theoretically, we draw attention to initiation processes as informal mechanisms of competition control. Empirically, we highlight the dynamics of status competitions in social media-supported economies.

OS-200: Social networks in migration and migrant incorporation: new developments and

challenges 2 Location: Room 206 Session Chair: Raffaele Vacca Session Chair: Miranda Jessica Lubbers

Negative social capital and requests for resources in a developing country: The case of rural-urban migrants in Kampala, Uganda

Giacomo Solano

Radboud University, Netherlands, The

This article analyses the social networks of rural-urban migrant entrepreneurs in Uganda. While social contacts are often an important asset to access resources for migrants, they are often expected to financially support the members of their social networks. These claims for support are here labelled 'negative social capital', following Portes' seminal work. This paper focuses on the kinds of networks that are more likely to produce negative social capital, operationalized here as requests for financial resources, and links this to the discourse on bridging and bonding social capital. By means of a regression analysis, this article provides evidence of dense networks with a higher share of migrants (bonding social capital) being associated with negative social capital. In addition, both a higher share of contacts met before migration, which is related to bonding social capital, and a higher share of contacts living in the city, which is related to bridging social capital, are negatively associated with requests for resources. These findings suggest that migrants can instrumentally keep some contacts from before migration and acquire new key contacts in the urban area.

Networks, Climate, and Migration in Western Honduras

Loring J Thomas¹, Ziang Xu², Vahid Satarifard², Michael Oppenheimer¹, Nicholas A Christakis² ¹Princeton University, United States of America; ²Yale University, United States of America

Migration in Central America is a complex process, driven by social networks, demographic factors, and the physical environment. We investigate how these drivers cumulatively drive both international and internal migration patterns from Western Honduras, using detailed longitudinal data from 175 isolated Honduran communities (N = 24,646). We focus on the effects of kinship and friendship networks on migration, alongside standard demographic predictors and also several climate predictors. Analysis is conducted with a series of logistic regression models, regressing the set of demographic, network, and climate predictors on individual-level migration decisions. When considering international migration, Western Honduras matches the observed patterns of selectivity for migration. Those with any formal education, men, and younger people tend to be migratory. Likewise, damaging climate conditions (maximum temps > 30C) depress migration rates, which we hypothesize is due to the negative effect these temperatures have on agriculture. Finally, network structure prior to observed migration does not significantly drive international migration. On the other hand, network structure does strongly predict patterns of internal mobility. Internal migration is not nearly as selective as international migration, and we find that those embedded in highly cohesive friendship networks are less likely to engage in mobility. These results frame internal migration from Western Honduras as a social process, rather than an economic one.

Persistent ties, evolving networks: Accounting for changes and stability in migrant support networks **Rizza Kaye Cases**

Institute for Sociology of the Slovak Academy of Sciences, Slovak Republic

One of the salient themes, both in the social network analysis literature and its applications to migration research, is a shift to a more dynamic conceptualisation of (migrant) social networks. To elaborate on the dynamic nature of migrant networks, I reconstructed and examined the support networks of 134 Filipino nurses, domestic workers, and care workers in New York and London in three migration phases (pre-migration, initial adjustment, and current situation) through the factors that significantly shaped their stability or evolution at the micro- and macro- levels. At the micro-level, shifts in the respondents' networks were examined vis-à-vis biographical events and transitions. At the macro-level, immigration policies and migration pathways were also discussed as shaping network dynamics. It was further observed that transnational ties re-emerged as relevant connections after the initial adjustment phase while ties in intermediary countries and connections that are geographically mobile should be included in an expanded concept of transnational ties beyond the countries of origin and destination.

Social Networks and Childcare Arrangements among Migrant Populations Verena Seibel

Utrecht University, the Netherlands, Netherlands, The

This paper will examine the complex relationship between migrants' social networks and their childcare arrangements. Social networks play a crucial role in migrant parents' childcare behavior: On the one hand, social networks provide informal childcare (childcare provided by grandparents, other family members, or neighbors/friends) to migrant parents; on the one hand, social networks are a crucial source of important information about formal childcare (provided by private or government-led organisations). Particularly the latter has been framed as crucial for migrant families as it increases female migrants' chances in the labor market and promotes language skills and cognitive abilities, and thus, integration chances for migrant children. Yet, families with a migration background use formal childcare significantly less than native families, creating long-term ethnic inequalities.

The goal of this paper is two-fold: First, it provides a long-needed overview of the complex relationship between migrants' social networks and their childcare behavior. While most studies focus only on one aspect (such as the provision of informal childcare), a closer look at the literature reveals that social networks can be both, hindering and facilitating formal and informal childcare. Second, we analyze unique social network data (Childcare; Dutch Longitudinal Internet Studies for the Social Sciences ([LISS]) and examine which factors determine if migrant parents rely on their social network for formal or informal childcare and how these patterns differ for non-migrant patterns. Novel to this data is its incorporation of information transmission within migrants' social networks specifically targeted at childcare.

Previous research shows that migrant parents possess less information about the organization of formal childcare as well as childcare benefits provided by the government, thus reducing their chances of accessing formal childcare. We examine to what extent this information gap is due to ethnic differences in resources within social networks. We argue that social networks that are strong in providing informal childcare are less beneficial in providing relevant information about formal childcare possibilities and vice versa. Moreover, given the ethnic differences in social network composition between migrant and non-migrant parents, these social network effects might explain the lower usage of formal childcare among migrant populations. With reference to the social protection literature, we explore the theoretical meaning of these patterns, in particular for the labor market participation chances of migrant women.

Temporary labor migration and social networks in the origin

Aubrey Tabuga

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Evidence based on the case of a migrant-sending village in the Philippines shows that social networks at the origin play crucial role in the perpetuation of temporary labor migration to various destinations. They provide not only financial resources but also information that are deemed more trustworthy and reliable. Furthermore, it shows that a socially cohesive network structure allows for social influencing to transpire thereby facilitating migration behavior to cascade across households in the community. Aided by social network analysis and migration history data, this study provides evidence of how earlier cohorts of migrants provided much needed financial and informational support to recent cohorts. It also points out that the initial diffused distribution of pioneer migrant-sending households across the community network. Such prior distribution and connectedness allowed pioneers to influence their personal networks into labor migration through provision of various types of support. This study shows that examining more deeply the network structure of migrant-sending origin communities can provide interesting nuances about network effects on migration.

Transnational Family (Re)Configurations in a Context of Crisis Migration: A Personal Networks Perspective

Mihaela Nedelcu

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This presentation introduces a new research project (2025-2029) that aims to document, analyse and understand the dynamics of transnational families in a context of 'crisis migration', in the case of Ukrainian forced migrants. By combining theoretical perspectives from family sociology and transnational family studies, with a social networks approach, in this project the transnational family is understood as a Transnational Family Configuration (TNFC), i.e. a diverse and dispersed personal family network that unfolds across kinship and national boundaries. TNFC is a relational and dynamic entity embedded in evolving social, spatial and temporal contexts in which different resources can be mobilised and exchanged. The combination of two methodological frameworks - the "family network method" (Widmer 2010) and "telling network stories" (Ryan 2021) - is used as the basis for a qualitative and longitudinal research design that includes (repeated) in-depth semi-structured interviews combined with pencil-based ego-maps. Two case studies allow for a comparative investigation of TNFC among Ukrainian forced migrants in two contrasting destination contexts, namely Romania and Switzerland. Through these theoretical and methodological approaches, this study will provide an understanding of: 1) the transformation of the composition and geographical dispersion of forced migrants family networks under conditions of forced displacement; 2) the impact of the forced displacements on family relationships, support exchanges and care arrangements; and 3) the mobilisation of relational resources by forced migrants to cope with family needs and obligations and to support their family members in nearby places and across borders.

OS-174: Networks & Sustainability 3

Location: Room 105 Session Chair: Christina Prell Session Chair: Paul Wagner

Networks of Engagement: Political CSR and Environmental Governance in Canada and Norway

Mark CJ Stoddart¹, Nathan Andrews²

¹Memorial University, Canada; ²McMaster University, Canada

This presentation uses network approaches to analyse how oil and gas companies and host governments construct community engagement processes, with implications for political corporate social responsibility (CSR) and meaningful community engagement in environmental governance. Drawing on comparative analysis of oil exploration and extraction in Atlantic Canada and Norway, the research investigates how global frameworksincluding sustainability goals (e.g., the Paris Agreement, UN SDGs,), Human Rights-Based Approaches (HRBA). Indigenous rights frameworks (e.g., UNDRIP) — are translated into regionally specific engagement networks around offshore oil development. Data sources include corporate reports, government documents, and web content. Using Discourse Network Analysis (DNA), a method integrating social network analysis and textual analysis, we examine the networks that connect engagement frameworks with corporate actors, governmental institutions, and a range of rightsholders and stakeholders including social movement organizations, labour associations, Indigenous communities, and municipalities. The findings reveal regional contrasts: the Norwegian cases emphasize environmental frameworks - with greater attention to the Paris Agreement - and corporatist networks of inclusion in encacement processes, while the Canadian case foregrounds Indigenous rights-based approaches. Across both regions, gender-based approaches remain peripheral, reflecting gaps in inclusive engagement. These distinctions illustrate how despite the aura of universalism of global engagement frameworks, these are translated into regionallydistinct networks of engagement that structure environmental governance by framing which stakeholders/rightsholders are included, as well as shaping the boundaries of climate and environmental debates. By highlighting the intersection of public engagement frameworks and rightsholder/stakeholder networks, we offer insights into equitable engagement strategies for extractive development and social-environmental sustainability.

Social Conflicts in Sustainable Environmental Governance: The Future of Rice Paddy Landscapes in Huwei

Wei-Kuang Liu

Landscape Architecture, Chung Yuan Christian University, Taiwan

As urban areas continue to expand, the conversion of agricultural land into urban planning zones has become an irreversible trend. However, in light of sustainability considerations, farmers' rights, and principles of justice, this study conducted an empirical investigation in Huwei, Yunlin, Taiwan, to examine the social conflicts and contradictions arising during the transformation process and to propose rational urban design recommendations. Rice farming in Huwei began in the early 20th century, and large-scale rice paddies emerged as a definitive landscape feature after World War II. However, the recent establishment of a high-speed rail station in Huwei has influenced local land development patterns, significantly affecting urban planning and agricultural land use.

Incorporating a sustainable environmental governance framework while aligning with the United Nations Sustainable Development Goals on justice and equality, this study examined the effects of government policies and rice farming on various social groups and environmental sustainability through a social network analysis. Additionally, geographic information system overlay analysis was performed to investigate the historical context of agricultural development, the contemporary distribution of farmland, and the relationship between urban planning and land use in Huwei. Furthermore, qualitative interviews were conducted to capture the perspectives and power dynamics among different social groups. By integrating these approaches, this study aimed to propose strategies for preserving rice farming culture within urban planning zones, contributing to the planning for and development of a resilient and sustainable environment.

Social Networks, Disasters, and Sustainable Development in Rural Agricultural Communities

Yuzuka Kashiwagi

Nihon University, Japan

This study examines the impact of a major earthquake on sustainable cocoa production in rural Indonesian communities, specifically focusing on how social networks influenced farmers' adoption of agricultural practices – recommended seedling sources and fertilizers and female empowerment – and their ability to secure favorable cacao bean prices. Targeting 3,727 registered cacao farmers in Central Sulawesi, we collected socioeconomic network, agricultural, psychological, and disaster-related data. These data were combined with pre-disaster agricultural survey data from the same farmers. Results from social network analysis revealed that the earthquake significantly altered information dissemination and social influence patterns regarding agricultural practices. For instance, post-earthquake fertilizer choices in some neighboring subnetworks reversed, deviating from network clusters detected by modularity clustering algorithm. In contrast, farmers achieving higher cacao bean prices were concentrated within

established social networks, indicating that access to beneficial price information relied on long-standing connections rather than newly formed ones. Differences in the damage level by the earthquake and village affiliation did not strongly predict the above changes. Further analysis using edge and node attributes explores the specific conditions that drove these changes, aiming to elucidate the factors influencing resilience and vulnerability in post-disaster agricultural communities. This study highlights the fragility of sustainable agriculture programs in the face of natural disasters and suggests the need to understand how actors on social networks adapt under extreme stress.

Social-ecological network dynamics and sustainability outcomes over time

<u>Michele L Barnes</u>¹, Henry A Bartelet¹, Joshua Cinner¹, Peng Wang², Örjan Bodin³, Nicholas A J Graham⁴, Emmanuel Mbaru⁵, Petr Matous¹, Sarah R Sutcliffe⁶, Nyawira Muthiga⁷

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Understanding the dynamic interplay between human societies and ecosystems is central to achieving sustainability. Social-ecological network approaches provide a powerful framework for disentangling the complex and evolving relationships between people and ecosystems. While existing research has shown that specific social-ecological network structures can support environmental sustainability, their temporal dynamics and connections to social sustainability outcomes remain poorly understood. Using longitudinal panel data from 629 resource-dependent fishers in Kenyan coastal communities, we examined how social-ecological networks evolve and relate to material and subjective wellbeing – measuring access to resources and livelihood satisfaction, respectively. Both wellbeing measures exhibited dynamic changes but increased overall, coinciding with a growing tendency for fishers to form social relationships with others who rely on the same species, creating 'closed social-ecological triangles'. Existing research, including in these same communities, has linked this network configuration to ecological benefits such as higher fish biomass and functional richness. However, our results from multilevel, temporal autologistic actor attribute models revealed that fishers embedded in these configurations were more likely to experience declines in subjective wellbeing over time. These findings uncover a hidden trade-off between environmental benefits and individual social outcomes, underscoring the need for governance strategies that account for the evolving and multifaceted nature of human-environment interactions to effectively navigate multiple sustainability objectives.

Sustainability through social networks: understanding students' food choices in an Italian university

Sara Jovanovic, Susanna Zaccarin, Barbara Campisi, Gianluigi Gallenti

University of Trieste, Italy

Keywords: sustainable food choices, food waste, responsible consumption, social influence

Food choices and sustainability awareness among university students can be analyzed by social interactions.

This study applies network analysis to explore how students' social connections influence their knowledge and adoption of sustainable food practices within a university collective catering system.

Data have been obtained from an online survey conducted at the University of Trieste (Italy) to examine students' eating habits, food waste behaviors, and sustainability awareness, while also mapping peer behavior on food choice and food waste.

The study aims to investigate whether social influence plays a significant role in shaping food choices and if such influence occurs mainly through horizontal (peer-to-peer) or vertical (opinion leaders/university environment/professors) networks. By applying network analysis, the aim is to explore how social connections influence the adoption of sustainable food behaviors.

This research aligns with Sustainable Development Goals (SDGs), especially with Goal 12 (Responsible Consumption and Production) offering insights into how social networks can be leveraged to promote sustainability and good practices in higher education. Moreover, findings could also support the development of targeted actions, such as educational campaigns, and to encourage responsible food consumption and reduce food waste among students and in the university canteen.

OS-203: Social support and health 3

Location: Room 106 Session Chair: Guy Harling Session Chair: Dorottya Hoor

Migrant Chinese women's online social support in the UK and its impact on their postnatal mental wellbeing

<u>Siyi Wang</u> University of Sheffield, United Kingdom Social support has been shown to be an effective factor in improving women's postnatal mental wellbeing. Medical sociologists unpack social support as informational support, emotional support, and tangible support (Lin et al., 1999). For the migrant population, seeking social support from digital spaces is popular because they lack adequate offline social networks to provide social support in host countries.

In order to understand migrant women's experience of accessing social support in digital spaces and how the online social support affects their postnatal mental wellbeing, my project focuses on migrant Chinese mothers living in the UK as an example. Twenty semi-structured interviews and three focus groups were employed to collect data. My presentation will address the types of social support that emerged from the groups and show how social support affects migrant Chinese mothers' postnatal mental wellbeing. Additionally, the research shows that migrant Chinese mothers prefer to seek peer support from other migrant Chinese mothers during the postnatal period. My presentation will outline what barriers they experienced when seeking peer support from the local population.

Current research on social support and health mainly focuses on using quantitative methods to evaluate the relationship between social support and health outcomes. However, different types of social support have various impacts. Therefore, this qualitative research further unpacks the different impacts that different social supports have on mothers' postnatal mental well-being, and contributes to the concept of social support by exploring the lived experience from the perspective of migrant Chinese mothers.

Social support through the COVID-19 pandemic and beyond: inequalities, protective factors, and social distancing

<u>Alexi Quintana Mathé</u>¹, Katherine Ognyanova², Francisca Ortiz³, David Lazer¹ ¹Northeastern University, Spain; ²Rutgers University; ³Universidad Mayor

Providing social support is one of the key roles of social networks. The COVID-19 pandemic put social networks under stress, providing a unique opportunity to study how the erosion of social contact impacts social support and how supportive relationships are rebuilt after social contact reinitiates. In particular, it raises the question of who was resilient to this impact and able to recover from it. In this work, we study the social support available to US residents since the beginning of the pandemic using 34 waves of a large-scale online survey with around 20,000 respondents per wave and viable samples across all 50 US states roughly every two months. We first describe the trends in social support available, finding a significant decrease during the pandemic and a slow posterior recovery. Then, we address the question of whether the pandemic increased the inequalities in access to social support or changed the role of protective factors. For this, we run cross-sectional regressions as well as panel analysis, focusing on the factors associated with recovering social support after the pandemic. Finally, we study the role of social distancing and online communication means. Our results show that non face to face communication played a major role and point to significant inequalities, such as by SES. We also find that social contact does not directly translate to social support availability: high social contact periods are not necessarily periods with high social support, and social distancing plays a minor role at the individual level.

The Impact of Functional Social Support on Physical Activity in Community-Dwelling Older Adults: A Systematic Review and Meta-Analysis

Paula Steinhoff, Lea Ellwardt, Amelie Reiner

University of Cologne, Germany

Background: Physical activity (PA) is essential for older adults, reducing chronic disease risk, improving health, and enhancing quality of life. However, PA declines with age, and many older adults do not meet PA guidelines. Functional social support (SOSU) can help reduce PA barriers by providing emotional, instrumental, informational, companionship, and validation support.

Aim: Although evidence suggests a positive association between functional SOSU and PA, findings remain inconsistent. This study refines previous research by systematically reviewing and meta-analyzing how functional SOSU influences PA in older adults. It examines associations between SOSU types and PA measures, with subgroup analyses by age, region, SOSU measure, and PA type.

Methods: We conducted a systematic review and meta-analysis according to PRISMA guidelines. The electronic databases APA PsycINFO, ProQuest, PSYINDEX, PubMed, Scopus, SocINDEX, and Web of Science were searched up to August 2023. English peer-reviewed studies focusing on community-dwelling older adults (mean age ≥60) were included. Study quality was assessed using the Newcastle-Ottawa scale, and outcome data were reported independently for each SOSU type.

Results: Of 20,907 abstracts screened, 43 studies met inclusion criteria for the systematic review, with most reporting a significant positive SOSU–PA association. For meta-analysis, studies measuring SOSU for PA and general SOSU were included. Analysis of 25 models showed a pooled effect size of β =0.13 for SOSU for PA and PA. The results suggest SOSU plays a key role in promoting PA, although heterogeneity and potential publication bias warrant further investigation. Random effects meta-regression will refine these findings.

Women's perceptions of their alters' support for and use of contraception: what matters for contraceptive behaviors in rural Uganda

<u>Alison Comfort</u>¹, Sarah Piombo², Esther Atukunda³, James Moody⁴, Carol Camlin¹, Charles Baguma³, Jessica Perkins⁵, Bernard Kakuhikire³, Emily Satinsky⁶, E. Betty Namara³, Mercy Juliet³, Phionah Ahereza³, Mary Namukisa³, Alexander Tsai^{2,7}, Cynthia Harper¹

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Social influence can play an important role in explaining women's contraceptive behaviors. There is limited evidence exploring whether social influence is occurring from exposure to alters using contraception, the perception that alters are using contraception, and/or beliefs that alters would be supportive of contraceptive use. To address this gap, we conducted a sociocentric network survey among all reproductive age women (ages 18-49; N=319) across eight villages in a rural parish in southwestern Uganda. We elicited their health network with a name generator and used name interpreter questions for data on ego's perceptions of alters' contraceptive use (women only) and whether ego thought alter would be supportive of ego using contraception. We gathered data on contraceptive-focused preference-aligned fertility practices, measured by (1) desire to use contraception and (2) current contraceptive use. Using multivariable logistic regression, we estimated individual and personal social network predictors of current contraceptive use and desired contraceptive use. We found that each additional alter believed to be supportive of contraceptive use was associated with significantly higher odds of egos using contraception, adjusting for ego age, education level, asset index, HIV-status, number of children, and intention to have more children (adjusted odds ratio [aOR] 2.73, p-value<0.001). Having alters using contraception or perceived by ego to use contraception was not associated with ego's contraceptive use. Our findings demonstrate that alters' support for contraceptive use matters and suggests that interventions encouraging individuals to share their support for contraceptive use is more important than whether alters engage in those behaviors.

Links between social network characteristics and health in adults with Rheumatoid Arthritis

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Rheumatoid Arthritis (RA) is a chronic inflammatory disease that affects the joints, leading to pain and functional limitations. Patients with RA have higher rates of depression, which has been linked to worsened RA outcomes. However, there is a lack of research looking at patients' social networks, and whether features of those networks are associated with depression and RA-attributable outcomes. Adults with RA symptoms (n = 69) in the Washington D.C. metro area completed a survey including measures of depressive symptoms and RA outcomes, along with personal network assessments. Participants with higher depression scores had more RA-attributable pain (b=0.013, p<0.01), more functional limitations in the categories of fine motor skills (b=0.12, p<0.01), mobility (b= 0.08, p<0.01), and body strength (b=0.04, p<0.01), and smaller personal networks (b=-0.03, p<0.01). Additionally, social network size modified the association of limitations in fine motor skills (b=-0.023, p<0.01) and mobility (b=-0.014, p<.01) with depressive symptoms. Future research aims to identify network mechanisms that improve quality of life for those diagnosed with RA. Initial findings suggest a need to identify ways to enhance or build personal networks to support people with RA.

Exploring the layered context of social network using Bayesian networks

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Department of Health Promotion, Care and Public Health Research Institute (CAPHRI), Maastricht University.

Network analysis has historically focused on the aspects which directly affect the form and function of a social network of social relationships between people. However, this approach ignores the larger context in which these networks exist (e.g., physical environment). Harnessing additional information from non-network methods could improve our understanding of the way social networks are formed by its larger context, and the factors most important in the process. In the CONNECTION project we utilize collected large scale observational cohort data and population census data from various sources, to assess context factors in social network formation. Data in the following categories has been included; the local level of urbanization and green spaces, nearness to various amenities that could facilitate social interaction, socio-economic data, as well as information on the individual's health status. Our contributions in this article are two-fold. First, we investigate if patterns can be observed in the data which may help us better understand how social networks are shaped by its wider context. We envision that a better understanding of this process will eventually translate into concrete policy steps that can help shape the larger context to support stronger social networks. Second, we investigate the potential Bayesian networks have in modelling the factors of influence. Bayesian networks are highly interpretable and can incorporate existing expert

knowledge. Preliminary results show these aspects are of significant value when studying the different layers of the larger system that shapes social networks.

OS-181: Personal Networks across the Life Course 3

Location: Room 107 Session Chair: Marlène Sapin Session Chair: Claire Bidart Session Chair: Guillaume Favre Session Chair: Michel Grossetti Session Chair: Béatrice Milard

Personal Networks Across Normative and Non-normative Life Events: A Study of the Transition to Adulthood

<u>Olga Ganjour</u>^{1,2}, Eric D. Widmer^{1,2}

¹University of Geneva, Switzerland; ²Swiss Centre of Expertise in Life Course Research (LIVES Centre)

This study examines the impact of normative and non-normative life course events on the personal networks of young adults. Non-normative life course events, especially interruptions after compulsory education, as well as their number and duration, disrupt chronological age norms. These disruptions, in turn, shape the composition and structure of personal networks in the long term.

Using data from the large-scale, nationally representative survey of young adults in Switzerland (ch-x), collected between 2020 and 2023, this study analyses ego-centered network data from the Personal Networks and Professional Aspirations module. Personal network methods are used to identify the main types of young adults' personal networks and assess their structural properties in relation to social capital.

The results show that young adults who experience normative life events are embedded in large personal networks, consisting of ties to peers and parents. They occupy a central position within these networks, which exhibit high levels of reciprocity and transitivity. In particular, young adults who follow a continuous path through upper secondary education tend to have personal networks with a strong presence of friends, while those following a vocational path are embedded in either family of origin or professional networks.

Conversely, young adults who experience interruptions after compulsory education are more likely to be involved in smaller networks in which they tend to occupy less central positions. These networks are either sparse or mainly composed of extended family members. The results are discussed in the context of cohort solidarity and young adults' collective action.

Personal networks and transnational migration: A life-course approach

José Luis Molina¹, Renata Hosnedlova², Miranda Lubbers¹

¹Universitat Autònoma de Barcelona, Spain; ²Sciences Po Toulouse, France

By conceptualizing migration as a dual-focus process, this presentation advances our understanding of how migrants actively manage relationships across borders, balancing opportunities, and constraints in both settings. Drawing on three datasets—the Catalonia Migrants Survey, the Madrid Ukrainian Panel, and the Normandy Panel—the study analyzes personal network changes over time, considering the interaction between life events and multiple foci of interaction across borders. The case studies presented illustrate the diversity of interactions and the multiple possible trajectories in migration while advocating for using mixed methods to address the phenomenon's complexity effectively.

Processes and mechanisms of personal networks change along different life transitions: A crosssurvey, mixed methods and collective analysis

Claire Bidart

LEST, CNRS, Aix Marseille Univ, Aix en Provence, France

The effects of biographical transitions on personal networks are most often studied for a single transition with a single survey. However, a comparative study of the effects of different transitions affecting different domains and stages of life (starting work, finding a partner, having a child, moving away, migrating, having a health problem, retiring...) can help to better identify the processes that are set in motion at the time of these transitions. These effects concern Ego's sociability, the number of alters cited, their roles, their characteristics, their similarity to Ego, the qualities of the relationships, as well as the overall structure of the network. These processes of network evolution - for example, the reduction or increase in its size, changes in its composition, the intensification of relationships, or the densification or centralization of its structure - are implemented by more precise mechanisms that constitute

these processes at different levels. The aim here is to identify and compare these processes and mechanisms triggered by different transitions.

A team of 11 researchers from 6 countries has joined forces to produce a forthcoming book based on 13 surveys that allow both statistical and narrative analyses, with either a longitudinal or cross-sectional dimension. The idea is to build on the complementary nature of these surveys to identify recurrent processes and mechanisms typical of the 9 transitions studied. This presentation will describe the original approach of working together on a set of surveys subjected to mixed methods analysis, with common frameworks, concepts and objectives.

Strangers in the family? Prevalence of 'hidden' kin and their predictors across kin type

Lisa Jessee, Lea Ellwardt, Thomas Leopold

Universität zu Köln, Germany

Background. Research on family relationships has primarily focused on solidarity exchanges between individuals, such as closeness, contact, and support, typically among relatives whom individuals know of. However, little attention has been given to 'hidden' kin - relatives whose existence is known to individuals' but whose names or living status remain unknown, and with whom no solidarity is exchanged.

Objective. This study aims to a) identify the prevalence of 'hidden' kin across kin type (i.e., parents, siblings, grandparents, aunts, uncles, cousins, half-siblings), and b) examine the socio-demographic factors predicting 'hidden' kin.

Method. We use data from the U.S. sample of the KINMATRIX survey, which includes N=4,933 anchors who reported on N=96,160 biological anchor-kin dyads. 'Hidden' kin were identified based on a) the unknown living status of kin and b) the unknown name of kin. We used descriptive methods to assess the prevalence of 'hidden' kin across kin and logistic regression to identify predictors of 'hidden' kin.

Results. Descriptive results show unknown living status in 0.3% of anchor-sister/mother dyads, rising to 7.6% for anchor-paternal grandfather dyads. Unknown names occur in 18.24% of anchor-paternal grandfather dyads but none in anchor-sibling dyads. Logistic regression showed that younger, male, less educated, and anchors with disrupted family biographies were more likely to report unknown living status of kin. This was also more likely for Black but less likely for Asian/Asian American anchors compared to White anchors. Unknown kin names followed similar patterns but were also more common among Asian/Asian American anchors and less common among hetero anchors.

The IdNet project: Bridging sociological, social-psychological and social media perspectives in personal network research

<u>Eric Widmer</u>¹, Christian Staerklé², Guillaume Fernandez¹, Sarah Fontanellaz², Esté Torres¹, Eva Green², Marlene Sapin², Tommaso Venturini¹, Gil Viry³

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Many young adults face conflicting demands and expectations regarding their identities as members of social categories whose status in society is debated and contested, while expressing anxiety about the ties that link them with other persons. This paper presents the IdNet research project, which offers an analysis of personal networks and social identities of young adults during the eventful 2020-2023 period in Switzerland. The basis and driving force of this research is the edition of the Swiss Federal Surveys of Adolescents (www.chx.ch) dedicated to personal networks of young adults. It includes near full coverage of young Swiss men (N approx. = 60'000), as well as a sample of about 15'000 Swiss women, most between 18 and 21-year-old. Based on data from this large-scale representative national youth survey, and combined with a longitudinal follow-up study and an Internet extension to be conducted, the project investigates the psychosocial processes that transform personal networks into social identities. It further identifies the contextual conditions under which personal networks give rise to psychologically meaningful identities. The presentation stresses some of the opportunities but also challenges that such an interdisciplinary project presents.

OS-96: The legacy of Harrison White

Location: Room 108 Session Chair: Michel Grossetti Session Chair: Sophie Mützel

AESOP: Operationalizing Identity and Control Using Generative AI to Create Realistic Dynamic Networks Kathleen M Carley

CMU, United States of America

In Identity and Control, Harrison argued that social structure, culture and identity are continually evolving as individuals manage uncertainty by interacting. The resulting dynamics and changes in identity both control and can be controlled through the network. Generative network models, however, do not exhibit these properties. We argue that this is because they consider only the social and not the semantic network, and only use nodes at one level - people or organizations, not both. We ask whether Large Language Models (LLMs) can be used to generate communities that behave as White described.

LLMs are increasingly utilized to generate synthetic data, providing valuable solutions in scenarios where real-world data is scarce, expensive, or privacy-sensitive. The hope is that LLMs will create artificial datasets that closely mimic real-world interactions and network structures so that it can be used for education, testing and training algorithms, and conducting behavioral research without compromising user privacy. The questions are: How realistic are these synthetic data? Are the networks realistic? How can such realism be assessed?

The AESOP-MOMUS system for generating and validating synthetic social media data is described. The resulting synthetic data are assessed for realism, and for exhibiting the properties discussed by White. We find default methods for using LLMs to create synthetic data generate messages that look real to humans, but that have very unrealistic semantic and social network properties. Harnessing the LLM to a network structure results in statis networks where the message content and agent identity don't make sense given the agents network position. However, we find that by using principles defined in Identity and Control, more realistic data can be generated.

These principles include: 1) Structural equivalence – this is used to enable mutual changes across social and semantic networks. 2) Duality of structure – the individual's role has causal priority over the messages they send. 3) Focus on uncertainty – uncertainty is created by incorporating inauthentic actors, low credibility information and news sites, and evolving events. 4) Narrative focus – meaning emerges from connections among actors, concepts, events. 5) Relational identity – actor identities are formed and maintained in relationships. 6) Control and agency – actors have agency which they employ when sending or refusing to send messages; however, the content is influenced by the emerging social and semantic networks. 7) Narrative construction – identities are constructed through narratives. In this process, many of these principles are extended from the original person or group social networks describe by White to both social and semantic networks. Finally, narrative is used as the basis for generating networks and identities and for interpreting them. How these play out in AESOP is illustrated showing generated networks and messages.

While more realistic, this synthetic data is limited as the dynamics are event based. Hence, there is only one context at any time. Future research should explore whether ambiguity handling in LLMs generated actor messages will support context flipping. Methods to improve the dynamics of identity and network are discussed.

Before the Labels: How Art Galleries Organized Exhibitions in the Absence of Categories

Erwanghao Yu¹, Alessandro Lomi², Simone Santoni¹

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This study examines how art galleries as cultural intermediaries structured exhibitions and shaped understanding of modern art during 1904-1915, a period of unprecedented artistic innovation preceding the institutionalization of modernist categories. Drawing on the Database of Modern Exhibitions (DoME) and associated visual archives, we investigate how galleries accomplished coherent exhibition curation despite lacking established category systems.

Our study reveals how network structures and cultural practices co-evolved during this pivotal period. We demonstrate that galleries developed classification practices through their interconnected exhibition decisions, creating informal networks of artistic association before formal movement categories emerged. The research combines two complementary data sources: historical exhibition records from DoME and computational analysis of exhibited artworks' visual features. This allows us to examine both the social networks formed through curatorial decisions and their relationship to emerging artistic styles.

Our findings illuminate how cultural intermediaries navigate evaluation in periods of categorical instability. We examine how galleries' classification choices were influenced by both network structures (relationships between artists and exhibitions) and cultural dynamics (evolving artistic conventions). This research aims to advance our understanding of classification processes in markets experiencing radical innovation, exploring how early social networks and cultural practices may shape the foundations of emerging category systems.

Decoupling: a concept to go beyond networks

Michel Grossetti

CNRS/EHESS, France

In Markets from Networks, Harrison White develops the concept of decoupling, notably in a chapter entitled "Embed and Decouple" (chapter 10). He also uses this concept in Identity and Control. This concept is a generalization of his theory of markets first presented in 1981 in an article entitled "Where do Markets come From? In this theory, firms in a situation of strong structural equivalence relative to suppliers or customers adjust to each other on the basis of price and quantity signals. These adjustments can lead to the stabilization of firms' positions in niches corresponding to product characteristics in terms of quality. In this case, reciprocal adjustments lead to relative consensus on quality assessment. The decoupling of a market is a process of emergence of an aggregate-level social formation from a network of dyadic relations between economic players. This social formation is structured by a type of order (a "discipline" in his language), which White calls an "interface".

reciprocal of embeddedness, which is the dependence of a social formation on networks of dyadic relations. If generalized, this concept makes it possible to conceive (and empirically analyze) the emergence of a social entity in relation to others, which constitute or encompass it. In this paper, I will develop this possibility of generalization and take an example of the decoupling mechanisms of organizations in relation to persons and their networks. This example concerns research projects involving collaborations between academic laboratories and enterprises in the field of engineering. Many of these projects are decided and developed on the basis of chains of interpersonal relations, but the involvement of organizations (laboratory and enterprise) is reflected in the implementation of procedures for materialization (creation of models or documented digital models), formalization (contracts, agreements) or collectivization (information sharing, rotation of representatives in meetings) that reduce the effects of embeddedness in networks. Conversely, other processes, such as personalization (the monopolization of collaboration by one person in the enterprise or laboratory), weaken decoupling.

How New Fields Emerge from Barriers in Semantic Flow

Ethan Greist

University of Notre Dame, United States of America

The existence of social fields – distinct sites of social competition and interaction around some common understanding of norms and goals – has long been recognized by sociologists. The mechanics underlying the emergence and development of these fields are, however, far less well understood. This is partly due to the way that these mechanics are shrouded by popular spatial models of fields which are ill-suited to processual questions about field evolution. Using data on 50 years of bill cosponsorship between United States senators, I construct a structural topic model which relates the social network interactions of these individuals through bills to the topical fields that these interactions emergently create. I show that the "speciation" of new topics can come from both intra-field and inter-field mechanisms which are amenable to discovery through the pairing of semantic and social network analysis. I describe how shifts in the mediating technologies of social network interaction – in this case the decline of the congressional committee system – influence the rate and kind of field evolution.

Mapping the exchange space of data work for AI: a Franco-Malagasy case study Maxime Cornet^{1,2,3,4}

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The increasing digitalization of our societies and the rapid development of artificial intelligence (AI) is tied to the emergence of professions related to what has been titled "data work". In the global South, hundreds of thousands of often precarious and poorly paid "data annotators" digitize, sort, and classify vast amounts of data.

In this presentation, I focus on the structure of the global "data work" market through a field study conducted between France and Madagascar in 2021-2022. Through a mixed methods, multi-site research design -- 300 questionnaires, and more than 200 interviews with various stakeholders: workers, managers, CEO, data-scientists and public servants -- I reconstructed an extensive network, mapping the exchange of data work related to the island.

Through an analysis that incorporates Harrison White's theory of markets and a stochastic blockmodel approach, I show that the exchange space is particularly structured by the chronic uncertainty that prevails there and the very low visibility that actors intervening within the network have with respect to the rest of the exchange space. In particular, I show that in order to minimize the risks associated with this uncertainty, a mechanism of double observation is set up within the space. Producers observe the signals sent by other producers in order to position their offer, but they also observe the signals sent by customers in order to select the projects they will accept. This analysis allows me to draw up a relational typology of the actors and to define the relational constraints that structure this space.

OS-197: Social Networks in Childhood, Adolescence, and College 3

Location: Room 109 Session Chair: René Veenstra Session Chair: David R. Schaefer Session Chair: Carolyn Parkinson

Distance or Competition? The Co-Evolution of Friendship and Conflict Networks among Socially Dissimilar Students TIMOTHEE CHABOT

Université Toulouse Jean Jaurès, France

How are enmities among school children formed? This question has been asked by at least two strands of research: studies of school bullying, aiming to understand and prevent violence among students in general; and studies of social mixing at school, trying to understand under what conditions students from different socioeconomic and ethnic backgrounds can bond.

A first hypothesis is that enmities are shaped by social and relational distance, following a mechanism of discrimination and group identity: Students primarily dislike or harass others dissimilar to them, particularly in socioeconomic and ethnic terms, as well as others belonging to different groups of peers. Conversely, another hypothesis is that proximity generates enmities,

following a mechanism of competition: Students primarily confront others that resemble them, as well as potential rivals within their own peer group. In network terms, this translates into two related questions: what is the effect of attribute **dissimilarity** on the formation and maintenance of negative ties? And what is the effect of structural equivalence – i.e., having similar positions within the friendship networks?

To answer these questions, I use Stochastic Actor-Oriented Models (SAOM) applied to the coevolution of friendship, dislike and bullying networks in four French middle schools. 861 students were surveyed over 30 months, allowing to reconstitute grade-level complete networks. I also provide qualitative evidence from these schools to help interpret statistical results.

Results suggest that structural equivalence in the friendship networks increases the odds of conflicts, both for disliking and bullying ties. On the contrary, attribute dissimilarity has little to no impact, with the exception of academic performance. Theoretical as well as policy implications are discussed.

Friendship Networks in a Comprehensive College Transition Program

Emily Howell, Megan S. Patterson, Andrea Vest Ettekal Texas A&M University, United States of America

Support and connectedness are primary elements of students' sense of belonging. Comprehensive college transition programs (CCTPs) provide multi-pronged support for college students. Research demonstrates these programs often improve students' sense of belonging by providing an intentional community for students (Cole et al., 2019). CCTPs are associated with desired outcomes such as student well-being, retention, and persistence (Melguizo et al., 2021). Social network analysis allows for a deeper understanding of community formation within CCTPs. Sense of belonging is conceptualized at multiple levels such as broadly to the university or within specific groups such as a class. The purpose of this study is to investigate whether belonging impacts friendship networks among students involved in a CCTP throughout one semester. At a large university in the USA, three freshmen CCTP classes were surveyed at weeks 4 and 14 of the semester. Employing separable temporal exponential random graph modeling, networks were analyzed for friendship tie formation and dissolution. Classmates were significantly likely to form ties based on their university-level sense of community across all three classes (parameter estimate range=0.56-1.63, ps. .001-.008). University-level sense of community was significant in ties persisting throughout the semester in two out of three classes. Results indicate class-level sense of community was not impactful for student friendships. This study argues promoting a university-level sense of community is important for undergraduate students' friendships throughout CCTPs. Therefore, CCTPs prioritizing fostering a sense of belonging to the university rather than to the smaller cohort may see greater friendships.

Friendship Networks, Community Context, and Adolescent Health: An Integrated Approach

Daniel T. Ragan¹, Sarah M. Chilenski², Mark E. Feinberg²

¹University of New Mexico; ²Pennsylvania State University

Relationships with peers, and friends in particular, are a crucial element of adolescent development and well-being. These friendships, like other interpersonal networks, are embedded and influenced by the larger community, and a rich history of social-ecological research links community characteristics to problem- and health-related behaviors. Most studies of peer dynamics, however, have been limited in their ability to investigate how adolescents' broader community shapes the interplay between friendships and these behaviors. In this presentation, we outline an approach for connecting these literatures through a research project that combines longitudinal assessments of adolescents' health behaviors, their friendship choices, and their specific communities. Our project builds on existing survey data from a trial of the PROSPER prevention model across 28 communities. In addition to measures of health and well-being, these data contain social network friendship data covering all students who are enrolled in the same school and grade. We show that geocoding the students' home addresses allows for the creation of measures that capture the specific community context of each individual. By combining these community data with the students' communities and friendship and survey data, this project will provide new opportunities to examine the joint contribution of communities and friendships to adolescent health and well-being.

Interethnic Relations in Schools with Different Ethnic Composition

Apollinariia A. Ermolaeva, Valeria Ivaniushina, Daniel Alexandrov

Higher School of Economics, St.Petersburg, Russian Federation

Most studies, including our research on Russian schools, have found that ethnic homophily is usually asymmetric with ethnic majority students being "ethnically blind" (i.e., not giving a clear preference to friendships with other majority students) and ethnic minority students tending to form ties with peers of similar background. At the same time, in some studies interethnic relationships were found to be dependent on ethnic composition of schools. Our previous research on adolescent networks was based on schools with relatively low presence of ethnic minority students (mostly 15-20 percent). To discern the effects of ethnic composition of schools on homophily in adolescent

networks we recently sampled schools in Russian cities with varying presence of minorities, including ones with 70-85% of minority students. Fitting exponential random graph models for 97 classroom networks, the study explores the friendship preferences of ethnic majority and minority students. Preliminary findings reveal that both ethnic minority and majority students exhibit a preference for forming connections with peers of the same ethnicity, and while the share of ethnic minority students relates to ethnic minority homophily in a non-linear manner, no significant effect of class composition was observed for ethnic majority homophily. These results and their discussion will be presented at the conference.

Leadership, Friendship, and Defending in Elementary Classrooms: A Social Network Perspective

René Veenstra, Zhe Dong, Xingna Qin, Gijs Huitsing

University of Groningen, Netherlands, The

Recent research shows that positive leaders in elementary schools excel at building relationships, while negative leaders use aggression to achieve personal goals (Dong et al., 2023). Another study found that negative leaders are detrimental to classroom well-being, while positive leaders also pose challenges - especially for girls, who experience lower self-esteem and increased depressive symptoms, illustrating the healthy context paradox (Dong et al., 2024).

This presentation builds on these studies by using multiplex longitudinal social network analysis to examine the role of positive ann negative leaders in the co-evolution of friendship and defending behaviors. We examine whether positive leaders are more likely than negative leaders to defend non-friends or to cross gender boundaries. Using two waves of KiVa NL data from one school year (fall and spring), we analyze 59 classrooms with only positive leaders, 29 with only negative leaders, and 25 with both.

Despite similar friendship network structures in these settings, cross-gender defending by positive leaders leads to cross-gender friendships more often than when negative leaders do the same. However, when negative leaders defend a peer, friendships tend to form or persist, whereas for positive leaders, defending does not predict friendships. Regarding the development of defending relationships, the stochastic actor-oriented models show that same-gender friendships are a much stronger predictor of a defending relationship for negative leaders than for positive leaders.

OS-106: Advanced Mathematical and Statistical Network Methodology 3

Location: Room 112 Session Chair: Martin Everett

Two mode directed data

Martin Everett

University of Manchester, United Kingdom

We first give a mathematical definition of multimode data this includes directed multimode data. Most 2-mode data is undirected but it is possible to have directed data, this would require both modes to have some degree of agency. We give some examples of directed two-mode data and suggest techniques for analyzing and representing such data. We examine standard methods but also look at projections and core-periphery models including the dual projection approach.

We need an intervention - determining whom to target using D-optimality

Ellinor Fackle Fornius, Johan Koskinen

Department of Statistics, Stockholm University, Sweden

Interventions in networks is becoming an increasingly more important topic in public health, business, and public policy more widely concerned with opinion change and online networks. Yet, network research suffers a lack of viable causal frameworks and the choice of targets of interventions are typically based on heuristics. Optimal design theory has long been established as a statistical technique for designing experiments, interventions, etc, but has thus far rarely been applied to networks. A notable exception is Parker, Gilmour, and Schormans (2017), who proposed optimal designs for networks but only for a linear model, i.e, with independent (SIC!) outcomes. We explore designs for network effects and network autocorrelation models, and how these are affected by increasing network autocorrelation and social influence - whom to do treat if potential targets have the capacity to influence others? We derive the local D-optimal design for a specific illustrative example. However, this design is not unique, and highly sensitive to the strength of network autocorrelation. In terms of designs, network models suffer from similar limitations as standard non-linear models but, in addition, determination requires that the network is fixed and known. We suggest that a way forward is to consider designs that are optimal in expectation, either with respect to an a priori network model such as the ERGM or autocorrelation coefficient.

Evidencing preferential attachment in dependency network evolution

Clement Lee

Newcastle University, United Kingdom

The preferential attachment model is often suggested to be the underlying mechanism of a network's growth, largely due to that the degree distribution often follows the power law, albeit approximately and partially. While such attribution can be made in the absence of the network's evolution history, it is more sensible to directly model the evolution when such data is available. This is the case in this work, where the incremental changes of the dependency network of R packages are available. Not only do we fit a generalised linear model based on preferential attachment, we also incorporate a preference function that is realistic for the tail heaviness of the resulting degree distribution. Results suggest that the influence of packages grows superlinearly initially and linearly above a threshold.

Expanding the ERGM Framework: Modeling Interrelated Health Outcomes with Jointly-Distributed Binary Data

George G Vega Yon¹, Thomas W Valente², Jacob Kean¹, Mary Jo Pugh¹

¹The University of Utah, United States of America; ²University of Southern California

Exponential-Family Random Graph Models (ERGMs) are foundational in social network analysis. More recently, their application has extended beyond traditional static and panel networks to diverse data types. Notable extensions include Exponential Random Network Models (ERNMs), which jointly model networks and outcomes; the Generalized Location System (GLS), used for occupational stratification and residential settlement patterns; and the Autologistic Actor Attribute Model (ALAAM), an influence model that captures outcomes through motif-based structures.

In this paper, we introduce a novel application of the ERGM framework for analyzing complex, interrelated binary outcomes beyond conventional network data. Specifically, we propose modeling jointly-distributed health conditions to examine how multiple diseases may be interdependent. Using an empirical panel dataset, we construct a model that moves beyond assumptions of independence between health outcomes. Looking at the data as a bipartite network where individuals are mapped to various health conditions, our approach conceptualizes diseases as a complex system, where the presence or absence of one condition is characterized by sufficient statistics featuring other conditions.

Our analysis leverages the R package defm, which facilitates the estimation of these models. By providing both a methodological extension and a practical implementation, we demonstrate the potential of the ERGM framework in capturing interdependencies in health and other domains with complex binary data structures.

OS-53: Networks, Philanthropy, and Social Impact

Location: Room 114 Session Chair: Louis Michael Shekhtman Session Chair: Dikla Yogev

Mapping Philanthropic Grants with Network Science

Louis Michael Shekhtman¹, Alexander J Gates² ¹Bar-Ilan University, Israel; ²University of Virginia, USA

The nonprofit sector in the US is estimated to constitute around 5% of GDP representing over \$2T in revenue. Likewise, globally philanthropy from direct cash giving alone is nearly 3% of GDP, reaching \$550B annually. Despite this there has been limited efforts on understanding the large-scale patterns of philanthropic funding. Here we detail our efforts to collect and disambiguate over 10 million grants listed on the tax returns of over 700,000 non-profit organizations in the United States from 2010-2023. The data for this effort comes from the Internal Revenue Service's (IRS) release of electronically formatted filings. We highlight how this data can be used to form the network of grants between funders and recipients, enabling the application of tools from network science. We characterize several key aspects of the network. First, we observe clear inequalities in the network with a long-tailed distribution in f the amounts and number of grants given and received. Indeed, some funders and recipients give or receive thousands of grants totaling billions of dollars, while most are involved with much more modest amounts. At the level of specific grants, we identified the strong inertia in giving with 70% of grants repeating one year later. Finally, we show how the network can be used to predict potential future funding, offering recipients and donors to better identify one another to advance their missions.

Interlocking Board Memberships: Governance Networks Across Corporates and Nonprofits

Dikla Yogev¹, Alexander Finkelshtein², Louis Shekhtman²

¹University of Toronto, Canada; ²Bar-Ilan University

This study examines interlocking board memberships between corporate and nonprofit sectors using network analysis and data from LittleSis. Findings reveal structural differences: corporate boards are more insular, reinforcing sector-specific governance, while nonprofit boards, particularly in the arts and philanthropy, exhibit greater cross-sector connectivity. Board interlocks show strong geographic clustering, with governance networks aligning with regional economic ecosystems. Despite some overlap, corporate and nonprofit boards largely operate independently, with financial institutions playing a central role in business interlocks. Sectoral diversity analysis using Shannon entropy indicates that art organizations have the most diverse board connections, while finance boards remain more homogeneous. These insights highlight the role of board interlocking in shaping governance, influencing decision-making, and reinforcing elite networks. The study contributes to research on organizational networks, governance structures, and the intersection of business and nonprofit leadership, with implications for policy, transparency, and cross-sector collaboration.

Connected Boards, Diverse Leaders: How Networks Shape University Presidencies

Ty Benjamin Misiorek, Jianjian Gao, Alexander J. Gates

School of Data Science, University of Virginia, Charlottesville, Virginia, USA

Mirroring corporate boards, university trustees oversee governance, set budgets, shape public image, and make key hiring decisions---including presidential appointments and faculty promotions to tenure. As gatekeepers of institutional power, they operate within networks of influence that shape leadership pipelines and policy decisions. Yet, despite extensive research on academic leadership, the link between board composition, professional networks, and research outcomes, remains understudied. Here, we investigate how university boards' composition and social embeddedness influence their selection of presidents. Analyzing data from 179 American universities from 1999 to 2018, we find that institutions with greater women representation on their boards are more likely to appoint women presidents, even after controlling for institutional factors such as university rank, student demographics, faculty composition, and board size. Furthermore, universities with boards that have more interlocking directorates demonstrate a higher likelihood of selecting women presidents. These findings challenge the presumption of autonomous selection processes in university leadership appointments, and illuminate the interconnected nature of gender dynamics in academic governance. Our results further reveal institutional mechanisms that either promote or hinder gender diversity in university administration. By demonstrating how leadership diversity can reinforce or constrain itself within organizational structures, this research offers insights that extend beyond academia, informing broader discussions on gender representation in leadership across sectors.

Direct Philanthropic Donations in the Chilean School System: A Social Network Analysis in the last two decades (2003- 2023)

Cristobal Villalobos³, Ignacio Wyman², Diego Palacios¹

¹Society and Health Research Center, Universidad Mayor, Chile, Chile; ²University of Manchester; ³Pontificia Universidad Católica de Chile

This study examines the evolution and patterns of direct philanthropic donations in the Chilean school system over the past two decades (2003–2023) through a Social Network Analysis (SNA) approach. While philanthropy in education has traditionally focused on major foundations and policy-level influences, this study focuses on direct financial contributions made by individuals and private organizations to schools and intermediary bodies. Using data from the Central Registry of State Collaborators and Municipalities, we identify trends in donation volumes, donorrecipient relationships, and thematic priorities.

Findings reveal a concentration of donations among fewer actors over time, with an increasing shift from private organizations to individual donors. The analysis also highlights a predominance of donations targeting infrastructure and equipment, though recent years show diversification toward teacher training, psychosocial support, and student retention initiatives. Donations remain spatially concentrated, with a disproportionate share allocated to select regions, raising concerns about potential inequities in philanthropic giving.

These findings contribute to the broader discussion on philanthropy and education privatization, demonstrating how direct donations reflect market-based dynamics and evolving policy incentives. The results suggest that philanthropic giving is highly sensitive to legislative and fiscal changes, reinforcing the need for policy frameworks that ensure greater equity and transparency in educational donations. By applying SNA, this study underscores the role of philanthropy as a structural force shaping educational opportunities, offering insights for policymakers, researchers, and stakeholders involved in educational funding.

Growing indigenous philanthropy abroad: international networks in fostering national philanthropy in Brazil (1995-2005)

Pedro Grunewald Louro^{1,2}

¹Université Paris-Saclay, Paris; ²University of São Paulo, Brasil

This presentation analyzes an international network of organizations engaged in fostering the rise of "indigenous philanthropy" abroad. It examines efforts by American foundations aimed at creating this kind of institution in countries without their own modern national foundations, as was the case in Brazil from the 1990s to the 2000s. While the role of international philanthropy in shaping scientific networks abroad has been well documented, its role in nationalizing philanthropic associations remains largely undiscussed. To fill this gap, this presentation proposes a network analysis of roughly 110 organizations, attributing edges according to four criteria: funding, joint projects, interconnected boards and committees, and the displacement of actors between organizations. Based on documentary research on these organizations and interviews with the actors involved in these networks, the discussion highlights how American foundations transplanted their institutional model of action — namely, donation not as charity, but as an investment for social innovation — to Brazil. The network reveals two positions as the main sources of resource and idea flows. On the one hand, the Kellogg Foundation established connections with economic elites and their new foundations. On the other hand, the Ford Foundation established connections with non-government organizations and social science research centers. In doing so, the Kellogg Foundation focused on training grantmakers, while the Ford Foundation was interested in preparing grantees and advisers to receive and manage funding. Thus, the network constitutes a division of labor, as the main positions have structural equivalence but are opposed to one another.

OS-91: Statistical Approaches for Modelling Network Dynamics

Location: Room 116 Session Chair: Göran Kauermann Session Chair: Anuska Ferligoj Session Chair: Vladimir Batagelj

Tracing the ephemeral: Exploring the temporal structural dynamics of social interactions

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¹ESMT Berlin, Germany; ²Defence Science and Technology Group, Department of Defence, Australia

The concept of a network path has been foundational to network scholarship, enabling measures like betweenness, centrality, or reachability to capture how social actors connect and how information flows in a network. Advances in communication technology and the availability of fine grained time stamped interactions data necessitate rethinking the concept of network path to enable the development of measures, metrics and concepts uniquely adapted to capture the dynamics of social interactions. Building on the increasing recognition of the importance of microdynamics in social life, we advocate extending the notion of a network path into the temporal domain. We propose a framework for studying temporal structural dynamics in social networks, introducing metrics and measures tailored to capture the intricacies of ephemeral, time-sensitive relational processes. By integrating temporal dimensions, scholars can explore not only how and whether social actors connect, but also the temporal nuances of their interactions. This dynamic approach has profound theoretical implications for understanding relational processes and offers novel methodological tools for analyzing the evolving nature of human networks.

Modelling emergent structures in mobility - Model specification and population inference

Marion Hoffman¹, Claudia Noack², Per Block³

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It is increasingly common to study mobility and migration of individuals between social and physical locations as networks in which locations are nodes connected by mobile individuals. This conceptualisation as mobility networks facilitates the analysis of how individuals influence one another in their mobility destinations.

Technically, this amounts to analysing interdependence between individuals' mobility paths. A recently proposed framework allows the statistical modelling of these social processes and, therefore, dependence in mobility, combining features of Exponential Random Graph Models (ERGMs) and classic log-linear models.

However, insufficient attention was paid to how such models should be specified in a principled, theoretically informed way. In this presentation, we apply statistical theory to propose model specifications that can be used to analyse emergent structures in mobility. In particular, we discuss how to specify models that (i) are based on clear dependence assumptions on the individual level, that (ii) have a clear individual level interpretation, that (iii) avoid (near-)degeneracy, a common problem for models with dependent observations, and (iv) that may be used to carry out population inference with sampled data.

Causal Relational Event Models

Melania Lembo¹, Veronica Vinciotti², Ernst C. Wit¹

¹Università della Svizzera italiana, Switzerland; ²University of Trento, Italy

Relational event models (REMs) describe temporal interactions between social actors, from the invasions of alien species, lending on the interbank market and patient transfers between hospitals. An important question in all of these, is what are the causal drivers underlying these processes. This is a causal discovery question and requires a causal inferential procedure that goes beyond MLE-based associative inference currently employed for REMs.

By exploiting the connection between REM partial likelihood under nested-case control sampling and logistic regression, we are able to use causal discovery methods recently developed for generalized linear models. In particular, we show that a causal relational event model is identified by means of two conditions: a standard MLE property and a crucial invariance property, expressed in terms of Pearson risk. The empirical analogue of these conditions requires a statistical test for the detection of the causal model among a set of candidate models. For this, we develop an efficient alternative to bootstrap, by deriving an approximate distribution of the standardized Pearson statistic under the causal model. We apply this method on a dataset of 350,000 events to investigate the causal drivers of bike sharing in Washington D.C.

Everything You Always Wanted to Know about Relational Event Models (but were afraid to ask) Ernst C. Wit

Universita della Svizzera italiana, Switzerland

Imagine a social network and most likely you will conjure up a picture of a static graph. In fact, this is how network models started to be developed by foundational work in the 1970s, followed in the 1980s by exponential random graph models. These models model the probability of the presence of an edge, possibly dependent on other edges. When temporal network data started to become available in the 1990s, an obvious choice was the temporal ERGM extension. Obvious, but not necessarily sensible. In fact, in the early 2000s SAOMs proposed modelling the presence of an edge not as a binary process, but as a temporal event history process. Pushing the connection with non-homogeneous Poisson process further, the relational event model (REM) introduced in 2008 has proven a particularly flexible model for modelling all kinds of relational processes, from alien species invasions, bike sharing, communication networks to lending on interbank markets.

In this talk I will sketch the most important developments in the history of dynamic network modelling, including TERGMS, SAOMs and Dynams, with a particular attention to relational event models. We describe the five-fold temporal dependence of relational events on time, and we show how new developments in REMs make the model ever more practical and adaptable to the needs of a practitioner.

Extending dynamic network modelling to higher-order social interactions

Veronica Poda¹, Veronica Vinciotti¹, Ernst C. Wit²

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Network data are widely collected across various domains, from biology to social sciences. The most common representation of these data is in the form of dyadic relationships, where pairs of nodes are connected by links. However, in some cases, groups of people are linked by higher-order interactions, such as two persons gossiping about a third one. Hypergraphs provide a framework for such interactions, where hyperedges represent subsets of nodes participating in the same event.

This work presents an extension of dynamic network models to higher-order interactions. By modeling hyper events via the proposed relational event model, we are able to analyze the temporal evolution of hyperedges and to uncover the dynamics of complex social phenomena. Using a rich dataset from a longitudinal study of over 40 secondary school communities in Hungary, we explore the dynamics of gossiping and the drivers underlying this social phenomenon. In this way, we are able to uncover patterns in how gossiping forms and evolves, offering new insights into social dynamics.

OS-41: Network Approaches to Attitudes and Beliefs

Location: Room 125 Session Chair: Claudia Zucca Session Chair: Lorien Jasny Session Chair: Mario Diani

Mapping the Belief System of Populist Attitudes in South Korea

<u>Seula Lee</u>, Yoonyoung Na, Hyeona Park Seoul National University, Korea, Republic of (South Korea) Populism is one of the most frequently discussed concepts in explaining contemporary global politics. While it lacks a strong ideological foundation, populism gains influence by merging with various sociopolitical issues and ideologies. Political sociology and social psychology theories emphasize that political attitudes are not the result of a single factor but rather a multidimensional outcome of dynamic social structures and psychological elements. This suggests that populist attitudes are also shaped by such complex influences. However, existing research on populism primarily focuses on the relationship between political ideology and psychological attitudes, with studies largely limited to the U.S. and Europe.

This study seeks to expand the scope of populism research by examining its multidimensional nature in South Korea, where related studies remain scarce. Using network analysis, this study examines how populist attitudes in South Korea connect with identity shaped by key social cleavages (ideology, security, class, and gender), political issue positions, and psychological dispositions. Through this approach, we systematically map the belief system underlying Koreans' populist attitudes. Additionally, considering generational conflict as a major dividing factor in Korean society, we explore how populist belief systems vary across age groups.

To achieve this, we analyze data from the 2022 Political Perception Survey (PPS) and employ Explanatory Graph Analysis (EGA), a method widely used in recent psychological research on belief systems. By providing a comprehensive mapping of South Koreans' populist attitudes, this study contributes to a deeper understanding of populism beyond Western contexts, offering nuanced insights into its political and sociological implications.

How large-scale public health measures shape personal networks? Conflicts and the transformation of relationships during the Covid-19 crisis

Béatrice MILARD, Renata HOSNEDLOVA

University of Toulouse 2, France

Biographical events are known to disrupt personal networks, but public events – such as the Covid-19 crisis and the policy decisions it prompted – also have a significant impact on these networks. On can hypothesize a connection between individuals' opinions and practices regarding public health measures during the Covid-19 crisis, their social characteristics, the nature of their personal relationships and the emergence of conflicts with specific individuals. Do differing views on public health measures generate tensions within social circles? How do these conflicts play out in different networks? Can these tensions be seen as a new form of social capital, shaped by individuals' social characteristics and relationships? Based on data from the "Life in Lockdown" (VICO) project, a longitudinal survey funded by the French National Research Agency, this study examines various variables, including opinions on vaccination, social characteristics (e.g., gender, age, income, education), types of sociability (family-oriented vs. friendship-oriented), and changes in personal relationships after the lockdowns. Particular attention will be given to interpersonal conflicts that led to broken ties and the success or failure in reestablishing these ties one year later.

Affect and Belief System: Tracking the Historical Interplay of Emotions, Identities, and Opinions Duhui Lee

Rutgers University, United States of America

Despite the soaring importance of political hostility, little is known about how affective attitudes are interrelated with other salient political values and opinions within a broad political belief system. This study aims to understand how tangible political attitudes align with affective hostility across various social groups based on different identities in American politics. Three key foci arise to do this: affects, stability, and heterogeneity—emotional elements, variability over time, and social group differences in belief systems, respectively.

The theoretical framework addresses two emotional dimensions shaping political hostility. First, affective intelligence theory (Marcus, Neuman, and Mackuen 2000) focuses on emotional responses influenced by political leaders, distinguishing between dispositional (habit-driven enthusiasm) and surveillance (anxiety-driven reconsideration) systems. Second, group stereotype theory (Fiske, Cuddy, and Glick 2007), anchored in social identity theory (Tajfel 1981), emphasizes everyday emotional dynamics based on group perceptions. This model evaluates groups on warmth (trustworthiness) and competence (effectiveness), highlighting everyday prejudice and stereotypes.

The data comes from American National Election Studies (ANES), the most comprehensive nationally representative survey dataset consistently measuring emotional reactions toward political figures and social groups since the 1950s. Thirteen post-election waves from 1984 to 2024 are analyzed. This paper empirically uses emotional evaluations of presidential candidates—anger, fear, hopefulness, pride—across election periods and feeling thermometers toward various social groups, such as ideologues, economic classes, races/ethnicities, religions, and sexualities.

Using belief network analysis, this study draws on American National Election Studies data from 1984 to 2024. Belief network analysis conceptualizes a belief system in which individual attitudes are structured as networks (Boutyline and Vaisey 2017). Several measures of centrality and clusteredness within belief networks are investigated to identify structural aspects both cross-sectionally and longitudinally. This method offers three advantages: identifying central beliefs through network centrality, analyzing relationality between beliefs to examine cognitive interdependence, and revealing structural equivalence through modularity, illuminating clustered alignment of political attitudes central to

polarization research. In so doing, I track the changes in centrality and modularity within belief networks to understand better how affective dimensions have had a key role in belief alignment.

The analysis categorizes key variables into three groups: (1) Affective Components: Emotional reactions toward presidential candidates and social groups. (2) Issue Positions: Attitudes on civil rights, economic policy, and immigration. (3) Social Identities: Subjectively perceived identities and objective socio-demographic characteristics. Overall, this study aims to clarify how affective dimensions shape political belief systems, providing novel insights into affective polarization and the social foundations of political attitudes in contemporary American politics.

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Belief Systems and Constraint: Individual Level Change and Belief Network Structural Effects William Holtkamp

University of North Carolina at Chapel Hill, United States of America

Scholars have increasingly begun to examine beliefs and belief change through systemic models, where group level belief systems are derived from and describe the propensities of what individuals think about the world. However, few studies examine the effects of belief system structures on belief change processes. Establishing a link between supraindividual organization of belief systems and individual level change is key to understanding the relational dependencies of ideological systems and the individuals who constitute those systems. I use a networks-based approach to examine 161 survey questions across a broad array of policy areas in the 2006-2014 overlapping General Social Survey (GSS) panels. I weight the survey by inverse density, model the surveys as weighted bipartite networks and assess them individually within each survey wave. Each time period is processed independent of all other time periods. I produce a bipartite projection of survey responses, and use this bipartite projection to cluster respondents into inductively communities using the Leiden community detection algorithm with modularity maximization. This groups respondents into clusters based only on their belief containing survey responses. In each independent period, I then subset the unique detected communities and produce belief networks of their survey responses to represent their unique belief system. Within each belief network, I calculate density, density of belief modules, core-periphery structures, network autocorrelation, and network autocorrelation of belief modules represent structures through which the belief system exerts its influence and pulls individuals into alignment with its underlying ideal values across 20 different belief areas. I use these network measures within multilevel, multivariate panel models to assess whether individuals move towards or away from their belief system means over time. My results show that while the network attributes of modular structures have little relationship with belief change trajectories, core-periphery structures, density, and autocorrelation are associated with significant levels of change towards the belief system mean across the areas of racial attitudes, religion, abortion, suicide, and LGBT rights. Critically, while individual level change is relatively uncommon, these are policy areas where individual level change is in fact observable within the GSS. The stronger the network connections, the more individuals change towards the mean value of their belief system. These results shed light onto a part of the process of the mutual constitution of individuals and the belief systems they both exist within and create. The supraindividual structure of the belief system can act as a driver of individual level processes of people changing their mind.

Constructing semantic networks of happiness and unhappiness based on word-association task

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Abstract: Understanding the everyday meanings of happiness and unhappiness, which are inherently polysemic and vary by individual context, is crucial for valid measures of these emotional states, yet research is scant. This study addresses this gap by constructing semantic networks based on data from a mini-snowballing word association task involving over 2,500 participants. In this task, individuals listed five words associated with 'happiness' or 'unhappiness', and subsequently named three associated words for each. Through network construction and community detection from these associations, we identified sub-concepts underlying happiness and unhappiness. Key sub-concepts of happiness included Peacefulness, Joyness, Friends, and Play, while those for unhappiness included Stress, Loneliness, Poverty, Conflict, and Disaster. Further analysis examined how demographic and socio-economic statuses influence conceptualizations of these states. Regression analyses with sub-concepts as dependent variables and demographic and socio-economic variables as predictors showed variations in perceptions of happiness based on gender and education level. Our findings illustrate how demographic factors

shape the semantic schema of emotional states and highlight the complexity of understanding happiness and unhappiness across different social groups. This study contributes to the broader discourse on happiness and unhappiness by mapping the diverse ways people interpret these fundamental human experiences.

OS-98: The role of networks in education and labor markets

Location: Room 202 Session Chair: Annatina Aerne Session Chair: Mattia Vacchiano Session Chair: Maria Prosperina Vitale

The stability of academic prestige: Characterizing the sociology job market with stochastic block modeling

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We investigate the role of "prestige" and the effects of hierarchy in the sociology job market over six periods between 1986-2021. The sociology job market has undergone significant transformations over the past few decades, particularly with regard to the hiring of assistant professor positions. Many scholars have investigated the role of institutional prestige on hiring (Long, Allison, and McGinnis 1979, Headworth and Freese 2015, Gaddis 2015), examining the "ranking effect", the impact that a scholar's graduating department plays a role in their employment. We extend Burris (2004) by examining the meaning and role of prestige in the Ph.D. exchange network over time. Using stochastic block modeling (Snijders, van de Bunt, Steglich 2010), we partition these networks into three different groups, and which we characterize with respect to their average placement success. We demonstrate how these dynamic partitions correlate with ranking, even as the universities that constitute them change over time. Then, we use PageRank centrality, as a measure of social capital, to predict school ranking, and show the effects of block assignment on prestige. By controlling for different university characteristics (e.g., public vs. private), and using a dynamic, stochastic partitioning, we show how the meaning and impact of prestige in hiring has changed over the period of a tightening job market.

The Social Implications of Telework: Changes in Contact Frequency and Network Composition

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As teleworking arrangements remain prevalent beyond the pandemic, they continue to reshape daily routines, with potential implications for individuals' social interactions. While teleworking reduces face-to-face interactions with colleagues, it eliminates commuting time and can offer greater flexibility, potentially increasing engagement with family and friends. Prior studies have shown that teleworking influences how individuals spend time with their social relationships and with whom they interact; however, limited research applies the structural information of personal networks to explore these dynamics.

This study addresses this gap using personal network data to examine how teleworking influences the frequency of interactions with different types of close contacts. It also considers the moderating roles of personality traits, namely extraversion, agreeableness and neuroticism. Utilising data from the Dutch Longitudinal Internet Studies for the Social Sciences (LISS) panel, we compare teleworkers and commuters, analysing their contact frequency with family and friends.

We hypothesise that teleworking is positively associated with interaction frequency with close contacts for both family and friend ties. We also anticipate personality traits to play a significant role in teleworkers' social engagement. To test this, we conduct a moderation analysis using multi-level modelling to account for the nested structure of ego network data.

The findings will contribute to discussions on work-life balance and the social implications of telework, demonstrating how contextual factors shape personal networks. By identifying conditions under which teleworking advances or limits social contact for individuals of varying social dispositions, the study offers insights relevant for policies on remote work and social wellbeing.

Assessing the role of social support in personal networks during educational transitions

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¹University of Salerno, Italy; ²University of Milan Bicocca, Italy; ³University of Naples Federico II, Italy

The student decision-making process in the transition from high school to university or the labor market is affected by a complex interplay of personal aspirations, motivations or social relationships. Beyond educational performance

and economic factors, the support received by students from family, peers, and other adults can shape students' choices. The present contribution investigates how different types of social support —informational, emotional, and appraisal—are mobilized within students' personal networks and which factors influence their choices. Personal network data were collected on a sample of high school students in Southern Italy using a multiple name generator to identify significant alters within three key social circles: family, school, and social environment. Information on alters' characteristics, along with ego-alter and alter-alter ties, has been gathered through a name interpreter. Multilevel logistic regression models have been estimated, one for each kind of support, to examine the determinants of support provision while accounting for the hierarchical nature of the data. The models undertake alters (level 1) nested within egos (level 2), and incorporate both alter characteristics (type of relationship, gender, age), and ego attributes (gender, parental education, and specific soft skill scales, such as autonomy, problem-solving, leadership). Preliminary results highlight how the provision of social support varies based on the kind of relationship between alter and ego and individual characteristics.

Keywords: Egocentric network data, Multilevel logistic model, Peer effects, Social support

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How does the social capital of novice teachers impact their career decision to stay in or leave the teaching profession?

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Nowadays, new teachers who enter the teaching profession do not stay long and leave

for other jobs in alarming numbers. In the UK, an estimated 40% of graduates who

enter the teaching profession leave in the first five years (Kyriacou and Kunc, 2007;

Sibieta, 2020), and for new teachers in shortage subjects such as math and physics,

the attrition rates are as high as 50% (Sibeta, 2020). To solve the problem of novice teacher attrition, researchers tried to explore the reasons why they leave to better understand the issue and then proposed some corresponding suggestions and theories in the process. Admittedly, it is a complicated issue, and such a leaving decision is usually caused by a combination of factors over a period of time. When studying the reasons of novice teachers' attrition, previous

studies have focused on the personal characteristics of the novice teachers, such as

teachers' resilience (Beltman, Mansfield and Price, 2011; Hong, 2012), while now a

few researchers have shifted their attention to the network aspects of these teachers

(Hokpins et al. 2019). Thus, I adopted social network theory, placing novice

teachers' social networks in the center of my research, with both qualitative and quantitative data, I explored how their personal networks impact decision to stay or leave the teaching profession. To be specific, I studied 1) how novice teachers interact with other people in their networks, both with people internal and external to their work, including leaders, colleagues, students, parents of the students, and their own family members and friends, 2) how the opportunities, constraints and other things embedded in their personal networks influence their decision to leave the teaching career. The study is significant because it provides a better understanding of how novice teachers' personal networks impact their leaving decision, and then hopefully the issue of novice teacher attrition can be decreased by coming up with methods to equip teachers with supportive networks that support their teaching career. Furthermore, when the attrition rates of novice teachers decrease, the attached challenges can also be relieved. To be more specific, the issue of teacher shortages, the high demand for teacher hiring can be relieved, and the

budgets used to recruit and train new teachers can be saved, and students

achievements do not need to be impacted by the leaving of their teachers.

How Telework Modalities Reshape Social Life and Social Interactions

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We present a study examining how different teleworking modalities shape social interactions, focusing specifically on work-family conflict, interruptions during work activities, perceived managerial control, and various forms of social support. Our analysis draws on data from 4,000 employees across Switzerland, Spain, Germany, and the Netherlands, including detailed information on over 28,000 professional and household contacts. Our findings illustrate multiple ways teleworking influences social relationships. For instance, the quality of the physical working environment emerges as a crucial factor in reducing interruptions over work activities and household conflicts. Interestingly, when teleworking leads to overtime and work intensification, it appears protective against conflicts with hierarchical superiors, who themselves represent an ambivalent source, simultaneously contributing to social conflict and providing essential social support. Furthermore, a mismatch between desired and actual telework intensity significantly predicts conflicts and negative experiences within social networks.

These results are based on the most extensive dataset to date of personal relationships within telework contexts, offering a significant contribution by integrating social network analysis into the literature on telework.

OS-135: Gender and Social Networks 3

Location: Room 203 Session Chair: Elisa Bellotti Session Chair: Michelle Nadon Bélanger

Exploring the Role of Friendships in Narrowing a Gender Gap in Sense of Belonging

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Belonging, as a fundamental psychological need, plays an important role in students' mental well-being and academic persistence. Being a numerical minority has been found to be associated with a lower sense of belonging, for instance, female minority students in engineering education. Although the theoretical arguments of belonging and qualitative research highlight the importance of interpersonal relationships on belonging perception, the quantitative research remains insufficient in determining the extent to which the established peer relationships influence students' sense of belonging, especially those who are a gender minority within the study cohort. To fill this research gap, the present study implements a longitudinal research design to study sense of belonging and friendships among N = 311 first-year students in three different study cohorts. Participants were surveyed four times during their first academic year 2022-2023. By applying mixed-effects models with longitudinal aggregated network data, we find a significant and positive influence of the number of friends within the cohort on students' sense of belonging. Our preliminary results also suggest that having a higher ratio of cross-gender friends positively affects female minority students' sense of belonging. Moreover, we evaluate whether the association between friendships and sense of belonging is moderated by satisfaction with their social connectedness. Overall, our findings shed light on the importance of peer relationships to narrow a gender gap in sense of belonging and provide practical implications for educational institutions to integrate gender-underrepresented students more strategically in higher education.

From Superwoman to Global Professional: How Social Networks and Social Capital Shape the Careers of South Korean Women in STEM

<u>Taehyun Kim</u>

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The fields of science, technology, engineering, and mathematics (STEM) in South Korea have traditionally been perceived as male-dominated. Despite two decades of government-led policies aimed at fostering female STEM workers, only a small number of women have managed to sustain long-term careers in STEM. Before gender imbalance became a major societal issue, female STEM workers often coped with gender inequality in male-centred organisations by adopting the "superwoman" role, striving for perfection in both work and family life. Since the 2010s, however, Korean female STEM professionals have increasingly pursued career development not only through networking within their fields but also through government-led initiatives promoting overseas employment. This shift suggests a growing perception that leaving the domestic STEM industry can positively impact career progression.

This study explores how female STEM professionals, who have limited social capital due to male-dominated social networks, have navigated career development and how their narratives have evolved. To investigate this, in-depth interviews were conducted with 15 female STEM professionals working in South Korea and Western countries.

Findings indicate that since the 2010s, the expansion of global STEM networks through online platforms and international academic exchanges has provided Korean female STEM workers with greater opportunities to acquire social capital. Consequently, the "superwoman" narrative has gradually weakened, enabling women to seek alternative career paths beyond male-dominated networks. This study argues that the increasing trend of overseas employment among Korean female STEM professionals is not merely an individual choice but a structural shift facilitated by global networking and social capital exchange.

Gender and the Co-Evolution of Political Orientations and Social Networks

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Despite growing interest in political polarization in social networks, relatively few studies have explored the coevolution of political orientations and social ties (Lazer et al., 2010; Wang et al., 2020), and even fewer have considered the role of gender, which is often correlated with the former. This study expands the literature by analyzing the social networks of law students, whose political orientations are often intertwined with the ways they build social ties and how those ties influence their political behavior. Using two waves of the Student Experiences in Law School Study (SELSS), conducted at three law schools in the Midwest during fall 2019 and spring 2020, we examine the co-evolution of social ties and political behavior, with a particular focus on the moderating role of gender.

Our research addresses two key points. First, we differentiate political behavior into two components: political orientation and membership in student chapters of politically oriented legal organizations. Second, we center gender in our analysis to explore how the gender of law students influences their formation of social ties in relation to political orientations and organizational memberships, and how these ties, in turn, shape their political behavior. Using Stochastic Actor-Oriented Models (SAOMs), we hypothesize that law students will align both their political orientations and organizational memberships with those of their friends. In addition to this peer effects hypothesis, we expect homophilous selection based on political affiliation and orientations. Furthermore, we anticipate positive interaction effects between similarity in political associations and orientations. Finally, we test the role of gender in both peer effects and homophilous selection.

Gender dynamics and farmers access to seeds in south-eastern Senegal

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Seed circulation is a source of exchange of both cultural knowledge and genetic material and shapes the distribution of crop diversity and associated knowledge. Through a case-study among the Bassari of south-eastern Senegal, we explore the pathways, mechanisms, and actors mediating farmers access to seed with a focus on gender. By examining how seeds are accessed and by whom, we seek to uncover the social and power dynamics that shape gendered inequalities in seed access. We used a mixed-methods approach, combining ethnographic methods with a seed network survey documenting farmers seed acquisitions for the six main staple crops cultivated in the study area. We then tested the association between farmers' centrality in the seed circulation network and their socio-demographic characteristics (n=258 farmers). We find that intersecting individual-level factors (i.e., gender, age, wealth) influence farmers' centrality in the network and therefore, their access to seed. We argue that the roles and expertise around seeds are gendered, situated, dynamic, and constantly renegotiated, leading to structural inequalities affecting farmers' access to seed. Moreover, such inequalities can be exacerbated by external interventions rooted on colonial histories and reinforced by the neoliberal food regime. To guarantee equitable access to locally adapted and culturally appropriate seeds entails explicitly addressing gender, wealth, and other dimensions of local inequality within and beyond households.

Hey mama, we've got your back: The Utilization of Motherhood Social Support Networks

Sara Francisco

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In this study, I explore how social support from online and offline communities are complementary resources that can aid women during the transition to motherhood. Although new mothers' social support has been studied, little research systematically explores the social interactions and types of social support utilized within both online and offline networks. To address this gap, I ask two questions: (1) what types of support do mothers seek? (2) how do mothers navigate support within their online and offline communities? The current study uses a combination of over 2000 threads related to support scraped from five parenting subreddits, original survey collection of over 400 social media users, and 46 in-depth interviews to study mothers' usage of online and offline social support networks. I find that mothers often rely on both online and offline networks to provide various types of support. Motivations for using online communities over offline networks varied, suggesting that depending on the topics, comfort level, and timing, mothers may selectively choose where and who to seek support from. Women frequently sought emotional and informational support within online communities, in contrast to more practical and emotional support from their offline relationships. Overall, these results suggest that online peer groups in which mothers can disclose events and challenges may help reduce feelings of isolation, enable the exchange of support between new mothers, and may supplement their in-person networks.

OS-210: Networks in Trade and Finance 3

Location: Room 204 Session Chair: Raja Kali Session Chair: Zhen Zhu Session Chair: Anastasia Mantziou

The Supply Chains of Artificial Intelligence

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It is acknowledged that great powers inevitably aspire to dominate different global topics. Topics like Artificial Intelligence (AI) have consolidated new perspectives on national and foreign policy strategies. The race for AI supremacy began several years ago. However, as AI advancements continue to transform industries, organizations, and strategies, there is a tendency to overlook the geopolitical implications of this ecosystem and its supply chains.

Some aspects of the AI ecosystem, such as data, algorithms, hardware, raw materials, and energy, are already defining several issues on the national security and diplomatic agendas of countries. These AI components define the implications of its development, usage, and diffusion.

A supply chain is a network that transforms inputs into outputs. This network conceptualization implies a relational approach where nodes and links interact, and several dimensions could be included. There is a growing interest in supply chains because price hikes, shortages of several goods, and tariff imposition affect economic growth and how businesses conduct operations. These phenomena, however, are a consequence of geopolitics. On the contrary, the supply chain of AI (the network that transforms minerals, data, microchips, energy, and work for developing and deploying AI) is a cause of global competition. However, there are no studies about the global implications of the AI supply chain to date.

So, in the age of AI, questions arise: What are the strategic supply chains? What does it mean for lagging countries and their organizations? To address these questions, we aim to analyze whether the race for AI supremacy is shaping two aspects: first, an AI gap among countries and their organizations, and second, an AI ecosystem, especially, hardware, energy, knowledge, and data centers. By empirically demonstrating the existence of the AI gap and its increase over time, this paper sheds new light on the implications of the AI ecosystem for different countries and their organizations. As a result, we provide evidence for the AI capabilities gap. It implies that only a few countries possess systemic AI capabilities, while many others will need to leverage them. Thus, AI methods are at the center of the AI ecosystem, serving as a tool for the advancement of organizations but also as a tool for power.

In this paper, we analyze four networks from different domains: the materials layer, the semiconductors layer, the energy layer, and the Al knowledge layer. However, the results obtained here also hold for a wide spectrum of layers that we can integrate into an Al ecosystem or another technological ecosystem that works with a supply chain pipeline. We first describe their network structure, namely, ordered graphs with the same vertices and similar degree definitions. Thus, each layer \$L\$ has the same number of nodes, \$N\$, as all countries are represented in each layer.

OS-175: Networks & Sustainability 4

Location: Room 105 Session Chair: Christina Prell Session Chair: Paul Wagner

Sustainable Supply Chain Management: A Social Network Analysis Perspective On Italian Value Chains

Mario Nicolas Mora, Matteo Mura, Mariolina Longo

University of Bologna, Italy

The accelerating urgency of climate change necessitates innovative strategies to integrate sustainability into supply chain management (SCM). This article bridges network theory and sustainable supply chain management (SSCM) to examine how network structures and firm-level sustainability performance interact to shape sustainable practices across complex supply chain networks. Employing a multi-scalar approach, the research spans macro-level analysis of an entire network and meso-level insights from industry-specific sectors.

The study utilizes Social Network Analysis (SNA) and Exponential Random Graph Models (ERGMs) to explore how sustainability metrics influence network connectivity, firm centrality, and tie formation. Key findings highlight the role of central firms as sustainability hubs and the significance of relational dynamics, such as homophily, in shaping collaborative behaviors.

This research contributes theoretically by integrating network theory into SSCM, offering new insights into the structural and relational dynamics critical to advancing sustainable supply chains. Practically, it provides actionable guidance for managers and policymakers, advocating for interventions such as digital traceability systems, targeted support for central firms, and collaborative platforms to foster resilience and sustainability. The findings underscore

the importance of leveraging network configurations and central actors to drive systemic change, paving the way for resilient, adaptive, and sustainable supply chains aligned with global climate goals.

Understanding Transformation Processes: A Network-Theoretical Approach to Capital Mobilization in the Energy Transition

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RWTH Aachen, Germany

Transformations are prevalently difficult to grasp in their process and dynamics. In the literature they are therefore predominantly described ex-post. To better understand this social phenomenon, it is important to examine transformations, such as the energy transition, as they unfold. Particularly in complex infrastructures like electricity supply, it becomes evident how microstructural decisions generate macrostructural effects and vice versa. In this, Network analysis presents itself as a suitable methodological approach, as it allows for scale-free analysis and the dynamic representation of interdependent levels.

The goal is to make transformation processes as such more tangible. Therefore, the study addresses the research question: What needs to be mobilized in a transformation process to change the distribution of capital within the field in the desired way? By combining Bourdieu's concept of capital with network-theoretical approaches, the study investigates how small-scale changes can lead to large-scale transformations. A case study of an energy transition living lab serves as an empirical approach to examine theoretical assumptions and explore possibilities for analysing transformations in their processualism.

The theoretical framework is defined by a targeted reduction of field structure and an expanded interpretation of Bourdieu's concept of capital. Particular attention is given to the forms of relationships between entities within the transformation process. The study adopts a temporal perspective, analysing capital mobilization and the expansion of influence within the network over time. The results aim to provide deeper insights into the dynamics of transformation processes and enhance the understanding of their internal logics.

OS-58: Online Health Communities

Location: Room 106 Session Chair: Zhen Zhu

Multimorbidity patterns and early signals of diabetes in online communities

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This study examines how online communities on Reddit can reveal connections between diabetes and other health conditions, as well as potential early signs of diabetes. We focused on three primary diabetes-related subreddits and their links to 85 other health conditions. By tracking user participation across different health-related communities, we mapped a multimorbidity network, highlighting common co-occurring conditions.

The results show strong links between diabetes and mental health conditions, including depression, anxiety, and ADHD, reinforcing the known psychological burden of diabetes. Additionally, users frequently engaged in discussions about weight loss, reproductive health, and autoimmune diseases, such as fibromyalgia, multiple sclerosis, and chronic pain, highlighting potential multimorbidity concerns.

We also investigated early signals of diabetes by analysing the temporal patterns of individual users. We found that many people discussed mental health, obesity, or pregnancy conditions before participating in diabetes-related subreddits, particularly for Type 2 diabetes. This suggests that digital behavioural data could help detect individuals at higher risk of developing diabetes, offering opportunities for earlier health interventions and support.

So many of us have been where you are and come out the other side: Central actors, moral sentiment, and recovery networks

Kimberly Ann Glasgow

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The opioid epidemic in the United States is an ongoing public health crisis, causing devastating harms at the individual, interpersonal, community, and societal levels. Morality-based discourse around addiction and treatment, particularly medication-assisted treatment, is pervasive in society. It informs attitudes towards harm reduction efforts, treatment approaches, and the self-image of substance users. It can shape and limit access to supportive alters. Moral foundations theory posits that moral attitudes and evaluations are based in a small number of "foundations" or dimensions.

Online social support from communities can play a key role in recovery. Prior work has examined online Reddit health communities (subreddits) organized around recovery and management of opioid use disorder, and the actors who engage in opioid and treatment-related conversations within these communities, from the perspective of moral

foundations. It found that moral content is common, moral profiles within communities reflects their specific purposes and values, and that central actors are often prominent in moral discourse.

In this work, we examine central actors more closely, exploring their moral expressiveness towards alters, and their role in shaping the moral tenor of the network, its cohesiveness, and other network properties. These findings could provide insight into the effectiveness of these health communities, and the influencers within them.

Topics co-occurrence in the online counselling service

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This is me is the largest online counselling service for young people in Slovenia. Since its establishment in 2001 at the National Institute of Public Health, more than 57,000 questions have been answered. Safety, privacy and optimal user experience is managed by a professional editorial office, that takes care of continuous online communication between adolescents and counsellors (doctors, psychologists, teachers, social workers and other experts). Part of the daily work of the editorial office is also to assign a topic to each guestion received. The most common topics of questions relate to relationships and mental health (about half of all questions) and to body and physical health (about a quarter of all questions). Some topics appear together more frequently than others. Understanding the cooccurrence of issues is crucial as it provides a deeper insight into the complex challenges adolescents face. This understanding can help to develop more comprehensive and effective support strategies for addressing mental illness comorbidity and also enable the adaptation and improvement of other activities within the This is me prevention programme, ensuring safe and positive user experiences for those who seek help. Therefore, the results of the exploratory analysis applied will be presented using the social network methodology. Here, the nodes represent the topics and the links between the topics represent the extent of co-occurrence. Since the co-occurrence depends on the frequency of occurrence of the individual topics, the links are normalised using Jaccard normalization. Special attention is paid to the most severe topics (e.g., suicide, anxiety, depression, self-harm behaviour, and others) and other selected topics. The results show an increasing trend in mental health issues, with specific topics strongly influenced by age and gender. Several topics that require an interdisciplinary approach (i.e., health professionals from different fields) were identified, such as domestic violence, eating disorders, sleep disorders, sexual orientation and identity, and others. Understanding the topics co-occurrence can enhance online support platforms, positioning them as an important first source of (mental) health support, especially for adolescents, who might not otherwise take the first step toward seeking help.

OS-182: Personal Networks across the Life Course 4

Location: Room 107 Session Chair: Marlène Sapin Session Chair: Claire Bidart Session Chair: Guillaume Favre Session Chair: Michel Grossetti Session Chair: Béatrice Milard

Role of self-esteem, need for cognitive closure and communion in evolution of social networks

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We investigate the significance of psychological traits for the evolution of social networks in a natural setting, specifically within bounded student groups. We focus on three crucial psychological traits: self-esteem, need for cognitive closure, and communion. Adopting a longitudinal approach, we use the Stochastic Actor-Oriented Model (SAOM) framework to explore the causal relationships between these psychological traits and friendship networks. In our study, a friendship tie is defined as the coexistence of liking and interaction.

We test the following hypotheses: Self-esteem increases popularity and activity in friendship network; There is expected homophily based on the level of self-esteem; Need for cognitive closure increases the role of triadic closure for creating friendship ties; There is expected homophily based on level of need for cognitive closure; Communion increases popularity and activity in friendship network; There is expected homophily based on level of communion; Communion increases the role of triadic closure for creating friendship ties.

Data were collected from 11 student groups across 4 universities located in 4 Polish cities. Each group consists of all 1st-year students from one major. The selection criterion was that the majors should be small enough for most classes to be taken as a single group. There were three waves of measurement: November/December 2022, March/April 2023, and July/August 2023. We analyze a dataset consisting of 6 bounded groups (the remaining groups were excluded due to low survey participation rates), covering 173 students who gave consent to participate in the study.

Singlehood, Social Network, and Perceived Old-age Support: A Study of Middle-aged Never-married Adults in Hong Kong

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The present paper aims to examine the perceived old-age support network among middle-aged never-married adults in Hong Kong. Family has been conceived as an important source of old-age support in both Western and Chinese societies. The increasing proportion of people remaining single throughout their lives and longevity of human life has prompted closer research attention to the social connections and old-age support of never-married individuals who do not have a family of their own. Moreover, the trend of population aging in many societies has generated great concerns for sustainable elderly care and support to be provided by the government, and subsequently, given rise to the concept of "aging in place", which encourages older adults to utilize family and community resources, and middle-aged adults to plan early for old age. However, relatively scant research has examined middle-aged never-married adults' perceived availability of old-age support, the relative importance of kin and non-kin ties as sources of old-age support, and the association with network relations.

To address the above issues, the present paper will employ data from a territory-wide random sample survey of 802 never-married adults aged between 40-59, which was conducted from mid-August to the end of December 2024. About 43% of the respondents have a partner and 20% live with their partner at the time of the survey. About 90% of the respondents have siblings. Respondents are asked to report on the expected sources of support in 11 areas of need when they enter old age, including day-to-day personal care, home repair, financial support, and companionship, etc. Support sources include self, partner, sibling, friend, relative, paid help, government, etc. They are also asked to indicate the extent to which they are concerned about whether these needs can be met.

About 30-60% of respondents report to rely on themselves for the 11 specified needs, particularly for financial and daily routine matters. More than 10% of the respondents do not expect to get help from anyone for all the 11 needs. Less than 10% of the respondents name siblings and friends as sources of support in old age, except that one-fourth of the respondents consider friends a source of companionship. The number of confidant ties and closeness with siblings are not associated with perceiving friends and siblings as sources of support. Relatives play a minimal role in perceived old-age support. Social capital, as measured by the number of occupations reached via social ties, is found to be associated with the tendency of self-reliance. Paid help and government support are perceived to be important sources of support in some areas, such as household chores, medical expenses, and housing. The findings will be discussed in the context of the self-reliance ideology and welfare regime in Hong Kong. Implications for social policies will also be explored.

OS-220: The legacy of Harrison White 2

Location: Room 108 Session Chair: Michel Grossetti Session Chair: Sophie Mützel

What would Harrison say? About recent trends in social network research

<u>Jan Fuhse</u>

Leipzig University, Germany

Harrison White was a towering figure in the development of network research. His passing gives us an opportunity to reflect on recent developments in the field: What might he say about them?

(1) White opposed rational choice modeling, and would probably be critical of Hedström's program of individualbased analytical sociology. He saw individual identities not as driving forces behind social networks, but as constructed in network processes.

(2) He showed little interest in the study of network mechanisms like homophily, transitivity, and preferential attachment. His focus was on the identification of systematic network patterns specific to institutional fields.

(3) White seems to have ignored ego-centric networks in survey research. He was chiefly concerned with studying the meso-level of full network configurations.

(4) He would probably have been sympathetic to computational social science, with direct connections to pioneers of the field (Carley, DiMaggio, Mohr).

(5) As a trained physicist, White was sympathetic to developments in interdisciplinary network science. However, he was critical of the abstract mathematical modeling of social phenomena without substantially engaging with them.

(6) White would obviously have a strong affinity to relational sociology, but with little interest in theoretical forbears and ontological discussions.

(7) As a quantitative scholar, White was not interested in qualitative methods to study networks. However, the qualitative study of interaction / communication (e.g., with conversation analysis) and of meaning in networks fit his research aims more than qualitative interviews.

Where do restaurants come from?

Elise Penalva-Icher¹, Paola Tubaro², Eloire Fabien³

¹Dauphine PSL university, IRISSO Research Center; ²CREST, CNRS, ENSAE, Institut Polytechnique de Paris; ³Université de Lille, Clersé Research center

Among Harrison White's multiple contributions to economic sociology, the 1981 market model stands out as a cornerstone, emphasizing coordination through quality rather than price. In recent years, the rise of digital platform intermediaries has made economic activity more complex. The proposed presentation raises the question of coordination in the restaurants market since the arrival of these platforms. It extends and renews the interest of White's model by showing that the role of platforms is more to support producers' coordination through quality – thus aligning with his original perspective – than the matching of supply and demand, as standard economics would have it.

We analyze the effects of a popular booking and review platform on the dine-in restaurant market in the mediumsized city of Lille, France. In line with White's framework, we conceptualize restaurants as a producers' market where multiple quality conventions — ordinary, advanced, and paradox — coexist with failure area. We instantiate these ideas through a combination of observations, interviews, web-scraping, and business data about 283 restaurants, following a sequential mixed-methods design. In particular, we use MRQAP analysis to show how dyadic similarities and differences in platform use, both by restaurants and by clients, predict their relative position in White's market structure. We conclude that platforms rationalize firms' practice of observing one another as a basis to make volume and quality decisions. The rise of digital platforms equips producers with devices that amplify their view of competitors, standardize their offerings, and support the stability of their business choices over time.

OS-198: Social Networks in Childhood, Adolescence, and College 4

Location: Room 109 Session Chair: René Veenstra Session Chair: David R. Schaefer Session Chair: Carolyn Parkinson

Mental health and peer relationships in adolescence – a cross-sectional social network analysis

Tom {Chin-Han} Wu¹, Alex Lloyd¹, Laura Lucas¹, Olivia Stirling¹, René Veenstra², Essi Viding¹, Pasco Fearon¹ ¹Department of Clinical, Educational and Health Psychology, University College London, London, UK; ²Department of Sociology, University of Groningen, the Netherlands

Mental health and peer relationships are closely associated in adolescence and there is increasing interest in using social network models as an approach to understanding this association. For instance, social network analysis has been used to examine associations between peer relationships and disruptive behaviour disorders as well as depression. Using Exponential Random Graph Models (ERGM), we will examine the relationship between symptoms of mental health problems and social network structures using basline data from the ReSET trial (pupils aged 12-14, N=3625). Mental health was assessed using self-reported Strengths and Difficulties Questionnaire and Me and My Feelings. Peer nomination questions included best-friendship, likability, friendship circle, and advice-seeking nominations. For each question, participants were allowed unlimited number of nominations of peers in their year group in their school. The analysis will focus on similarity in mental health status within friendship groups (i.e. mental health homophily) and the relationship between mental health and interpersonal relationships. We will present the main findings and consider implications for future research.

Mindsets and Peer Networks: How Growth and Fixed Beliefs Shape Peer Networks in Physical Education

Annabell Schüßler¹, Viviana Amati²

¹Heidelberg University; ²Università degli Studi di Milano-Bicocca

Motivational beliefs, such as students' mindsets, are crucial in shaping their learning behaviors within educational settings. Students with a fixed mindset often perceive effort as futile once they reach their perceived intellectual limits. In contrast, those with a growth mindset view challenges as opportunities for skill development, maintaining motivation and optimism—qualities associated with greater academic success.

While much of the existing research has focused on individual performance outcomes, very little attention has been paid to how these beliefs impact social dynamics. In a recent study, Zander et al. (2023) found that university students with a growth mindset were more likely to be chosen as helpers and collaborators in learning environments, as they are perceived as approachable and view seeking help as a strategy for growth rather than a sign of weakness.

Building on this, we investigate whether students' growth and fixed mindset orientations affect friendship formation, team selection, and group collaboration in physical education classes. Using a cross-sectional design with 364 students (aged 10 to 16) across 16 classrooms, we apply multilevel-ERGMs to analyze how mindset orientations shape peer network structures while controlling for class specific norms.

We anticipate that students with a growth mindset are favored in both friendship and group work contexts, as their emphasis on effort and development aligns with cooperative and inclusive behaviors. However, preferences may differ in competitive game scenarios. Furthermore, the role of a growth or fixed mindset in social embeddedness may depend on the prevailing mindset norms within each class.

Neural Similarity at Resting and Movie-Watching fMRI Predicts Future Social Distance in the Social Network of an Entire High School

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Recent evidence utilizing both human social networks and fMRI data suggests that people are more likely to be closer to those with similar neural representations. However, it remains unclear whether this closeness is driven by neural similarity (homophily hypothesis) or if individuals become similar as a result of their social connections (social influence hypothesis). To elucidate the causal direction, we tested whether brain functional connectivity predicts future social distance. Data from the Korean Study of Adolescent Health (KSAH) were analyzed. At Time 1 (T1), 141 first-year high school girls in South Korea participated in a social network survey, nominating up to seven individuals with whom they discussed important matters. School-level social network swere constructed based on nominations restricted to within-school ties. Among these participants, 58 were enrolled in a brain MRI study. Eight months later (T2), participants completed the same network survey. The final analytical sample included 55 participants with both T1 brain fMRI and T2 social network data, yielding 1,485 dyads for analysis. Partial least squares regression, validated through 10-fold cross-validation, was used to predict social distance from neural similarity. The predicted social distance from both resting-state and movie-watching fMRI was strongly correlated with observed social distance (r = .60). While we cannot conclusively rule out reverse causation, it was confirmed that, at least among middle adolescents, worldview (cultural view) influences the formation of friendships.

Pairing or peering? Exploring the impact of social networks on mathematical performance in 3rd grade schools in Milano and Napoli

Teodora Erika Uberti¹, Giulia Assirelli², Mariagrazia Santagati³, Gianluca Argentin⁴

¹Università Cattolica del Sacro Cuore, Milano; ²Università Cattolica del Sacro Cuore, Milano; ³Università Cattolica del Sacro Cuore, Milano; ⁴Università degli Studi di Milano-Bicocca, Milano

Previous research across multiple disciplines has documented the positive nexus between good peer relationships in the classroom and learning. Robust social networks create inclusive learning environments, enhance academic performance of more fragile students, build children's confidence, and foster resilience in young learners. In this study, we examine how structural position in classroom' networks influence mathematics performance among 3rd grade primary students. We hyphotize that "peer" interactions facilitate mutual support, thereby affecting academic outcomes. Moreover, we consider the relevance of student "pairing" based on different aspects of homophily/heterophily patterns.

Data were collected as part of the MATES project (https://www.progetto-mates.it/), funded by the Italian Ministry of University in 2022. A total of 3,316 students from 180 classes across 78 schools in Milano and Napoli participated in our study. At the beginning of the school year 2024/2025, students completed a questionnaire that gathered personal background information (e.g., gender, preschool attendance, family background), attitudes toward mathematics (using a psychological scale), cultural habits (e.g., sports, playing musical instruments, television viewing), and responses to ego-alter questions used to define the classroom's overall social network.

Using standardized mathematics test scores as our outcome measure, and collected from national INVALSI procedure, we assess the influence of students' positions within the classroom network while controlling for several individual factors. Our findings show both expected and unexpected correlations, offering insights about the not linear influence of pupils' networks on their educational outcomes.

Social network and wellbeing among Gen Z college students

Akhaya Kumar Nayak

Indian Institute of Management Indore, India

Network, norms, and trust constitute three important dimensions of social capital. The strength of social network in Indian society has tremendous value for the individual and groups. Be it a village, a small town or a large city, Indian children grow up playing together with other children in the common areas of colony/apartment. They then go on to have multiple groups of friends in school and colleges. Apart from spending time with family and relatives, they spend a considerable amount of time with their friends. However, every child doesn't have a similar amount of social network (positive or negative).

In addition, with the emergence of digital media and high penetration of mobile network/internet connection, Gen Z is spending more time online. There is an increasing perception that Gen Z isn't spending as much time with offline social networks as their predecessors, which may be affecting their wellbeing. This study aims to explore the relationship between positive and negative offline social networks of Gen Z college students and their physical, mental, academic and social wellbeing.

The study assumes that higher positive social network and lower negative social network leads to higher personal, mental, and social wellbeing of the Gen Z college students. The study adopts a mixed-method approach. The quantitative data has been collected through a structured questionnaire (based on established scales) from Indian UG students. The qualitative data is collected using a semi-structured interview schedule through a personal/telephonic interview.

Quantitative data has been analyzed using structural equation modeling and qualitative data has been analyzed using thematic analysis involving certain techniques from grounded theory approach such as initial coding, focused coding and generating categories. The result shows a complex relationship between social networks and different aspects of wellbeing. The width and intensity of positive relationships is directly and positively related to physical, mental and social wellbeing but not necessarily to academic performance. The qualitative study suggests that Gen Z prefers lesser but closer offline relationships. The results are extremely useful to the counselling services of colleges and universities.

OS-107: Advanced Mathematical and Statistical Network Methodology 4

Location: Room 112 Session Chair: Martin Everett

Graph inference from the contacts of random walkers

Sergey Shvydun

TU Delft, Netherlands, The

The relationship between the dynamics of a process and the underlying network topology is crucial to understand complex systems. On one hand, there is significant interest in understanding how the structure of the network impacts the dynamics of processes. On the other hand, there is also interest in the inverse problem: given the dynamics of a particular process, to what extent can the underlying network structure be inferred? This problem is crucial in various fields, including biology, recommendation systems, and communication networks, where the initial structure of the network is unknown while understanding the underlying graph structure can provide valuable insights and predictions.

In this talk, we infer the initial topology of the graph G from the contact data of random walkers. More precisely, we consider M independent random walkers that traverse an unknown underlying graph G with N nodes and L links with respect to the NxN probability transition matrix P. The nodes in the graph G represent different physical locations (e.g. workplaces, homes, hospitals, schools or public transport stations) and links are physical paths between locations. What can we infer about the graph G only from the interactions of random walkers? Although it is tempting to conclude that network reconstruction is impossible from the K-length random contact sequence, which represents only one possible realization of the Markov process, we show the opposite. We demonstrate that if the NxN probability transition matrix P of the random walkers admits a steady-state distribution (the process is ergodic) and the K-length contacts sequence is sufficiently long, we can infer

- the number of nodes N in the underlying graph G,
- the number of links L in the underlying graph G,
- the Markov chain with matrix P and the reversed Markov chain with matrix P',

- the underlying topology of graph G.

We would like to point out that the formulation of the network reconstruction problem is motivated by the analysis of empirical datasets that provide contact information between people but lack details about the underlying graph topology and the location of contacts. We also believe that the obtained results represent a significant step forward in gaining a deeper understanding of network evolutionary processes.

New Specifications for New Wave Biased Nets

Carter Tribley Butts

University of California, Irvine, United States of America

The biased net framework, originally introduced by Solomonoff and Rapoport in the 1950s, has undergone many iterations over the decades. Recent work (building on work by Skvoretz and colleagues) has proposed an approach based on a Markovian specification in which observed networks arise from a latent dynamic process driven by "activation" events (which result in the formation or persistence) and "inhibition" events (which prevent or remove ties). Although the likelihood arising from this process is incomputable, approximate Bayesian inference can be performed using an approximate prevision strategy, in which a non-parametric least-squares learner trained on synthetic data is used to infer posterior expectations from observed graphs. While proof-of-principle work with this approach has made use of model terms based on traditional biased net concepts (e.g., parent, sibling, and double-role effects), it is also possible to specify models using terms more closely related to more modern exponential-

family random graph and stochastic actor-oriented frameworks. These allow for more natural specification of covariate and dependence effects, including both activation and inhibition variants. Here, we discuss some of these new specifications, and illustrate their application to empirical cases.

Positional analysis of multilevel networks over time

Antonio Rivero Ostoic

University of San Simón, Bolivia

This presentation focuses on the analysis of multilevel networks over time. Multilevel structures are complex systems that combine different types of ties in various domains where the aim of the modelling is to reduce the structural complexity of networks and provide a meaningful interpretation. We will demonstrate a graphical representation of multilevel structures over time and conduct a positional analysis of multilevel networks with different types of ties. Algebraic methods will be used to represent the role algebra for the constructed positional system, and the presentation will also discuss challenges and future directions in analysing multilevel structures and dynamics in complex networks.

Should we model mobility as networks? An empirical comparison using five types of mobility

Per Block¹, Marion Hoffman^{1,2}, Nico Keiser¹, Kieran Mepham¹, Micol Morellini^{1,3}, Jingying Wang¹

¹University of Zurich, Switzerland; ²Toulouse School of Economics, France; ³Department of Sociology and Nuffield College, University of Oxford, United Kingdom

Recently, network methods have become increasingly popular for analysing various types of mobility. In these methods, the rows and columns of mobility tables (e.g., occupations) are treated as network nodes connected by mobile individuals, creating a directed, weighted mobility network. Originally, descriptive network methods like community detection have been used alongside statistical methods such as exponential random graph models (ERGMs) developed for binary networks. Recent extensions to log-linear models have further integrated network approaches to the study of mobility. These models challenge the dominant covariate-based approach to mobility by explaining mobility through endogenous network structures, such as reciprocation or clustering, that represent emergent social mechanisms. In this study, we empirically assess the necessity of modelling endogenous structures across five types of mobility, and "money mobility" derived from a behavioural experiment. For each type, we compare the fit of (i) a log-linear model with one endogenous (network) parameter, (ii) a log-linear model with one measured covariate, and (iii) such a model with one latent covariate estimated to maximize the model fit. Model fit is assessed by the extent to which individuals from the same origin select the same destination, i.e., bandwagon effects in mobility. We find that the network model consistently fits the data best. Our results suggest that researchers interested in such bandwagon effects should consider using network methods. Furthermore, our study offers a method to compare different models using flexible fit criteria that relate to researchers' modelling goals.

OS-82: Social Networks and Religion

Location: Room 114 Session Chair: David Eagle

The Social Structure of a Schism

Joseph Roso¹, Joseph Quinn², Gabriel Varela³

¹Ambrose University, Canada; ²University of South Carolina, United States of America; ³Duke University, United States of America

Scholars are interested in what keeps people in groups: their commitment to the group's ideals or social structures. Classic economic theories would expect people to make individually rational assessments of the gains they get from a group, and leave when the group's values shift from their own. Insight from sociological and social networks research, on the other hand, suggests that people's commitment to groups is not reducible to their individual beliefs alone, and that group cohesion plays an important role in decisions to leave. This problem has been difficult to study because it is rare to find a clear test case where (1) an organization dramatically and clearly shifts its stated values and (2) there is information on individuals who left the group. We identify a case that addresses both of these problems: the United Methodist Church (UMC), which experienced a recent schism over same-sex marriage. We analyzed a dataset of UMC pastors in North Carolina collected prior to the schism to investigate the ideological and social network predictors of leaving the UMC. Preliminary findings show that, net of personal beliefs, pastors were more likely to remain in the UMC if they were connected to other pastors who also remained. Individuals' ideology is a significant factor in group cohesion, but social structure plays an important role as well.

Is Project 2025 A Christian Nationalist Playbook?

Sean Farley Everton Naval Postgraduate School, United States of America

Project 2025 is a political initiative of The Heritage Foundation, an American conservative think-tank based in Washington, D.C. The initiative's agenda is captured in its book, Mandate for Change: The Conservative Promise: Project 2025 (Dans and Groves 2023). It seeks to promote conservative policies for reshaping the federal government. Some critics argue that the initiative is a Christian nationalist plan to infuse the government with conservative Christian values. There is little doubt that Project 2025 seeks to shape the Federal government in a conservative direction. It is less clear that it is a Christian nationalist plan to promote Christian values. Notably, "Christian" only appears seven times in the Project's book. Although it may be true that theologically-conservative Christians find many of Project's policy recommendations appealing, that does not mean that the initiative is a Christian nationalist document; one would expect conservative Christians to see many of the policy recommendations of a conservative think-tank appealing for the simple reason that they are conservatives. This paper will draw on semantic network analysis and LDA topic modeling to examine the Project's primary text and assess the extent to which it is a Christian nationalist document. Ideally, it will do so by comparing it with earlier mandate editions (conditional on the availability of digital copies of earlier mandates).

I Have Friends Who are Queer: How Peer Networks Impact Support for LGBTQ+ in a Liberalizing Context

Craig Rawlings, David Eagle

Duke University, United States of America

A large body of research demonstrates that inter-group friendships reduce stigma and increase acceptance. Using longitudinal data on the friendship networks between students in a seminary where there is increasing acceptance of LGBTQ+ individuals, the authors seek to test the relative strength of several competing hypotheses about the mechanisms that underlie these changes. A baseline model measures how simply perceiving LGBTQ+ people as in your friendship network influences changing attitudes on same-sex marriage and the ordination of gay clergy. Subsequent models explore whether reciprocated ties, tie strength, the number of ties, the centrality of ties, and homophily alter this association. We also explore whether these associations hold for students with strongly negative attitudes at baseline. In a time when LGBTQ+ individuals are facing increasing social exclusion, this research helps inform important debates about the factors that increase acceptance.

Meaning in Motion: How Shared Cognitive Associations Drive Belief Shifts

<u>Josh David Gaghan</u>, David E Eagle

Duke University, United States of America

This paper investigates how cultural schemas – networks of cognitive associations – influence the belief formation of students in higher education. One challenge in studying cultural schemas is the difficulty of measuring them using traditional survey data, which focuses on measuring beliefs rather than the underlying relational nature of meaning between beliefs. Although work on belief networks has recently gained prominence, it assumes that all uniformly share the same perceived relationship between beliefs.

In this paper, we leverage the insight behind the development of relational class analyses that, even though we cannot measure an individual's belief schema through traditional survey instruments alone, we can estimate the relational similarity between the beliefs of one person and another. Using longitudinal social network data from a mainline Protestant seminary, we examine how shared cognitive associations mediate the transmission of beliefs between students.

We find that belief shifts towards one's peers are more likely to occur when they increase the similarity between individuals' cognitive schemas, highlighting that social influence is not simply a matter of adopting specific beliefs but of aligning cognitive structures. Moreover, we find that social interactions activate these schemas, leading to the emergence of shared meanings. Our findings contribute to the study of cultural transmission by (1) developing a novel method for measuring individuals' cultural schemas, (2) demonstrating how shared schemas mediate belief shifts, and (3) showing that social influence involves aligning cognitive structures rather than just adopting beliefs.

OS-214: Statistical Approaches for Modelling Network Dynamics 2

Location: Room 116 Session Chair: Göran Kauermann Session Chair: Anuska Ferligoj Session Chair: Vladimir Batagelj

Meet MrQAP - A New Package for Network Regressions for Matrices and Cognitive Social Structures

Robert W Krause

University of Kentucky, United States of America

The new R-package MrQAP allows more flexible estimation of Multiple Regression Quadratic Assignment Procedure models in R. In this talk I will introduce the package, how to use it, and give some example applications on Cognitive Social Structure data. It is the first package that allows analyzing Cognitive Social Structures within a permutation regression framework, that is, network data where every participant not only reports about their ties but also about the ties they perceive others have. This forms a three dimensional data cube of senders, receivers, and perceivers, which can now be properly permuted.

The package comes with a variety of quality of life features: parallel processing, handling of many model families (OLS, logistic, Poisson, multinomial choice, etc.), heteroskedastic consistent estimators, random intercepts, withingroup permutations, and handling of multiple networks at the same time. Naturally, the package is freely available on Github and hopefully soon on CRAN.

Modeling Network Dynamics with Latent Cohesive Subgroups

Stepan Zaretckii¹, Tom Snijders^{1,2}, Marijtje van Duijn¹, Christian Steglich^{1,3}

¹University of Gronignen, Netherlands; ²Nuffield College, University of Oxford, England; ³Institute of Analytical Sociology, Linköpings University, Sweden

The statistical treatment of social network panel data often presupposes that micro-level network mechanisms generate observed macro-level outcomes, without fully accounting for the emergent meso-level network structures and the feedback mechanisms they may instantiate. To address this gap, we introduce a novel form of dependence in stochastic actor-oriented models (SAOMs), where actors' network choices are influenced by their latent memberships in cohesive subgroups. These groups correspond to dense subgraphs in which actors are embedded and, as the network evolves over time, reflect shifting cohesive patterns. Formally, this is represented as the co-evolution of a one-mode network and a two-mode latent membership structure. The model requires prior ideas about the expected number of groups per actor and the number of actors per group, along with their variances. As application, we model school friendships, where cohesive subgroups represent unobserved peer groups formed among friends. We compare different specifications of friendship closure and find evidence that the social context of peer groups stabilizes and balances friendships, as students prefer to have more ties with their new groupmates. Furthermore, our results indicate that endogenous friendship dynamics induced by latent memberships better reproduces cohesive subgraphs observed at the network meso-level.

Parameter Estimation in Exponential Random Graph Models: A Generalized Stochastic Approximation Approach

Arya Karami¹, Pavel N. Krivitsky²

¹Sharif University of Technology, Iran, Islamic Republic of; ²The University of New South Wales, Australia

Exponential-family Random Graph Models (ERGMs) are vital for network analysis, yet parameter estimation remains challenging due to normalizing constant intractability. A popular approach, Stochastic Approximation (SA), works by repeatedly conducting a short simulation for the current parameter guess to obtain an estimate for the gradient of the log-likelihood, then making an update in the direction of the gradient whose magnitude is gradually reduced. A number of variants have been proposed, including Robbins-Monro and Equilibrium Expectations. Variants of SA are also found in machine learning, with the ADAptive Moments (ADAM) algorithm particularly popular for fitting neural network models. Each of these variants in turn involves further decisions such as how quickly the update size is reduced, and when the algorithm is determined to have converged.

We introduce a general framework that has these three variants as special cases. We conduct a series of simulation studies evaluating the impact of these settings on rate and reliability of convergence for difficult ERGM problems found in the literature. Through heuristic arguments and empirical study, we synthesise a variant of SA for ERGMs that seeks to draw on the best aspects of each of the existing.

Sampling Relational Event Graphs: Measurement Error Relational Event Models

Martina Boschi¹, Eric D. Kolaczyk², Ernst C. Wit¹

¹Università della Svizzera italiana; ²McGill University

For nearly two decades, Relational Event Models (REMs) have provided the framework for analyzing streams of timestamped interactions. These models explain the governing dynamics of related relational phenomena based on statistics of previously observed events. However, as the size and complexity of temporal networks increase, REMs face computational bottlenecks. While several inference techniques have been proposed to reduce the computational costs of estimation procedures, improvements have been modest in optimizing the computation of history-based statistics.

We propose a series of estimators of explanatory statistics obtained from a sampled history of events. By deriving their theoretical properties, we can quantify and estimate their measurement errors, allowing us to make appropriate corrections during the estimation phase. Specifically, we fit REMs using error-in-variable techniques, including simulation-extrapolation methods. We assess the validity of our approach through both synthetic and real-world analyses designed to show the impact of history sampling and to compare our method to existing baseline techniques.

Our methodology enables the fitting of REMs to very large datasets, greatly expanding the practical applicability of these models.

Selection and influence in co-evolution of two two-mode networks

Tom A.B. Snijders^{1,2}

¹University of Groningen; ²University of Oxford

This paper presents effects in Stochastic Actor-oriented Models for selection and influence in co-evolution of two two-mode networks with a common first node set which may be called 'actors'; the second node sets differ between the two networks; the first network serves to represent (by the one-mode projection) connections between the actors, who make choices of items in the second node set of the second network.

'Selection' refers to the impact of the item choices on the connections between actors in the first network, while 'influence' refers to the impact of the connections on the item choices in the second network.

Distinct specifications are proposed for selection and influence which are item-specific, and which refer to the number of items chosen (actor degrees in the second network). Descriptive statistics are proposed to represent the cross-sectional association between the two-mode networks, the explanation of which is the target of the selection and influence effects.

This is illustrated by an empirical example.

OS-168: Network Approaches to Attitudes and Beliefs 2

Location: Room 125 Session Chair: Claudia Zucca Session Chair: Lorien Jasny Session Chair: Mario Diani

From Nuance to Polarization? Network Analysis of Evolving American Belief Structures

Scott Leo Renshaw, Kathleen Carley

Carnegie Mellon University, United States of America

This work in progress examines the evolution of belief networks in the United States of America from the 1970s to 2022 using longitudinal data from the General Social Survey. By applying both Statistical Entailment Analysis (SEA) pioneered by Douglas White and the algebraic belief models of Martin & Wiley, we map how population-level belief networks of political, religious, and social attitudes transform over time. Following Butts and Hilgeman's approach to inferring memetic structure from cross-sectional data, we decompose observed behavioral characters into latent "microbeliefs" or "quasi-memes" that reveal underlying connections between seemingly disparate attitudes.

Preliminary findings reveal increasing polarization in belief networks on issues like abortion, with formerly nuanced combinations of microbeliefs present at the aggregate population level becoming more polarized and calcified into "all-or-nothing" positions. This contrasts with the stability observed in religious belief structures during the 1988-1998 period, suggesting differential trajectories across belief domains. Our analysis reveals complex structures that are reducible neither to distinct scales nor to models of itemwise independence, but rather form interlocking scale-like structures that evolve over time.

This approach conceptualizes beliefs as interconnected systems made up of individuals sharing complexes of microbeliefs, allowing us to work toward identifying distinct trajectories of "belief migration" and explore demographic variables that may be driving these population mental model changes in the US. By examining large, representative samples, we can investigate large-scale memetic ecologies and their evolution. Our research contributes to understanding how collective mental models evolve and how belief networks reconfigure in response to broader social changes.

La Dolce Vita: networking Habits, Attitudes and Behaviours of Italians

Teodora Erika Uberti¹, Emanuela Mora²

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This study presents findings from the project "Behavioural Change: Perspectives for the Stabilization of Sustainable Behaviours," funded by the Università Cattolica del Sacro Cuore. Two surveys were administered to representative samples of over 2,000 Italians—first in June 2021 (when COVID had ended but its impact lingered) and again in June 2023 (when pre-pandemic routines had partially resumed).

We examined Italians' Habits, Attitudes, and Behaviours (HAB) using Social Network Analysis to explore the correlations among approximately 50 variables (i.e. nodes) related to daily online and offline routines, sustainable practices, attitudes toward technology and pro-sociality. Our analysis detects the network structure of these HABs, focusing on layers possibly causing differences in HABs structures, i.e. gender and generations (i.e. Baby Boomers, Generation X and Generations Y and Z).

Key findings reveal that 2021 survey indicated stable HABs, with increased reliance on technology for work and leisure. The most central and strategic (measured as betweenness) HABs differ according to layers. For example, for females, sustainable habits and video chats with friends and relatives are central, while home cooking and socialising activities are more strategic in males' networks of HABs. In 2023 the most central HABs shifted for both genders, with in-persons interactions taking a more central and strategic role, while technology-driven HABs became less central.

According to generations layers both the 2021 and 2023 surveys show different structures, with older generations changing less and younger changing more, especially in technology-related HABs, though the latter group also experienced increased anxiety and psychological distress.

Leveraging Large Language Models For Analyzing Belief Space At Scale

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¹New York University, United States of America; ²University of Chicago, United States of America

Recent research has advanced cultural network analysis to map out cultural schemas held by individuals by measuring the correlations or relationality between beliefs in nationally representative surveys. However, longitudinal analysis of belief spaces is largely limited because not all beliefs were repeatedly asked over time. Since the survey questions asked multiple times are more likely to be politically charged, belief spaces constructed in this manner will likely exclude non-political and non-contentious beliefs. Our study aims to address this gap by fine-tuning large language models with the General Social Survey (GSS) from 1972 to 2021. Specifically, we analyze the latent individual belief embeddings trained during the fine-tuning process to examine the patterns of cultural belief spaces across 3,110 opinions among 68,846 individuals. Our initial analysis shows that the cultural divide between liberals and conservatives has widened, with liberals moving further to the left, whereas conservatives have maintained similar positions in the belief space from 1972 to 2021 in the GSS. We show how Americans' cultural belief spaces are structured by socio-demographic characteristics and partisanship over time.

Mapping Types of Opinion Polarization: Belief Networks and Political Environment across 89 Countries in 2017-2022

Steve Liming Meng, Yizhao Song, Felicia Feng Tian

Fudan University, China, People's Republic of

Recent studies on polarization have been shifting focus from elites to the mass public and from a unidimensional perspective of "polarization intensity" to a multidimensional framework encompassing both intensity and breadth. Belief Network Analysis has been applied to quantify these two dimensions. However, cross-national comparisons of opinion polarization remain limited, despite their increasing relevance in an era of deglobalization. Furthermore, the politically embedded societal context of a country may shape opinion polarization in specific ways, yet research in this area remains underexplored due to the scarcity of cross-national comparisons, which are essential for examining political influences on opinion polarization. In terms of BNA measurement, existing network indicators often reflect structural complexities, making it difficult to distill them into two unified dimensions, thereby hindering cross-national comparability.

This study utilizes the latest WVS/EVS datasets to construct belief networks for each surveyed country and employs principal component analysis to integrate network indicators into two unified polarization dimensions: the Global Concentration Index (GCI) for polarization intensity and the Universality Index (UI) for polarization breadth. We hypothesize that political environments shape polarization through top-down party competition, bottom-up civic engagement, and corresponding political-societal values. Using OLS and fixed-effects models, we find that polarization intensity is positively influenced by party competition and secular values, while the effect of party

competition on polarization breadth follows a U-shaped curve. Civic engagement and self-expression values exhibit no significant impact on opinion polarization. These findings contribute to a deeper understanding of cross-national variations in opinion polarization and their institutional determinants.

Mental models and group discussion in adaptive rangeland management

Lorien Jasny

University of Exeter, United Kingdom

This project uses a network approach to study the mental models and social learning in a small groups of stakeholders involved in a unique participatory experiment in collaborative rangeland management. Participants included traditional ranchers running an economic enterprise, conservation rangeland managers who use grazing to pursue economic and environmental goals, and government agency employees who managing public grazing programs. For two different day-long experimental sessions, these stakeholders were divided into four groups and asked to deliberate about the management of public land. Their mental models of rangeland management were measured by asking them to link their management goals to the practices that should be used to achieve the goals. This results in a bipartite network for each group, which we analysed before and after group discussion to measure social learning using temporal ERG models. We find that the most change and 'learning' occurred not in adding new goals and methods, but adding new relationships between the goals and methods respondents had previously mentioned. Additionally, in two of the groups, members added linkages that made their mental models significantly more similar to other group members.

The nascent network of patent judges at the Unified European Patent Court

Johannes Glückler¹, Jakob Hoffmann¹, Marius Zipf¹, Emmanuel Lazega² ¹LMU Munich, Germany; ²SciencesPo, France

Fifty years after the introduction of the European patent, the European Unified Patent Court (UPC) was established in 2023 as a unified body for the litigation of validity and infringement cases for all the participating member states in Europe. Because the UPC integrates judges from different national jurisdictions who were trained in different legal regimes and cultures, and because the UPC's 20 divisions are geographically distributed across the 18 member states, the new court faces the challenge of offering consistent and reliable case law to businesses from around the world. We examine the social mechanisms that promote the harmonization of national patent jurisprudence within this transnational institution. After one year of operation, we conducted a network survey on over 110 technical and legal judges at the UPC to explore the extent to which they had established personal contact, read each other's decisions and legal commentaries, and had engaged in inter-personal deliberation about general aspects of patent law before and after their appointment to the court. The findings from an explorative network analysis inform a relational, neo-structural model of transnational institutionalization that is shaped by mechanisms of both variation and convergence. Both, the appellate process as well as the formation of judicial beliefs affect harmonization. Judicial beliefs are enforced through informal deliberation networks among judges, exchanges at convergence events, scholarly commentary in publications, and citations of precedent-setting rulings. Given its geographical dispersion, the UPC will rely on the organization of temporary proximity as well as dense interpersonal deliberation networks among judges to ensure consistent jurisprudence in the future.

OS-172: The role of networks in education and labor markets 2

Location: Room 202 Session Chair: Annatina Aerne Session Chair: Mattia Vacchiano Session Chair: Maria Prosperina Vitale

Navigating structural constraints: Educators' personal networks and the dynamics of professional knowledge work

Liam Bekirsky, Bernie Hogan

University of Oxford, United Kingdom

Educators operate within layered structural constraints—bureaucratic, technological, and professional—that shape how they access, share, and create resources. We investigate these constraints by drawing on a qualitative mixedmethods study of UK teachers' personal networks. We focus on how teachers adapt to these constraints through formal and informal means relying on both school-based and external social contacts.

Findings suggest that educators adopt different strategies in selecting collaborators and sustaining professional relationships based on structural constraints. For example, institutional policies and hierarchies often limit direct

collaboration, creating negative space where informal networks emerge as counterstructures. Some teachers prioritise closure, seeking shared norms, community building, and institutional alignment, while others take on brokerage roles, reaching beyond their immediate circles to integrate external resources. However, these logics are not mutually exclusive - educators shift between them in response to technological and institutional barriers, such as policies restricting resource sharing via platforms like OneDrive.

Educators with greater institutional support are more likely to act as brokers, while those in precarious roles (earlycareer teachers) tend to be limited by their perceived network isolation. This study highlights the use of personal networks in understanding how educators navigate structural affordances and pressures to bridge structural divides.

As AI resource creation tools are increasingly integrated into teachers' professional work, the presentation will also consider how network structures might shape their adoption and dissemination across professional communities. The findings provide insights into how institutions can better support collaborative resource creation as digital and AI-driven tools reshape professional knowledge work.

Neighborhood peer effects in school choice

Quentin Ramond Universidad Mayor, Chile

This article examines the extent to which neighborhood peers influence families' school choice, and whether this effect varies according to socioeconomic background. It uses geocoded administrative data from Chile, where families have to rank and apply to schools through a centralized admission system. I build a unique longitudinal dataset linking four applicant cohorts to their nearest neighbors who applied to the same grade the years before, which allows to account for several endogeneity issues when identifying peer effects. I define peer group with egocentric neighborhoods, a series of local environments surrounding each student based on geographic distance and population density that approximate meaningful exposure and social interactions. I estimate a series of logistic regression models that analyze similarity in applications to specific schools as well as similarity in the ranking of these applications. Then, I use an instrumental variable approach to assess whether choosing the same school as neighbors leads to applying or not to schools with different student body composition, test scores, and instructional resources.

The results indicate that low-SES students are most likely to conform to their neighbors' choice, especially when the latter are from slightly higher-SES background. This pattern suggests that low-SES families face greater informational frictions in the school market or may face higher social costs of deviating from neighborhood peer norms, such that the information acquired through neighborhood interactions becomes more consequential for choosing a school among these groups. Then, the study shows that choosing the same school as more (dis)advantaged neighbors is (causally) associated with application to different schools, especially regarding the student body socioeconomic composition.

I conclude that geographically embedded social interactions influence the process of school choice and thereby may contribute to sustaining school segregation, with potential far-reaching consequences for the persistence of social inequality. The results also highlight the need for public policy to consider neighborhood social interactions to mitigate spatial and social disparities in educational opportunities.

NETWORKS MATTER: THE ROLE OF SOCIAL TIES IN EDUCATION MOBILITY IN ITALY. A personalnetwork study of college and mobility choices of southern Italy high school students

<u>Cristina Loria</u>, Elena De Gioannis, Federico Bianchi, Gabriele Ballarino Università degli studi di Milano, Italy

This study investigates the role of social networks on southern Italian students' decision to relocate to central and northern Italy for higher education. Indeed, student mobility in Italy is predominantly a unidirectional phenomenon, taking place almost exclusively from the South to the Center and the North, further exacerbating existing regional inequalities. While the academic literature has identified key drivers of student migration, such as academic performance, social class of origin, labor market conditions, and university quality, the role of social influence has remained underexplored. To address this gap in the existing literature, a survey was administered to 209 high school students in their final year from two high schools in a southern Italian city. Social network influence was assessed using personal network analysis, and logistic regression models were computed to assess the impact of students' personal networks on their higher education mobility decisions, while controlling for a comprehensive set of personal and contextual factors. The findings reveal a significant association between students' mobility choices and social network measures, with the most critical factor being the proportion of their social contacts who had pursued or

intended to pursue similar education and mobility paths. Noteworthy, the inclusion of social network influence measures diminished the impact of traditionally considered socio-demographic determinants, suggesting that while such factors may create the conditions for social ties to develop, it is the networks themselves that provide the mechanisms through which students adopt similar educational trajectories, thereby increasing the likelihood of migration.

Peer interaction networks and emergent leaders in study-abroad second language acquisition

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Study-abroad (SA) SLA research has demonstrated considerable variation in learners' L2 gains. A crucial factor contributing to this varied picture is students' interactions in their social networks during their time abroad.

While network science has consistently linked central positions to leadership figures, leadership emergence remains unexplored in SA SLA. Our study examines a complete cohort of 30 students from a large U.S. university enrolled in an intensive 3-month Arabic program in Amman, investigating factors that influence language progress and leadership emergence, particularly focusing on leaders who facilitate access to target-language (TL) speakers. Through a mixed-methods approach combining longitudinal quantitative Social Network Analysis supplemented and interviews, our findings reveal ① three predictors of progress measured with Oral Proficiency Interview (OPI): time spent learning the L2 out of class, perception of group integration, and closeness in the student network, alongside a near-significant impact of being nominated as a facilitator of communication with TL speakers. ② Emerging leaders exhibited high presojourn Arabic proficiency, high scores on multilingualism, and greater time spent learning the language out-of-class. ③ Students identified as facilitators of interactions with Arab speakers shared most of the same traits, but with an additional important predictor being their voterank – a metric reflecting optimal potential to influence others in the network.

The study corroborates the role of social network variables in linguistic progress during SA and pioneers the investigation of factors leading to the emergence of leaders during SA, while validating the predictive validity of centrality metrics.

Social network signatures of active learning classrooms: Triadic closure and equal connectivity

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Myriad studies have demonstrated the effectiveness of active learning methods over traditional, lecture-based teaching methods in university-level science courses. In the field of physics, education researchers have developed a handful of different active learning methods that are widely implemented at colleges and universities; however, no studies have systematically identified distinguishing features of these methods. Given that opportunities to engage in peer discussions are a core premise of active learning, one feature of interest is how different methods shape peer interactions. As part of a large national research project, we have collected students' self-reported peer interactions in 19 introductory physics courses in the United States taught using one of four well-established, but distinct, active learning methods: Peer Instruction, SCALE-UP, Investigative Science Learning Environment (ISLE), and Tutorials in Introductory Physics. We use temporal exponential random graph models to identify the types of peer interactions that form from the beginning to the end of the semester in each course. The results, which do not vary across active learning methods, class sizes, or classroom layouts, indicate that students develop connections with small groups of peers to form triadic closure. All students, regardless of their academic performance, form connections with a similar number of peers. These findings illuminate two social network signatures of active learning physics classrooms: triadic closure and equal connectivity.

OS-136: Gender and Social Networks 4

Location: Room 203 Session Chair: Elisa Bellotti Session Chair: Michelle Nadon Bélanger

Invisible Ties: Gendered Perceptions of Centrality in Social Networks

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Research on cognitive social structures reveals that perceptions of social networks can significantly shape individual outcomes, often more profoundly than the actual network structure. If women's social capital in organizations is systematically underrecognized, such misperceptions could have profound implications for career advancement and workplace gender equity.

This study examines gender bias and network perceptions through two vignette experiments. The experiments provided respondents with information about the structure of an instrumental network in a public organization and asked them to recall the structure of the network. The first experiment examines the presence of gender bias in network recall across varying organizational contexts. The second study delves deeper into how gender stereotypes exacerbate biases in perceptions of women's social capital within organizations.

We find that respondents consistently perceive men as having greater prestige and indegree centrality compared to women despite both having identical structural positions in the network. This bias persists across diverse organizational contexts and is significantly heightened in the presence of gender stereotypes. Findings from this study contribute to discussions on gender bias, network cognition, and gender equity in professional and governance networks.

Modeling social networks with homophily via multi-dimensional social distance attachment

Rubén Rodríguez-Casañ, Alessio Cardillo, Javier Borge-Holthoefer

Open University of Catalonia (UOC), Spain

The proverb "Birds of a feather flock together" reflects the tendency of similar individuals to establish mutual ties. Social networks emerge from interactions shaped by multiple attributes—such as class, ethnicity, age, language, and interests—some mutually exclusive and others not. While previous studies have primarily focused on singledimensional homophilic attachment with exclusive categories, the dynamics driving multidimensional connection preferences remain less explored. In this work, we introduce a social distance attachment model that captures both homophilic and heterophilic connectivity across multiple features, with the flexibility to incorporate social factors characterized by non-exclusive categories. This approach allows us to assess the relative importance and hierarchy of each factor in group formation.

To validate our approach, we analyze a historical collaboration network derived from the correspondence archives of the International Institute of Intellectual Cooperation (IIIC), UNESCO's precursor. This dataset, comprising 7049 documents from the interwar period and 684 individuals, reveals that homophilic attachment around topics was the primary driver of group formation, followed by language, while gender had the least influence.

We further explore whether alternative pathways can enhance the centrality of minorities, particularly women, within the IIIC network. While heterophilic connections promote minority inclusion across all configurations, crossdimensional bridging—especially through topic or gender—achieves higher connectivity than prioritizing language alone.

These findings suggest the need for minority inclusion strategies that go beyond conventional approaches, leveraging the interplay between social dimensions to promote more equitable participation in collaborative environments.

Motherhood and Intra-Organisational Networks: A Missing Piece in Gendered Network Inequalities

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¹University of Exeter, United Kingdom; ²Durham University, United Kingdom

Research on gender and intra-organisational networks consistently finds that men and women not only have different network structures but also derive unequal returns from them (Woehler et al., 2021). However, the existing literature assumes that all women face the same network challenges hence overlooking the critical role of motherhood. Our

work challenges that assumption and argues that motherhood, particularly early motherhood, significantly impacts women's ability to build and maintain professional networks. We propose that mothers, beyond the effects of gender alone, experience disadvantages in key intra-organisational network positions, particularly brokerage. Specifically, we argue that the demands of motherhood, especially the psychological and time-based strains associated with raising young children, create a heightened family-work conflict. Given that brokerage requires substantial time and cognitive resources, we argue that young mothers who experience heightened family-work conflict will face a distinct penalty in attaining and maintaining these influential positions. To investigate this, we collected complete network data from a UK-based not-for-profit organisation at two time points (six months apart), achieving 80% and 71% response rates at Time 1 and Time 2, respectively. Our preliminary findings, which will be presented at the Sunbelt Conference, provide novel insights into the intersection of gender, parenthood, and network inequalities—advancing the conversation on workplace equity beyond gender alone.

Perceived Care Networks and Fertility Decisions: A Trust Radius Approach

Hyeona Park

Seoul National University, Korea, Republic of (South Korea)

This study introduces a framework for analyzing perceived care networks in fertility decision-making. While prior research has focused on received financial and emotional support from close family, this study highlights expected social support across broader social networks. It conceptualizes care networks as multi-layered structures, extending from partners and family to friends, neighbors, care services, government, and broader society.

Using the trust radius framework, we develop a novel measurement approach to assess individuals' perceived care radius—the distribution of expected support across various network sources. This radius is operationalized using intercept-constrained regression, where the slope of expected support levels across sources indicates how evenly support is perceived to be distributed. A flatter slope suggests a wider care radius, while a steeper slope indicates concentration in fewer sources.

South Korea provides an ideal context due to public discourse on child-rearing exclusion (e.g., "No Kids Zones"). Preliminary findings from the 2023 Reciprocity and Cooperation Survey indicate systematic differences in perceived care radius by gender and socioeconomic status. Women, particularly those of lower SES, report a narrower care radius, suggesting greater dependence on formal services and a more stratified access to social support.

By integrating network perspectives into fertility research, this study advances methodologies for quantifying the structure of perceived support networks and examines how care radius perceptions shape fertility attitudes and intentions. Further analysis employs linear and multinomial logistic regression to assess the impact of care radius on childbearing decisions.

Social Networks and Gender: The Role of the National Interethnic Women's Network in Social Capital and Environmental Governance

Fanny Cecile Howland, <u>Diana Katherine Quintero Cano</u>, Carlos Eduardo Gonzalez, Alexander Buritica, Diana Carolina Lopera

CIAT, Colombia

In conflict and climate change contexts, women's networks play a key role in environmental defense, political mobilization, and collective action. However, there is limited information available about how network formation and structure (relationships and governance) influence their outcomes in terms of political advocacy and territorial transformations while facing multiple risks (climate extreme events for loss biodiversity, threats against environmental leaders). To address this knowledge gap, we analyze the case of National Interethnic Network of Women for Environmental Defense, composed of 32 women leaders from diverse ethnic groups and territories in Colombia, and examine how the network's structure and governance influence its sustainability, territorial actions, social capital, and advocacy capacity. Data was collected through a three-day participatory workshop, and fourteen semi-structured interviews, and analyzed using an innovative mixed-methods approach that combines Social Network Analysis (SNA), and discourse analysis. Findings show that although the network promotes solidarity and collective leadership through a horizontal model, it faces challenges due to its low relational density and dependence on a central node (an allied NGO) which raises concerns regarding long-term autonomy. Results also revealed differences in relationships patterns related to intersectionality factors. Nevertheless, participants report enhanced advocacy capacity, resource mobilization, and articulation with external actors. This research contributes to gender studies, environmental governance, and social networks by highlighting women's pivotal role in collective action. It

also motivates the debate on how an equitable and participatory organization such as women's networks can challenge traditional power structures and influence environmental policies as well as territorial actions.

OS-21: Early and Mid-Career Research in Social Network Analysis: Roundtable Discussion

Location: Room 204 Session Chair: José Luis Molina Session Chair: Elisa Bellotti Session Chair: Francisca Ortiz Ruiz Session Chair: Nynke Niezink

Early and Mid-Career Research in Social Network Analysis: Roundtable Discussion

<u>Tomas Diviak</u>¹, Jose Luis Molina², Elisa Bellotti³, Francisca Ortiz-Ruiz⁴, Nynke Niezink⁵ ¹University of Manchester, United Kingdom; ²Autonomous University Barcelona, Spain; ³University of Manchester, United Kingdom; ⁴Universidad Mayor, Chile; ⁵Carnegie Mellon University, United States of America

This is an abstract covering all the participants in the roundtable.

Key topics include:

- · Identifying strong opportunities and positions in the field
- Structuring CVs and job applications to highlight relevant skills and experiences
- Common pitfalls to avoid in applications and interviews
- Effective preparation for job interviews, including how to demonstrate fit with the institution or research project

The session will be concluded by open discussion of the discussants with the audience and follow-up networking among the EMCRs

OS-223: Keynote Simmel Award: Beate Völker

Location: Grand Amphithéâtre de la Sorbonne Session Chair: Beate Volker

OS-232: Keynote cocktail

Location: Cocktail Room - Grand Amphithéâtre de la Sorbonne

OS-230: Hospitality suite (Zamansky Tower, Panoramic room, 120 persons, with rotation)

Location: Hospitality suite (Zamansky Tower, Panoramic room, 120 persons, with rotation)

OS-39: Network and Music: Empirical Approaches

Location: Room 105 Session Chair: Myriam Boualami

Enhancing Music Recommendation Systems Through Artist Networks and Covariate Analysis

Deniz Yenigun¹, Doruk Sen²

¹California Polytechnic State University, United States of America; ²Istanbul Bilgi University, Turkey

How can we understand and profile the musical preferences of consumers of online music providers? Do they tend to stick to a single genre, or do they explore beyond genre boundaries? How can we develop well-tailored recommendations based on existing knowledge of listeners?

To answer these questions, we utilize a dataset from Last.fm, which contains variables on social networking, tagging, and music artist listening information from its users. We construct a network of music artists by defining a tie between

artists based on a threshold of shared listeners. Community detection methods are then applied to this network, revealing a strong similarity between the detected communities and musical genres. Our analyses reveal that users rarely confine themselves to a single genre. Therefore, we also identify key artists that act as bridges between genres.

Next, we incorporate supplementary internal artist-related data, such as user-generated tags, alongside external covariates—including genre, nationality, and years active—obtained via web scraping. Using this enriched dataset, we develop more nuanced and sophisticated user profiles. Based on these profiles, we propose a novel personalized recommendation list approach.

Our approach generates two types of recommendation lists: short lists that provide concise selections of artists for immediate exploration or purchase; and long lists that function as dynamic playlists, adapting to real-time user inputs. This structured, data-driven method enhances music recommendation systems, offering a more personalized and engaging listening experience.

Rethinking Toronto Music Networks with Black, Racialized, and Newcomer Musicians

Miranda Campbell, Nala Haileselassie, Maia Taruc-Pillling

Toronto Metropolitan University, Canada

he music industries increasingly matter to local economies, placemaking, and creative industries economic development (Hesmondhalgh, 2013; Rana & Campbell, 2019, 2020). However, the Canadian music industry maintains systemic barriers that reproduce inequality and discrimination, especially with regards to Black, racialized, newcomer, and immigrant musicians. Within the specific context of Canada, there remains a false tendency to believe these issues do not permeate its industries because of a storied history of so-called multiculturalism and acceptance (D'Amico-Cuthbert, 2021). Meanwhile, community music programs have been documented to foster inclusive opportunities for participants to engage in music making, alongside providing platforms and supports to develop music industry careers (Campbell, 2021; Marsh, 2012; Rimmer, 2012, 2018).

This paper presents findings from our collaborative "Mapping the Music Industries" research project, highlighting how our cultural mapping methodology (Duxbury, Garrett-Petts & MacLennan, 2015) expands what and who "counts" as a musician in the Toronto context. We forward cultural mapping as a method to make visible music networks that are otherwise poorly documented. We will present process findings from our methods to convene and co-create with our research participants, including four community conversation sessions, River of Experience drawings, follow-up semi-structured interviews, participation observation with community programs, and a Music Summit event with one of our research partners, AfroWave TO. We highlight tensions between the presence of vibrant diasporic music networks in Toronto and established funding and support models in Canada that often do not see or serve these diasporic networks. Alongside these tensions, we highlight the role of community music programs in providing 1)inclusive models for learning 2) music business knowledge and 3)spaces for relational exchange and networking alongside 4) raising the visibility of Black, racialized, and newcomer music. We explore the effects of these programs with a nuanced understanding of the anthropological Eurocentric origins of cultural and musical heritage work (Pryer, 2019), aiming to avoid reproducing essentialist discourse regarding diverse musicians with our alternative network mapping methods.

Pocket Calculator: Networks of performance technologies and leisure mobilities in the international electronic music open mic movement.

Susan O'Shea, Kirsty Fife

Manchester Metropolitan University, United Kingdom

Using the Electronic Music Open Mic movement (EMOM) as a case study, we explore how networks are the basis of community building and movement-making. Since 2017 EMOM has been responding to inaccessible or even hostile open mic spaces for electronic and soundscape producers and performers. Situated within a long tradition of improvised electronic music it represents an emerging grassroots movement that expands internationally to include groups in Mexico, Australia, Germany, Canada and beyond, where technologies bridge the gap between audience and performer, adopting hybrid roles and collective experiences. This paper examines how social networks propel the movement beyond geographical or technological borders. New micro-electronic performance instruments—including the Korg Volca, Roland AIRA Compact, and Teenage Engineering's Pocket Operator series, streaming platforms and virtual instruments—democratise music production and performance, enabling participatory leisure practices and music mobilities.

A concurrent mixed methods framework uses participant observations, organiser interviews (UK), EMOM community surveys and a digital ethnography of event-facilitating platforms and event streaming (UK and International). Using

social network theories and modes of analysis we explore the fluid roles of organiser, performer and audience member at EMOM events highlighting how digital and material mobilities shape networked transnational music cultures. This research advances critical discussions on how we can use social network analysis to understand realtime music world-building. Technology plays a central role in democratising leisure; challenging homogenisation narratives, with the paper offering insights into the co-creation of digital and material leisure spaces. The study positions EMOM as an exemplar of how networked electronic sound worlds, portable technologies and digital platforms combine to reshape community, identity and creative expression within contemporary grassroots leisure environments.

Creative Crossroads: The Role of Folding and Open Triads as Innovation Mechanisms at GroundUP Music Label

Silvia Ioana Fierăscu¹, Curtis Michelson², <u>Eric Szilveszter¹</u> ¹West University of Timisoara, Romania; ²Minds Alert LLC, Orlando, Florida

This study addresses the research question: How do networks facilitate innovation and influence the success of artists and songs? Focusing on the analysis of the entire GroundUP Music Label, our investigation integrates network theory with empirical analysis to examine how collaborative structures drive creative breakthroughs and build social infrastructures for reach. Initially grounded in the forbidden triads hypothesis – which posits that artists bridging disconnected groups foster innovation (Vedres 2017) – we uncovered two recurring configurations at play. A select group of artists occupies forbidden triads, acting as brokers who connect diverse creative circles, while most artists operate within highly transitive networks that underscore the role of trust transfer in building careers.

Employing a mixed-methods approach, we combine quantitative analysis of Spotify collaboration data with qualitative interviews with key label artists, further enriched by complementary performance indicators such as social media reach and sales metrics. Our findings suggest that both expansive bridging and localized cohesion are crucial for innovation, as each configuration contributes uniquely to artistic influence and success.

Ultimately, this case study advances theoretical insights into bottom-up open innovation models through dual dynamics of network structures. It also highlights the broader paradigm in which 21st-century musicians leverage both social networks and digital technologies to serve their music, expand their reach, and enhance their artistic impact.

Keywords: Social Network Analysis, Innovation Mechanisms, Music Ecosystems, Trust Dynamics, Creative Networks

Driver for Music Development: The Patent Study of The Evolution of Keyboard Innovations

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¹National Taiwan University of Science and Technology, Taiwan; ²National TsingHua University, Taiwan

Introduction & Background

Musical keyboard instruments have undergone substantial transformation, from early acoustic pianos to the digital innovations seen in contemporary synthesizers. This evolution reflects both technological advancements and shifts in musical trends. The study aims to understand the key innovations that have shaped these instruments, with a particular focus on the interplay between technological development and musical creativity. In such rapid IT development generation, we standing on the technological view to explore how technological progress interact with the music industry. This study aims to explore three main questions. First, how does the technological evolutionary path of keyboard instruments develop in the past decades? Secondly, what significant technology milestones bring changes and impact on music industry? And finally we further explore the existence of emerging trends in the industry.

Methodology & Data

To analyze the technological evolution of musical keyboards, this study employs a quantitative approach using Main Path Analysis(MPA). MPA is a bibliometric method used to trace the most significant developmental trajectories in a citation network, offering insights into the flow of knowledge through scientific fields. Introduced by Hummon and Doreian in 1989, it works by assigning significance indices to citation links, representing the importance of these links in the diffusion of knowledge from earlier works to later ones. The main path is identified as the most critical sequence of citations that connects key publications in a network, highlighting the dominant ideas that have shaped the field (Liu & Lu, 2012). We apply this method to explore the knowledge trajectory path of keyboard development.

The research collects a dataset of 2,749 U.S. patents, sourced from the Derwent patent database, covering a period from 1920 to 2024. By analyzing technological network and main knowledge trajectory, the study identifies critical technological milestones and influential innovators, shedding light on the major stages of keyboard development and the flow of knowledge within the industry. We also integrate edge-betweenenss cluster method to identify the existence of emerging technological advancement applied the keyboard development.

Conclusion & Implications

To explore the knowledge trajectory, we learn from Main Path Analysis (MPA) which reveals three distinct stages in the evolution of musical keyboard instruments: the initial phase focused on acoustic improvements, followed by the integration of electronic components, and culminating in the current era of advanced digital innovations. Notably, key knowledge flows have been observed from the U.S. to Japan, with Yamaha playing a central role in driving innovation. Based on the results, we also find a reciprocal relationship between music and technology. Technological breakthroughs create new musical possibilities, while evolving musical genres inspire further innovation. These technological development stages also explain the emergence of different musical styles. This dynamic suggests that both music and technology continuously influence and propel each other forward, indicating ongoing potential for innovation in the field. Standing at technological view, the research explains the dynamic interactions between technology and music. We also how the importance of these technological developments for future advancements in musical instrument design and production.

OS-81: Social networks and health in low- and middle-income setting

Location: Room 106 Session Chair: Maya Ronse Session Chair: Claudia Nieto-Sanchez

Homophilic Friendship Networks in a Heterogenous Context: A Social Network Analysis of Friendship Formation and Effects on Psychological Well-Being in Ethiopia

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¹Chinese University of Hong Kong, Hong Kong S.A.R. (China); ²University of Gondar, Ethiopia

Background: Friendship networks are critical for well-being, yet research on how they are formed in different contexts in underdeveloped countries like Ethiopia is limited. This study uses social network and learning theories to explore friendship formation and its effects on psychological well-being at Addis Ababa University.

Methods: We collected cross-sectional data from 371 first-year students having 3,493 friends. We explored the sociocultural context of friendship formations and visualized them using visual software. Additionally, we tested whether the various aspects of these networks affect psychological well-being using multiple and hierarchical regression modeling in R.

Results: We found a dominantly homophilic and homogenous friendship network among students who exhibit ethnolinguistically and religiously diverse backgrounds. The similarities are formed based on gender, ethnicity, and region. We prove that the key aspects of friendship networks, such as religious and regional homophily, friendship duration and type, frequency of contact, and tie quality, significantly predict psychological well-being. Moreover, different dimensions of friendship networks influence psychological well-being in various ways, and such effects are significantly clustered around the students.

Conclusion and Implications: This study highlights the formations and effects of friendship networks and underscores the need for future research to consider these dynamics. The key findings provide valuable insights about friendship network contexts that can assist policymakers in fostering inter-group connectivity among students, thereby mitigating social segregation and improving psychosocial well-being. Future research should also explore the mechanisms of homophilic friendships and strategies for promoting inter-group networks to reduce ethnoreligious tensions at the university and national level.

Community Detection of Venue and HIV molecular networks in Mexico City

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Background

Venue-based network analysis has previously been used to tailor HIV prevention messaging among sexual minorities, but is rarely combined with molecular network data.

Methods

From 07/2019-12/2022, persons with HIV in Mexico City participated in a survey (asking where they met sex partners) and donated a blood. HIV partial pol sequences obtained via Sanger sequencing were used to infer a molecular transmission network (pairwise genetic distance threshold <1.5% using Seguro HIV-TRACE). Modularity-based community detection was applied to derive communities composed of venues and individuals. Venues were classified by individual-level sexual risk (sexual minority identity, drug use during sex, and <100% condom use). A value of '1' was assigned to each (index averaging 0-3). Three regression models were run with the risk index, cross-community interaction, and their product (i.e. risk of transmission for each community) as outcomes, incorporating clinical, social network (Kleinberg's authority centrality scores), and demographic factors.

Results

In total, 1,101 participants named 423 venues. Among nodes with >1 tie, 69 communities were derived from 216 individuals and 130 venues. Models showed when communities contain more individuals connected to popular places and in HIV clusters, they foster cross-community interactions among communities with high-risk. When communities primarily contain more popular venues, they have lower risks and a lower likelihood of cross-community interactions. Finally, viral load, age, and drug usage were positively associated with risk for a community.

Conclusion

Venue communities attended by individuals who are socially influential and embedded in HIV clusters may be efficient places to engage in HIV interventions.

Explanations of homophily by HIV testing and treatment in household couples in sub-Saharan Africa

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Regular HIV testing and immediate initiation on antiretroviral therapy for those living with HIV have been shown to reduce HIV incidence in serodiscordant partnerships, where one partner is living with HIV and one is not. However, population-level HIV test and treat strategies have shown less impact than expected. One hypothesis to partially explain this reduced impact is sexual network-level structure, and specifically homophily in HIV testing and treatment, wherein those accessing HIV testing and treatment are more likely to be partnered with one another than expected under random mixing. We assess this hypothesis in heterosexual household couples within 21 Population-based HIV Impact Assessment surveys conducted in 14 countries in sub-Saharan Africa between 2015-2023. Individuals in couples with available self-reported data on HIV testing history, and biological data on HIV status, presence of antiretroviral therapy, and viral suppression, were categorized into "engaged" and "unengaged" with HIV testing and treatment. We find that HIV testing and treatment engagement between individuals in household couples is correlated (R=0.33). We will assess the extent to which sociodemographic characteristics can explain this correlation using actor-partner interdependence models, comparing a null model with no actor- or partner- effects to models with actor-, partner-, and actor-partner effects included. The extent to which couples-level homophily in HIV testing and treatment can be explained by sociodemographic characteristics will determine whether this homophily needs to be accounted for above and beyond anticipated mixing patterns by age and other sociodemographic characteristics, and can inform sexual network modeling strategies.

Insights from a mixed-methods whole social network analysis of close contacts in one village endemic for leprosy in the Comoros

<u>Maya Ronse</u>, Stefanie Dens, Claudia Patricia Nieto Sanchez, Koen Peeters Grietens Institute of Tropical Medicine, Antwerp, Belgium

Background: As part of an interdisciplinary research project aimed at improving leprosy prevention and control strategies, we conducted a whole social network analysis (SNA) of one village in a leprosy-endemic area in the Comoros.

Methods: This mixed methods SNA combined ethnographic qualitative data collection techniques with a quantitative door-to-door survey and detailed spatial mapping. The integration of the first two data collection methods is the focus

of this presentation. Two different questionnaires were administered: one at household level and one to all individuals aged 10 and above, residing in the village. Aside from name-generators regarding several types of "close contacts", questions were also asked on the regularity of specific contacts, profession or school/university being attended, places of praying, mobility (as in past places lived in within the village and beyond) and types of alters who raised ego (e.g. aunt, sister...).

Expected results / Discussion: A total of 4850 nodes were registered, including both members of the 522 households in the village and their contacts, who could live outside of the village. Among these, 1728 village residents participated in the individual survey. We will provide some qualitative and quantitative results on the social network's structure and characteristics, such as a social description of the population, centrality and cohesion characteristics based on different definitions of "close contacts", mobility patterns, etc. We will formulate preliminary conclusions and welcome discussions with attendees to improve our ongoing analysis.

Integrating interdisciplinary research on socio-centric networks and leprosy in resource-constrained settings: Challenges and lessons learned

<u>Claudia Nieto-Sanchez</u>, Stefanie Dens, Kristien Verdonck, Koen Peeters Grietens, Maya Ronse Institute of Tropical Medicine Antwerp, Belgium

Implementation of social network studies applied to health problems in low- and middle-income countries remains challenging. As part of an interdisciplinary study designed to better understand the observed patterns of leprosy occurrence in the Union of the Comoros, we conducted a mixed-methods whole social network analysis (SNA) in one village. While implementing the study, we kept track of the process, specific challenges, and lessons learned that could inform similar studies. We classified the challenges into four categories. The first category was linked to general implementation, e.g., coordinating data collection activities across teams, and cross-collaboration across settings and disciplines. Second, we encountered methodological challenges related to SNA, including the need to secure accuracy of name generators, obtaining names from research participants in a context influenced by historical mistrust, developing and linking data collection protocols in Network Canvas software, and processing large amounts of data in different datasets. The third category consisted of context-specific challenges, including the introduction of data collection procedures (tablets, software, map making) among local data collectors, determining relevant relationships to explore in the questionnaire, and finding culture-sensitive ways of inquiring into these relationships. Fourth, ethical considerations related to obtaining consent for SNA, integrating different levels of consent across datasets, participation of minors, and exploring leprosy-related questions without reinforcing stigma were also addressed. We intend to discuss examples of these issues and end the presentation with open questions for the exchange of experiences in different projects and settings.

OS-65: Sampled and Missing Network Data

Location: Room 107 Session Chair: Pavel Nikolai Krivitsky Session Chair: Michael Schweinberger Session Chair: Johan Henrik Koskinen

Forgetting Friends and Foes: Self-Reported Errors in Sociocentrically Mapped Face-to-Face Networks

<u>Karina Raygoza Cortez</u>, Marios Papamichalis, Nicholas A. Christakis, <u>Ana Lucia Rodriguez de la Rosa</u> Yale University, United States of America

Measuring social networks in community settings is complex. Surveys are the most common instruments for collecting face-to-face social ties, especially when assessing real-life friends and foes in defined communities (Stoebenau & Valente, 2003, Perkins et al., 2015; Shakya et al. 2017, Offer, 2021). This is typically accomplished by asking "name generator" questions in which a respondent (an ego) is prompted to recall their social contacts (their alters). Most social network analysis studies assume that participants' responses are generally accurate, often equating the absence of a tie with its non-existence (Marin, 2007; Marsden, 1990, 2005). However, empirical evidence shows non-trivial numbers of participant errors with this approach, which can even yield more forgotten than nominated ties contingent on instrument design (Sudman, 1985; Brewer, 2000). Here, we empirically analyze self-reported forgotten ties on 82 sociocentric signed network graphs in isolated rural Honduran villages. Respondents nominated their positive and negative relationships (ties) in 2019 and again in 2022. Immediately after completing the same survey in 2022, they were queried about omitted relationships they had previously included in their last network report in 2019, discerning among relational changes and present relationships that were not nominated by error (for both friends and foes). We analyze individual, tie, and village-level correlates of such "forgotten" ties. Friends (64.5%) are more overlooked than adversaries (11.6%). Reporter and tie characteristics (e.g., age, education, gender, religion),

network position (e.g., degree of the dyad), and village attributes (e.g., size, isolation) correlate to the probability of forgetting ties. Our findings highlight the multi-leveled considerations that can affect respondent error (including context, network, and participant characteristics). We highlight the differential errors with respect to positive and negative ties, confirming the need for more research focused on the methodological challenges of negative name generators, as appraisal recommendations for positive networks may not extend to the data collection of negative ties (Rodriguez De La Rosa et al., 2024). Finally, we show that reporting errors have implications for the computation of network metrics and might therefore affect the resulting analyses of studies that rely on them.

Bayesian estimation of ERGMs with not-at-random missingness in covert networks

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Missing data methods generally start with the missing at random (MAR) assumption. However, this assumption may not generally be applicable to missing network data due to dependencies in the true network. MAR is also particularly implausible when working with covert network data collated from various different sources. In previous work, we proposed using exponential random graph models (ERGMs) as a flexible way of modelling how covert networks are observed, i.e. the ERGM is used to model the processes that cause network tie-variables to be missing. Using this framework, we also demonstrated that plausible missing not at random mechanisms (MNAR) in covert network settings can have drastic effects on the observed network depending on specification of the missingness mechanism. In pursuit of a method to address the estimation of ERGMs to networks with missing data, that are MNAR, we integrate the statistical ERGM modelling of missingness mechanism with the estimation of ERGMs for covert networks using Bayesian data augmentation. We evaluate the proposed inference scheme with a variety of missingness mechanisms and estimation models. We also provide examples of sensitivity analyses of the estimated parameters with their corresponding missingness mechanisms.

Extending respondent-driven sampling to allow modeling of social networks with application to people who inject drugs

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Respondent-driven Sampling (RDS) is often used to sample hard-to-reach human populations, especially those at risk for transmissible disease such as HIV and HCV. RDS is conducted by collecting samples over the social network, leaving a tantalising trace of the social network in the dataset, and begging the question of whether this incidental network information can be used to make inference about the underlying social network that might relate to the transmission of infection. A key limitation of this pursuit is that the RDS network information is structurally limited to tree-structured data – there are no cross-ties and no way to infer endogenous clustering, a key component of disease transmission. In this study we introduce the augmentation of RDS data with the distribution of tokens to provide a sample of cross-ties and introduce a method to use these data to make inference to the underlying social network.

Sampled datasets risk substantial bias in the identification of political polarization on social media

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Following recent policy changes by X (Twitter) and other social media platforms, user interaction data has become increasingly difficult to access. These restrictions are impeding robust research pertaining to social and political

phenomena online, which is critical due to the profound impact social media platforms may have on our societies. Here, we investigate the reliability of polarization measures obtained from different samples of social media data by studying the structural polarization of the Polish political debate on Twitter over a 24-hour period. First, we show that the political discussion on Twitter is only a small subset of the wider Twitter discussion. Second, we find that large samples can be representative of the whole political discussion on a platform, but small samples consistently fail to accurately reflect the true structure of polarization online. Finally, we demonstrate that keyword-based samples can be representative if keywords are selected with great care, but that poorly selected keywords can result in substantial political bias in the sampled data. Our findings demonstrate that it is not possible to measure polarization in a reliable way with small, sampled datasets, highlighting why the current lack of research data is so problematic, and providing insight into the practical implementation of the European Union's Digital Service Act which aims to improve researchers' access to social media data.

Sampling error in social networks

<u>Judith Gilsbach</u>^{1,2}, Alyssa Smith³, Termeh Shafie², David Lazer³ ¹GESIS Leibniz Institute for the Social Sciences, Germany; ²University of Konstanz, Germany; ³Network Science Institute, Northeastern University, Boston, MA, USA

Sampling error has been well defined for classic population surveys (e.g. in the Total Survey Error Framework, Groves et al. 2011). Also for social network data a vast body of literature exists on sampling error. It is among the most extensively studied error types for social network data collections. However, sampling error in social network analysis appears to be polymorphic in nature and has not yet been clearly defined. As the ideal "random sample" does not exist in social network data due to its relational nature, many definitions of sampling error, sampling procedures and assessment strategies have been proposed. This work identifies five different types of cross-sectional and longitudinal sampling errors in social network data drawing on a systematic literature review as well as qualitative interviews with researchers. Identified errors are "within network sampling error" i.e. biases that occur if a subset of nodes or edges are drawn from a whole network, "between network sampling error" i.e. biases that occur when a sample of whole networks is drawn e.g. a set of school classes, "observation time error" i.e. the network is observed before or after an event that is supposed to be studied "observation span error", i.e. noise in observations due to too long observation periods being aggregated into an equilibrium and "observation distance error", i.e. the time between observations is inadequate. Further, "within network sampling error" and "observation time error" are empirically investigated using a large social media dataset as a case study comparing different sampling approaches.

OS-78: Social Networks & Inequality

Location: Room 108 Session Chair: Gianluca Manzo

Caste and Informal Credit: A Social Network Approach to Rural Finance

<u>Rahul Kumar Singh</u>¹, Tom A. B. Snijders^{2,3}, Marijtje A.J. Van Dujin³, Christian E.G. Steglich³, Sarthak Gaurav¹ ¹Shailesh J. Mehta School of Management, IIT Bombay, Mumbai, India; ²Department of Statistics and Nuffield College, University of Oxford, Oxford, UK; ³Department of Sociology, University of Groningen, Groningen, The Netherlands

Access to credit is vital for economic well-being, yet millions of rural households in India remain financially vulnerable despite the expansion of formal institutions (Rajeev & Nagendran, 2024). This issue is particularly acute in the semiarid tropics, where agrarian distress, farmer suicides, and caste-driven social stratification persist alongside weak financial infrastructure (Bhende, 1983). In this context, social networks serve as crucial conduits for informal credit (Wydick et al., 2011), enabling households to invest in agriculture, adopt new technologies, and smooth consumption during economic shocks. These networks, deeply embedded in kinship, caste, and trust, shape financial access. However, the formation and evolution of these networks—and their influence on credit access—remain insufficiently understood (Banerjee et al., 2024).

This study examines informal borrowing-lending networks in Kanzara village, addressing three key questions. First, it investigates how endogenous network structures shape borrowing relations. Second, it explores how household characteristics and tie-specific factors influence these ties. Third, it assesses the role of caste in credit access. Using longitudinal data from the ICRISAT VDSA survey (2007, 2013) and a Stochastic Actor-Oriented Model (SAOM) (Snijders, 2017), we find borrowing relations are highly reciprocal and caste-homophilous, with dominant castes lending within their groups while lower castes depend on them. Spatial proximity, patron-client ties, and external financial links further shape borrowing dynamics. These findings underscore the need for financial inclusion policies to address caste-based inequalities in credit access.

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Exploring the role of homophily in shaping support for redistribution

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Economic inequality remains a persistent issue, shaping societal structures and influencing public attitudes toward redistribution. While socioeconomic status and ideology are well-established predictors of redistributive preferences, the role of social networks has gained increasing attention. This study examines how homophily -the tendency of individuals to associate with others who share similar characteristics- affects beliefs about inequality and support for redistribution.

Using Chile as a case study, a country with high levels of inequality and pronounced social stratification, we analyze how educational and ideological homophily shape perceptions of meritocracy, tolerance for inequality, and redistributive policies. Based on data from the Longitudinal Social Survey of Chile (ELSOC, 2016) and the United Nations Development Programme (UNDP) survey for Chile (2016), we apply a case-control model to estimate homophily patterns, followed by multiple linear regressions to assess their impact on redistributive preferences.

Our findings indicate that educational homophily reinforces meritocratic beliefs and weakens support for systemic redistribution. In contrast, ideological homophily produces divergent effects: in left-leaning contexts, it tends to challenge inequality-justifying narratives, while in right-leaning contexts, it reinforces them. These results highlight the role of social networks in shaping economic attitudes, demonstrating the potential of a social network approach to understand better how beliefs, attitudes, and preferences about inequality are formed.

Investigating the Relationship between Information Availability and Influence on Directed Graphs

Elisa Jayne Bienenstock, Joel Nishimura

Arizona State University, United States of America

The principal eigenvector of an adjacency matrix is the basis of several important metrics in social network analysis. Bienenstock and Bonacich (2021) recently proposed using the Gini-coefficient of the principal eigenvector of the communication matrix to measure the extent to which the centralization of communication in an organization prevents that organization from incorporating outside information. This problem can be exacerbated when informational flows are one way. On directed graphs, nodes that are informed may not be influential, and influential nodes may not be informed. This subtle distinction is highlighted by the relationship between the forward and reverse versions of the DeGroot influence model with the corresponding reverse and forward versions of PageRank. We thus introduce two separate Gini-coefficient measures of influence inequality and information inequality for directed graphs and explore their implications for understanding influence and access in organizational networks.

Mapping network structures and dynamics of decentralised cryptocurrencies: The evolution of Bitcoin (2009-2023)

<u>Marco Venturini</u>^{1,2}, Daniel García-Costa³, Elena Alvarez Gracìa³, Francisco Grimaldo³, Flaminio Squazzoni¹ ¹Sorbonne Université, Paris; ²University of Milan, Italy; ³Universitat de València, València

Cryptocurrencies have recently been in the spotlight of public debate due to their embrace by the new US President, with crypto fans expecting a 'bull run'. The global cryptocurrency market capitalisation is more than \$3 trillion, with

1 Bitcoin exchanging for more than \$109,000 at the end of January 2025. Monitoring the evolution of these systems is key to understanding whether the popular perception of cryptocurrencies as a new, sustainable economic infrastructure is well-founded. In this paper, we have reconstructed the network structures and dynamics of Bitcoin from its launch in January 2009 to December 2023 and identified its key evolutionary phases. Our results show that network centralisation and wealth concentration increased from the very early years, following a richer-get-richer mechanism. This trend was endogenous to the system, beyond any subsequent institutional or exogenous influence. The evolution of Bitcoin is characterised by three periods, Exploration, Adaptation and Maturity, with substantial coherent network patterns. Our findings suggest that Bitcoin is a highly centralised structure, with high levels of wealth inequality and internally crystallised power dynamics, which may have negative implications for its long-term sustainability.

Networks and trajectories of popularizers on YouTube

Thomas Boissonneau

LISST, France

Through a survey, carried out for my thesis, based on the study of 464 YouTube channels and their videos, I am interested by the collective dynamics that structure the space of scientific popularization on the Internet. I study the nature of the social relations created by popularizers to structure their sphere and develop their activity. I observe how these relationships evolve and multiply over time and the individual's place in the network. I look at which actors are mobilized and the nature of these relationships. They collaborate not only with each other, but also with scientific institutions, with media and with commercial partners. Video collaborations are dated, so they can be studied over time. In addition, YouTube channels are studied in terms of their scientific discipline, seniority, audience and gender, enabling us to compare them in terms of the differences that can be observed about their trajectories and networks

OS-199: Social Networks in Childhood, Adolescence, and College 5

Location: Room 109 Session Chair: René Veenstra Session Chair: David R. Schaefer Session Chair: Carolyn Parkinson

The beneficial effect of accurate social perception, or will I be popular if I am orienting well on a social level?

Balazs Telegdy

Sapientia Hungarian University of Trasylvania, Romania

The study of peer perception is important in the context of social network analysis because the subjectively perceived place of individuals in a group influences their behavior within the group (Krackhardt, 1987).

In many cases, research exploring social networks takes for granted the ability of the research subjects to accurately assess social relations within a group. How incorrect this assumption is demonstrated by the fact that research that analyses the accuracy of social perception highlights the biases that impair this accuracy. Marineau et al. (2018) have shown that the mere fact of how many possible diads could potentially arise in a relatively small network, is itself a serious cognitive challenge for individuals.

The causal relationship between accuracy of peer perception and position in the formal hierarchy also varies across the literature: some authors, e.g. Krackhardt (1990), argue that position in the group does not affect peer perception accuracy, while others, e.g. Simpson et al. (2011), argue that it does influencing this ability.

In the current research I applied the Locally Aggregated Structure (LAS) reduction of the Cognitive Social Structure (CCS) – in the Krackhardt sense of the notions – as data were collected nominally with the classical sociometric methods developed by Moreno (1960). The study examines the impact of accurate social status perceptions on the status of individuals within groups lacking formal hierarchy. This investigation was conducted in six high school classes.

The Effects of Friendship Withdrawal and Rejection on Suspension and School Drop Out

<u>Liann Tucker</u>¹, Robert Faris², Emily Forrest Hutchens³, Nisha Gottfredson O'Shea¹, Tamara Taggart⁴ ¹RTI International, United States of America; ²University of California at Davis; ³University of North Carolina at Chapel Hill; ⁴George Washington University

Labeling theory suggests that when a stigmatizing event occurs, an individual may be labeled by others or self-label as undesirable, potentially leading to social rejection or withdrawal in the aftermath. Recent studies have found that both tie withdrawal and rejection can partially explain decreased academic performance following suspension. Simultaneously, connections to friends within schools have a protective effect against both suspension and dropout. In the current study, we use panel data on friendship networks of adolescents to examine: How much of the effect of suspension on school dropout is mediated through friend tie withdrawal versus tie rejection? We measure tie withdrawal as the number of friends a respondent fails to nominate from wave 1 to wave 2. Tie rejection is measured by the number of re-nominations a respondent does not receive from wave 1 to wave 2. We analyze data from the Context of Adolescent Substance Use longitudinal survey, which collected 7 waves of in-school surveys from 2002 to 2004, following three cohorts in grades 6-8 from 19 schools across three rural and semi-rural, racially diverse North Carolina counties. We combine this survey data with administrative school discipline records from the North Carolina Education Research Center, providing official suspension and dropout documentation for each student from 2002 through 2011. The sample includes 4,975 adolescents. Preliminary findings indicate that suspended students are more likely to withdraw from friendships than experience friendship rejection, and this withdrawal partially mediates the relationship between suspension and subsequent school dropout.

The kids are not alright: Social network correlates of adolescent mental health

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In the United States, startling increases in adolescent depression, anxiety, and suicide have catapulted adolescent mental health onto the public agenda. Although adolescence is generally viewed as a time of emotional precarity, research shows that some adolescents are more susceptible to mental health issues based on factors like psychosocial stress, minoritized social identities, social media use, and substance use. All of these factors reflect traits of the focal adolescent. Less explored is how adolescent mental health is associated with their peers and peer networks. The objective of this study is to determine how an adolescent's peer environment (network size, peer mental health, peer substance use, and peer bullying) contributes to four mental health outcomes (borderline/clinical: depression, anxiety, panic disorder, social phobia) above and beyond the effects of identity, psychosocial, and behavioral factors. Drawing on data collected from a large cohort of adolescents (n = 2,302) from 14 high schools in Southern California, I perform hierarchical regressions on each binary outcome, introducing identity, psychosocial and behavioral, and peer-related variables in subsequent blocks. Unsurprisingly, gender identity (being a cis-female and being trans/non-binary), psychosocial stressors, and social media activity are consistent predictors of poor mental health. Peer factors also contributed to poor mental health but more idiosyncratically across outcomes. Network size increased the likelihood of anxiety, peer marijuana use increased the likelihoods of anxiety and depression, having friends with social phobia increased the likelihood of personal social phobia, and peer-based bullying increased the likelihoods of anxiety, panic disorder, and social phobia.

"Do the young people feel like we left them alone?" Household life-cycles and sharing network dynamics in the Canadian Arctic

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Cooperative exchange networks are important to the livelihood strategies of small-scale food producers worldwide. Such networks are considered to support food security and climate change resilience, particularly because they may buffer households from variation in harvests. However, the processes that impact how and why cooperative exchange networks change over time are not well-understood, because this is a complex issue that invokes a panoply of empirical, statistical, and theoretical challenges. It has been suggested, for instance, that static interaction networks stabilize cooperation (in experimental settings), but in real-world settings turnover in nodes is inevitable as individuals or households progress through the life-cycle.

Here, we investigate how the formation of new households impacts the structure of cooperation networks, using data on food sharing networks collected in Kangiqsujuaq, an Inuit community in Nunavik, Canada, in 2013 and 2023. In this context, interhousehold exchange of traditional foods like caribou and fish are critical for food security and

nutrition, but the increasing cost of living in Arctic settlements, cultural loss, and climate change are considered to be potential threats to these networks.

Preliminary analyses indicate that households reported slightly more sharing partners in 2013 than in 2023, a surprising initial finding given prevalent concerns about network erosion. However, there was a considerable increase in housing stock in the settlement between the two study periods. This means that there are many "splinter" households, mostly formed by (now adult) children who lived with their parents during the 2013 study. Our richly-detailed survey dataset, combined with our long-term participant observation in the community, allows us to identify these households and their "origin" households in 2013.

We explore the hypothesis that the observed increase in sharing ties from 2013 to 2023 is driven by this change in housing availability. Specifically, we examine whether the "splintering" of households lead to previously invisible intra-household sharing now being documented as inter-household ties. This analysis provides important theoretical insight into how the common life-cycle phenomenon of household nucleation impacts the structure of exchange networks in a real-world setting. It also provides useful information for our community partners, who are concerned that the current housing situation has weakened family sharing ties and are motivated to develop community programs to support the access of younger generations to traditional foods.

Association between Power and Knowledge in Korean Adolescents: A Longitudinal Analysis

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Despite the well-established link between social networks and knowledge in the literature, empirical evidence on the association between power within classrooms and network knowledge is limited. Prior studies have relied on theoretical assumptions about cognitive social networks or used cross-sectional designs, limiting our understanding of these associations over time. To address these gaps, this study used panel data to examine whether and how accuracy in network knowledge is associated with a student's structural position within classroom social networks, as measured by degree and closeness centralities. Network knowledge was measured as the objective accuracy of students' perceptions regarding who is considered popular within their peer networks. Using five waves of the Korean Study of Adolescent Health (KSAH, 2022–2025), we conducted random-effects analyses. Results showed that students higher in power—indicated by higher degree and closeness centralities—were significantly less likely to have accurate network knowledge, after adjusting for individual characteristics (degree centrality, p<0.05; closeness centrality, p=0.001). Interestingly, students with higher outdegree centrality (i.e., those frequently nominating others as close friends) were likely to have lower accuracy in network knowledge, whereas indegree centrality was not statistically associated with accuracy. These findings indicate that structural positions within adolescent networks may act as a critical relational resource to the accuracy of network knowledge, underscoring the importance of the relationship between individual power and understanding of social networks.

OS-50: Networks, Collective Action, and Social Movements

Location: Room 112 Session Chair: David Benjamin Tindall Session Chair: Mario Diani

BeWater: Effective Protesters Navigate Watersheds in Street Networks

<u>Guillaume Moinard</u>, Matthieu Latapy LIP6, Sorbonne Université - CNRS, France

Suppose a group of walkers is trying to gather, in a city, with little knowledge other than observables in their direct surroundings. They must achieve this objective while unable to communicate, nor to access the live map of the city. This situation is common in social movements, where protesters risk having their phone seized and adversary forces block streets.

We leverage the OpenStreetMap database to model a city as a weighted street network. Nodes represent intersections and links are sections of streets. Weights are observables such as the length, width, or any information labelling a street that a walker can estimate when standing at its corner.

We introduce BeWater, a new algorithm for gathering on weighted networks. Walkers follow a drop of water principle: they repeatedly take the street that maximizes a given observable, as a droplet would follow the steepest slope. The stopping condition is met when they reach a street that locally maximizes this observable.

We run an extensive set of agent-based simulations to identify what are the best observables for gathering with major cities, such as Paris, Hong Kong or Seattle. Finally, we propose a network decomposition procedure to explain a given observable efficiency. For each node we only keep the link a walker takes when using a given observable. We then build the catchment basins, which are the sub-networks within which all walkers end up in the same place. BeWater is effective when using an observable that creates a little number of large catchments basins.

Country-of-Origin Ethnic Diversity Reduces Nationality Homophily in International Social Networks

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Nationality homophily—a persistent challenge in international social networks—limits individuals' access to diverse information and perspectives. While prior studies have focused on how immediate structural factors influence homophily, they overlook the potential long-term impact of structural restrictions. From a socioecological perspective, we propose that a country's ethnic diversity influences the structural opportunities available for cross-cultural interactions among its residents during their developmental stage. These opportunities, in turn, shape individuals' future willingness and ability to form cross-national connections in international contexts. We test this hypothesis using data on the communication network during an international hackathon event, applying the Multiple Regression Quadradic Assignment Procedure (MRQAP). We find that nationality homophily persists even in an environment designed to minimize structural constraints. Notably, participants from ethnically diverse countries exhibit significantly lower nationality homophily. Additionally, prior experience of living abroad also reduces nationality homophily during the hackathon. We contribute to the literature by introducing the socioecological perspective to demonstrate how structural factors can shape homophily over time. Practically, this study offers insights for organizations and policymakers seeking to foster inclusivity and diversity in global collaborations.

Detecting social movements within collective action fields: Comparing definitions

<u>Mario Diani</u>

University of Trento, Italy

Social movements have been conceptualized in two main ways: as "sustained interactions between challengers and powerholders" (Tilly), which also imply sustained interactions between challengers; and as a particular mode of coordination, connecting civil society organizations to each other through multiplex ties, in the context of broader collective action fields (Diani). Both perspectives assign a key role to network concepts and imageries. In this paper I explore various approaches to the operationalization of these concepts. I systematically compare the formal properties of the networks that emerge from different definitions, as well as the corresponding homophily mechanisms. To this purpose I draw upon data from earlier projects, in particular, my study of UK civic networks in the early 2000s.

Exploring Core-Periphery Subjectivities: Transnational Advocacy Networks and Indian Environmentalism

Roomana Hukil

McMaster University, Canada

This project unearths realistic explanations for transnational environmental problems. It critically assesses the role of collective advocacy in Indian environmental movements by identifying the opportunities and challenges that lie therein. It questions the manner in which states use regressive forms of regulation to curb foreign funding and how northern powers influence the interests of the south. Deploying a postcolonial lens, it explores India's postcolonial anxieties about neo-colonial forms of control and expansion as it regards transnational activism with 'anti-nationalism' and 'neocolonialism'. But it also unravels India's use of the very same oppressive posture to carry out its capitalist agenda by heavily encouraging foreign investments in the state. On the other hand, the research investigates the growing challenge of transnational coalitions covertly ascribing to western-liberal, Eurocentric ideals that, in turn, seize the democratic freedoms and domestic particularisms of local activists. Why do foreign non-governmental organizations (NGOs) hijack local movements? What does the past and present of Indian environmentalism say about its future? And, what lessons do South-South transnational alliances such as SIGTUR and Via Cempesina offer to effectually reform transnationalism in the global South. The qualitative research used in

the study is drawn from primary and secondary sources such as interviews, historical documents and archival material that tease out the role of state and non-state actors in critical IR theory. It uses an eclectic approach to present the case for a subaltern transnational framework using local knowledge systems to improve strategies for collective activism and environmental standards in the global South.

From Conversations to Relational Patterns to Understanding Processes - LLM-aided Analysis of Adaptation Processes in a Networked Direct Action Collective

<u>Timo Damm</u>

Complexity Science Hub, Austria

How do different dimensions of political work interact to constitute a set of intended and unintended responses to state-level repression, shaping the network structure, processes and relationships in an activist collective? I conduct in-depth interviews with 41 members of a grassroots, direct-action collective. Combined with field notes from observations over two months, this data provides rich insights into the complex emerging dynamics, changes in structure and processes, as well as their personal and collective sense-making. Given the sensitive nature of the group's activities, data collection is tied to the promise of complete confidentiality. This entailed exclusively offline analysis by one researcher only. This presentation outlines a local, open source implementation of the analysis from pre-processing to presentation of results. Local LLM implementations are used in all steps to augment the capacities and capabilities of the researcher. The framework for analysis includes the development and integration of contextual knowledge about the specific situation and timeline to improve the LLM's zero-shot learning. It uses the LLM in an auditable way through systematizing prompts and implementing chain-of-thought reasoning.

Preliminary results show complex adaptation patterns on a network level constituted by rather simple individual and relational considerations. Individuals' opinions in a collective decision process are shaped by their and other members' a) well-being, and b) satisfaction with tasks within and strategy of the collective. Rules for decision-making and patterns of decision impact derived from the data, can provide a basis for modeling adaptation processes to repression on the network under different conditions

OS-66: Scientific Collaboration Networks: data collection and quality, methods, models, and empirical application

Location: Room 114 Session Chair: Luka Kronegger Session Chair: Alejandro Espinosa-Rada Session Chair: Viviana Amati Session Chair: Marjan Cugmas Session Chair: Susanna Zaccarin

Bridging formal and informal collaborations in the study of Early Women Sociologists: a multilayer analysis

<u>Chiara Ferrari</u>, <u>Teodora Erika Uberti</u>, <u>Mariagrazia Santagati</u> Università Cattolica del Sacro Cuore, Italy

Purpose: This study investigates the possible intersection between formal academic collaborations, measured through co-authorships, and informal interactions, assessed through joint organization of conferences, events, and/or teaching, among scholars of Early Women Sociologists (EWS). Part of the broader project "Gendering Sociology: Proposal for Research and Teaching", this paper aims to recover the intellectual contributions of EWS by mapping formal and informal academic networks in this field, verifying if informal collaborations foster structured scholarly output or remain detached from formal research.

Methods: The mapping process was structured in three phases: (1) Desk-based identification of scholars, conducted through a multilingual scoping review across academic databases and research networks to identify EWS. (2) Administration of a questionnaire to international scholars and experts, to collect two types of ego-alter data: the informal relations, and the inspiring EWS. (3) Collection of official bibliographic records from Scopus and Ebsco repositories for respondents and alters.

Hence, we analyze relational data using a multilayer network approach. Specifically, examine three layers: the "formal" academic interactions captured by the co-authorship network (i.e. Layer 1); the "informal" collaborations network, or the overall sociometric structure derived from questionnaire responses (i.e. Layer 2); and finally, the EWS layer, which determines the foundational knowledge base for these scholars (i.e. Layer 3).

Contributions: The findings reveal that, while some international EWS have influenced sociological thought, the research community remains highly fragmented, with informal collaborations largely confined to small, self-referential groups. Notably, informal scholarly interactions rarely translate into formal co-authorships, suggesting the presence of structural barriers that hinder the transformation of intellectual exchange into sustained research output.

Caught Between Merton and Musk : Understanding the evolution of scientific norms and practices in the field of AI

Antoine Hugo Houssard

CNRS, France

In 1994 Gibbons [3] claimed that knowledge production shifted from its traditional form to a new synergy between academic and industrial actors. Although numerous studies have shown the strengthening of academia-industry ties, many also noted resistance to industrial logic and the effort to maintain clear boundaries [2, 6].

The field of AI, with its largely mixed composition, appears emblematic of this reconfiguration.

If initial discoveries were made in academia, many of the recent advancements are industry driven. The private sector, due to its substantial resources and its access to large databases, attracts most new talent, produces the most groundbreaking models and consequently dominates the field [1,4].

If elements such as the creation of industrial laboratories, participation in conferences, or contributions to the scientific literature highlight the rapprochement between the two actors, Raimbault [5] points out that, while some practices align, the goals and subsequent artifacts in which researchers invest remain differentiated. In other words, academics focus on papers as they produce value in their field, and industrials will focus on providing working code and models.

Considering the industrial domination in the field and the many convergences with academia, can we observe the emergence of a unified system of knowledge production and diffusion?

Using the PapersWithCode database as well as the OpenAlex and Github APIs, we collected extensive information about research projects including a code repository and an academic paper. Our findings suggest that, while some similarities emerge, industrial studies largely deviate in their topics, diffusion, and reception by scientific communities.

First, looking at the citations, we noted a slight industrial edge. Although industrial articles receive more attention, we noted that they also were significantly less likely to be fully published (12.3% when including an industrial author and 24% when fully academic). Furthermore, if published, industry papers have a longer time to publication ($x \approx 0.97$ years for academic papers and $x \approx 1.17$ for industrials) and only focus on the top journals, suggesting an instrumental use of the publication system. Moreover, using Uzzi's [7] method, we observed a higher tendency towards classical topic combinations for industry papers. Finally, employing a time series clustering method, we noted that academic articles are overrepresented in the clusters with exponential citation growth.

Regarding repositories, we noted significant differences. Industrials display higher diversity in programming language and some specificity, such as the usage of CUDA. Moreover, private researchers appear to invest more in the presentation and usability of the repository. This can be seen in several metrics such as the documentation length or the inclusion of" Code examples". We also note a higher industrial popularity on Github as well as a faster accumulation of stars. But we paradoxically observed very little discrepancy in the maintenance of repositories, with even an academic edge in some metrics, such as the time to close issues.

Overall, our results show that, while more successful, industrial research has narrower interests and displays relatively instrumental use of the artifacts questioning the idea of a unified system of knowledge production.

Differences and similarities in co-authorship network structures of Management and Statistics

Domenico De Stefano, <u>Amin Gino Fabbrucci Barbagli</u>, Francesco Santelli, Susanna Zaccarin Univeristy of Trieste, Italy Scientific collaboration, widely recognized as a key driver of research progress and innovation, has grown significantly over the years across all academic disciplines. This trend has been further strengthened by government policies at both national and international levels, which actively promote collaborative research initiatives. In this context, co-authorship serves as a concrete indicator of collaborative behavior among scholars and is commonly used as a proxy for measuring and analyzing research collaboration

While research topics and methodological approaches often differ between disciplines, there are, for example, communities of scholars that share common ground and have a distinctive pattern in their research interests.

While research topics and methodological approaches often vary across disciplines, there are also communities of scholars that can share common ground and exhibit distinctive patterns in their research interests.

A notable example of this can be found in Italy, where Economics—along with related fields such as Business, Management, and others—coexists with Statistics within the same macro research area (designated as "Area 13" by the Italian Ministry of University and Research). In many Italian universities, scholars from these disciplines are often hired within the same department and often have teaching duties within the same degree/PhD programs. This proximity reflects shared characteristics in departmental and institutional environments, as well as alignment with national strategies and policies on scientific production and research quality.

However, key questions arise regarding the potential convergence of scientific production mechanisms between these two large communities. Specifically, does this shared environment influence coauthorship behavior, shaping coauthorship structures, publication style, and productivity over time?

To address these questions, this studycontribution aims to conduct a comparative analysis of co-authorship networks in Management and Statistics, starting withfrom their network topology and examining similarities and differences in co-authorship dynamics

Multilayer Scientific Collaboration in a Scientific Research Centre

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How can scientific collaboration be explained within a research centre? While much of the social network literature on scientific networks tends to focus on academic papers as a means to explore scientific relationships (Bellotti & Espinosa-Rada, 2025), early studies in the sociology of science and knowledge have highlighted the importance of social interactions in knowledge diffusion and production (e.g., Coleman et al., 1957; Crane, 1972; Mullins, 1972; Collins, 1998; White, 2004). To better understand the complexities of social relationships in scientific settings, this study examines how informal communication, scientific interests, specialization, and structural opportunities influence and constrain scientific collaboration.

This presentation presents a case study of scientific collaboration within a research centre focused on sustainability science. The data was collected by combining surveys (i.e., sociometric) and bibliometric data. We investigate the various mechanisms driving collaboration, including friendship, regular interactions, informal communication, and shared "lazy" time spent together. We also account for the influence of factors such as institutional affiliation, interests in different specialities, and conflicts between researchers. For our analysis, we employ stationary actor-oriented models to analyze multilayer networks (i.e., multiplex and multilevel). The primary objective of this study is to uncover how cross-layer effects shape the relationships perceived as scientific collaborations.

Network Connectedness, Multivocality, and Organizational Emergence: The Case of Computational Social Science Lab

<u>Yiwen Zeng</u>

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How do new academic organizations emerge in an institutional landscape that favors stability? This study explores the role of networks in shaping the rise of Computational Social Science Labs (CSS Labs)—interdisciplinary research hubs that bridge computer science and social science. Drawing on institutional entrepreneurship and network theories, this research examines how scholars positioned at the intersection of different academic communities (i.e., multivocal actors) play a key role in creating and leading these new organizational forms. The methodology employs two comprehensive datasets: (1) a large-scale co-authorship network mapping collaborations between social and computational scientists using Web of Science publication data, and (2) a newly constructed global dataset detailing the introduction, membership information, and research agendas of CSS Labs. The Bayesian Hierarchical Network

Autocorrelation Model will be used to model on the relationship between collaboration network position and the likelihood of being a founder of a CSS Lab. Through network analysis, this study assess how increased cohesion between disciplines fosters the emergence of CSS Labs and how these labs, in turn, reshape collaboration patterns. The findings will contribute to scholarly understanding about the paradox of embedded agency by demonstrating how network positioning enables actors to recombine diverse institutional elements to create novel organizations. This research also engages with the concept of "cultural holes," integrating a knowledge-based perspective into brokerage theory. By revealing the relational and structural mechanisms underlying interdisciplinary organizational emergence, the study offers insights into how new academic institutions take shape amid evolving research landscapes in social science fields.

OS-215: Statistical Approaches for Modelling Network Dynamics 3

Location: Room 116 Session Chair: Göran Kauermann Session Chair: Anuska Ferligoj Session Chair: Vladimir Batagelj

Tail Flexibility in the Degrees of Preferential Attachment Networks

<u>Thomas William Boughen</u>, Clement Lee, Vianey Palacios Ramirez Newcastle University, United Kingdom

Devising the underlying generating mechanism of a real-life network is difficult as, more often than not, only its snapshots are available, but not its full evolution. One candidate for the generating mechanism is preferential attachment which, in its simplest form, results in a degree distribution that follows the power law. Consequently, the growth of real-life networks that roughly display such power-law behaviour is commonly modelled by preferential attachment. However, the validity of the power law has been challenged by the presence of alternatives with comparable performance, as well as the recent findings that the right tail of the degree distribution is often lighter than implied by the body, whilst still being heavy. In this paper, we study a modified version of the model with a flexible preference function that allows super/sub-linear behaviour whilst also guaranteeing that the limiting degree distribution has a heavy tail. We relate the distributions tail heaviness directly to the model parameters, allowing direct inference of the parameters from the degree distribution alone.

Using Infinite Hierarchical Dirichlet Process ERGM Mixture Models to Examine co-Voting Patterns in the US Senate.

Frances Beresford, Carter Butts

UC Irvine, United States of America

Co-voting networks provide important insights into political polarization, collaboration, and alliance formation in democratic systems. Here, we examine co-voting data from the United States Senate obtained from voteview.com, covering records from the 1st to the 119th Congress. Co-voting is represented in each Congress by a network in which senators are nodes, and two senators are adjacent if they voted together above a threshold rate. Such networks are structured both by shifts in the composition of the legislature, and by changing political forces that favor different types of alliance formation; these forces may vary over time in idiosyncratic ways, while also being consistent within particular periods (or even recurring to older patterns over time). This raises the challenge of modeling network behavior in a manner that is both flexible and well-regularized. Here, we employ a hierarchical Dirichlet process exponential family random graph mixture model (DP-ERGM) to infer the drivers of co-voting patterns across sessions. Our approach allows us to model hidden sub-populations of co-voting patterns over time, while using slab-and-spike priors to induce sparsity in the set of selected effects. We examine the incidence of drivers of voting patterns over time, apparent clustering in political forces generating voting behavior in different years, and the resulting graph distributions when marginalizing across latent subgroups. Implications for both voting patterns and the exploratory use of DP-ERGMs are discussed.

What and whom do we cite? Modeling citation networks via RHEM with latent node popularity effects

<u>Juergen Lerner</u>¹, Marian-Gabriel Hancean², Alessandro Lomi³ ¹University of Konstanz, Germany; ²University of Bucharest, Romania; ³University of the Italian Switzerland Citation networks are often used to quantify science, ranging from the impact of researchers, journals, or universities over to the interdisciplinarity or disruptiveness of papers. In this talk we present relational hyperevent models (RHEM) as a general modeling framework to assess patterns in the dynamics of citation networks. RHEM can be specified, among others, with endogenous effects (e.g., citing what many others cite or citing the work of those who previously cited the own work) and with random node-level effects representing the latent popularity of papers, or researchers. In an empirical analysis of more than 500,000 published papers we assess changes in one type of effects when controlling for others and estimate their relative explanatory power.

Estimation of Stochastic actor-oriented models: to GMoM or not to GMoM?

Viviana Amati

University of Milano-Bicocca, Italy

Stochastic actor-oriented models have been developed to analyze network dynamics when data are collected in a panel design. Several estimation methods are available, with the method of moments (MoM) being the default approach. This method is computed using a stochastic approximation algorithm, where the statistics that define the moment conditions naturally correspond to the parameters. Another approach is the generalized method of moments (GMoM), which extends MoM by incorporating more statistics than parameters. Although this method has been implemented and documented in Rsiena, guidelines on when to use the GMoM and which additional statistics to include are still lacking. In this paper, we present statistical approaches to determine when the additional statistics contribute useful information beyond what is provided by the moment conditions of the regular MoM. We also discuss the conditions under which the GMoM should be preferred over MoM.

On sample size and statistical power of the stochastic actor-oriented model

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The stochastic actor-oriented model (SAOM) represents change in network panel data as the outcome of actors' decision-making. The number of such decisions, therefore, serves as a natural operationalization of sample size. When there is a single dependent variable - whether a network or an actor attribute - this sample size is the primary determinant of the precision of estimates in SAOM-based data analyses and, consequently, of statistical power.

In co-evolution models, however, the situation becomes more complex. With multiple dependent variables, also sample size becomes multidimensional. Depending on the model specification, spillover effects between dependent variables may affect the precision of estimates. In this conference presentation, I propose a conceptual clarification and present empirically informed simulation studies that illustrate the main findings.

OS-169: Network Approaches to Attitudes and Beliefs 3

Location: Room 125 Session Chair: Claudia Zucca Session Chair: Lorien Jasny Session Chair: Mario Diani

Methodological Advancement in Causal Loops Diagrams Data Collection and Analysis: A Network Approach

Approach

<u>Claudia Zucca</u> Tilburg Universtity, Netherlands, The

Causal loop diagrams (CLDs) are an increasingly popular and flexible technique that empowers us to understand the behavior of agents or factors to explain complex behavior. It is now extensively used in the social science domain since it is a tool that allows us to map attitudes and concepts and the relationships between them. These diagrams are networks; hence, their analysis benefits from the employment of tools already established in network analysis.

Several techniques can be used to construct causal loop diagrams. However, most require qualitative data collection where stakeholders are invited to identify crucial factors to represent the system and the causal relationship between them.
This study introduces a methodological contribution focused on improving the accuracy of diagram construction. The qualitative data collection and the practice of merging more than one diagram into a finalized one might be the source of several biases in the finalized diagram. For instance, a group of stakeholders might be too influential in the depiction of the system, and another group might not be represented enough. This work introduces an application of Exponential Random Graph Models (ERGMs) to systematically appraise potential biases in the diagram formalized as a network. This methodology enables researchers to explore the system's structure and identify the underlying dynamics that led to the construction of the system under examination. The method has implications for understanding the attitudes and constructs depicted in the system.

Preventing Smoking through Advocacy Coalitions: Insights from Ego Network Analysis

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Background: Advocacy coalitions consist of individuals who share beliefs and often act together. They have become increasingly important in community health to influence health practices. However, social network analysis has been underutilized in studying such coalitions due to the challenges of collecting whole network data across multiple settings. This paper demonstrates the use of ego-network analysis to infer coalition structures.

We apply this approach to tobacco prevention in schools. School staff are sometimes reluctant to enforce nonsmoking rules, partly because they believe their colleagues do not prioritize this issue. As part of the ADHAIRE smoking prevention project, we examine homophily among teachers regarding smoking status and attitudes toward smoking prevention.

Method: We collected ego networks from 537 teachers across 20 secondary schools in a deprived Belgian province with high smoking rates. Teachers named up to five colleagues from whom they sought advice (average alters=4.7). Exponential random graph modeling (ERGM) was applied to assess homophily.

Results: We found significant homophily in attitudes toward smoking prevention (nodematch=0.525, stderr=0.008). Teachers opposed to stronger prevention measures exhibited greater homophily (nodematch=15.3) compared to those supporting more prevention (nodematch=0.33).

Conclusion: Teachers cluster into distinct coalitions based on their prevention attitudes. Opposition to prevention is particularly cohesive, weakening collective enforcement of smoking rules. Ego-network analysis offers a feasible and valuable approach to study coalition dynamics in school settings, highlighting the need to consider social divisions when implementing school-based prevention policies.

The dynamics of personal belief networks

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Ideological polarisation is typically understood as differences in beliefs about societal issues. We propose that polarisation can manifest not just at the level of beliefs, but at the level of how individuals perceive belief relations. A person's beliefs are embedded and structured within a broader belief system—their personal belief network. Beliefs that are not aligned with the rest of the personal network create dissonance. Previous research has explored how dissonance induces belief change (node values) but has neglected how individuals update their perceptions of the relationships between the beliefs (edge weights). We present a model of belief network formation at the individual level based on two psychological drivers: social conformity—where observing the beliefs of others influences personal belief network edges—and internal coherence—where an individual weakens/strengthens edges between dissonant/coherent beliefs. By applying this model to panel data on the political beliefs of German, Dutch, and Austrian citizens, we infer the dynamics of individuals' personal belief networks. The model predicts which beliefs are most central in individuals' networks, depending on the interplay between social and internal pressures. Our findings suggest that personal belief networks have become more interconnected and ideological in recent years, and that the average networks of political groups have diverged, reinforcing partisan divisions. Individuals polarise not only in terms of their beliefs but also more fundamentally in terms of how they structure these beliefs and what they perceive as coherent. This aspect of polarisation can widen ideological divides and undermine social cohesion.

The Ideological Structure of American Belief Systems

Firdaous Sbaï

University of Toronto, Canada

This project seeks to map the dimensional structure underlying contemporary belief clusters in the US. Literature on American public opinion has long debated the extent to which the public is ideologically consistent. While understandings of American ideology are overwhelmingly operationalized with a liberal-to-conservative spectrum, scholars as well as recent polling data show that a plurality of Americans seem to fall outside of this dichotomy. Some recent research has then turned to belief networks and correlational analyses to understand opinion cooccurrence, without being restricted by a single-dimension ideology axis. However, this work often pre-selects highly polarized opinion areas. This can be useful to track trends in polarization, but it also artificially restricts the belief heterogeneity that can be measured. On the other hand, some recent studies use a large array of belief items, but focus on the trajectory of belief clustering (e.g., density and modularity) over time. Instead, my project focuses on the ideological contents of co-occurring beliefs. I use General Social Survey data from 2022, including all opinion questions, to inductively assess the latent dimensions organizing belief systems in the American public. I use a combination of belief network analysis - employing weighted ties to represent pair-wise absolute correlations between belief nodes - with dimensionality reduction techniques to map clusters of co-occurring beliefs and interpret the latent dimensions that organize them. The paper explores how a multidimensional ideological structure (particularly for the plurality of Independents) complicates some assumptions in works on ideological consistency and current polarization.

The Innovative Use of Ethical Scenarios in Values Education: The Impact of Social Networking among Young Students

Wayne CHAN

Hong Kong Metropolitan University, Hong Kong S.A.R. (China)

This study aims to explore the role of Al-generated ethical scenarios in values education with a focus on the students with different types of social networking. It attempts to divide the young students into the Al users of two types: one featured with inward-looking social networking while another with outward-looking social networking. The former is what this study described as bonding Al users while the latter as bridging Al users. Researcher would then look into whether and how these different Al users achieve certain acceptance of the positive and core values; for example, respect for others, commitment, integrity, empathy, and so on.

In order to examine the dynamic relationships between the different AI users and their formation of positive values, this study was designed to adopt qualitative research method of in-depth individual interview with the students. The research targets were Hong Kong's students aged between 15 and 18, and interviewees comprised a total of 30 students from 5 different schools. It was generally found that by using AI-generated ethical scenarios, the bridging users could more effectively operationalize the conceptual notion of positive values as various daily-life and practical issues for their understanding. On the other hand, the bonding users could be more capable of making use of AI-generated ethical scenarios by going through the inevitable ethical reasoning and then making the decisions that were reflecting the positive and core values. Overall, this study is expected to shed some light on the innovative delivery of values education that could better address the individual needs of students with different types of social networking.

OS-221: The role of networks in education and labor markets 3

Location: Room 202 Session Chair: Annatina Aerne Session Chair: Mattia Vacchiano Session Chair: Maria Prosperina Vitale

Unraveling the Impact of Peer Networks on Soft Skills: Insights from a High School Survey in Italy

<u>Maria Prosperina Vitale</u>¹, Nunzia Brancaccio¹, Marialuisa Restaino², Giancarlo Ragozini³ ¹Dept. of Political and Social Studies, University of Salerno, Italy; ²Dept. of Economics and Statistics, University of Salerno, Italy; ³Dept. of Political Sciences, University of Naples Federico II, Italy

Scholars highlight that peer interactions not only shape educational choices but also play a crucial role in developing social and personal competencies. A social network analysis approach offers valuable insights into how student relationships influence the acquisition of soft skills within the school environment. These skills—such as communication, collaboration, leadership, problem-solving, and emotional management—are increasingly

recognized as essential for academic success and professional growth. Within this framework, this study examines the impact of peer relationships on individual soft skills across different types of social interactions. Primary data were collected during the 2024–2025 academic year through a survey conducted in high schools across the Campania region in Southern Italy. The study employed a proportional quota sampling method, selecting 28 out of 324 schools and involving approximately 1,500 final-year students. A whole-network design was implemented to capture various dimensions of social interactions, with students identifying up to five classmates in four relational categories: best friends, academic support, personal advice, and discussions about future aspirations. The questionnaire incorporated the validated 3SQ psychometric scale, which assesses ten dimensions (e.g., trust, empathy, leadership, openness, collaboration, and autonomy). To evaluate the impact of social relationships on soft skill development, network models were applied to analyze how different types of interactions contribute to shaping specific competencies. The findings offer deeper insights into the role of peer influence in fostering essential skills for students' academic and personal growth.

Note: We acknowledge financial support under the National Recovery and Resilience Plan (NRRP), Mission 4, Component 2, Investment 1.1, Call for tender No. 104 published on 2.2.2022 by the Italian Ministry of University and Research (MUR), funded by the European Union – NextGenerationEU– Project Title From high school to university: Assessing peers' influence in educational inequalities and performances – CUP F53D23006150006- Grant Assignment Decree No. 1060 adopted on 07/17/2023 by the Italian Ministry of Ministry of University and Research (MUR).

OS-137: Gender and Social Networks 5

Location: Room 203 Session Chair: Elisa Bellotti Session Chair: Michelle Nadon Bélanger

The Intersection of Gender, Caste, and Class in South Asian Social Networks

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Scholars of gender recognise that identities are intersectional, with social networks shaped by multiple intersecting structures of distinction and exclusion. In South Asia, caste is one such structure, operating as a mechanism of stratification that not only regulates access to material resources but also conditions the formation and reach of social ties. While much scholarship has examined caste-based inequalities in economic and political domains, less attention has been paid to how caste and class shape women's social networks. Drawing on demographic, economic, and complete social network data from three field sites in rural South Asia—two in India and one in Nepal—this study examines how caste and class positionalities mediate women's social ties beyond kinship and household structures.

Initial insights suggest that upper-caste women experience a narrowing of social networks due to restrictions on physical mobility and severance from natal kinship ties, leading to networks concentrated within the marital household and affinal relations. In contrast, lower-caste women, while similarly disconnected from natal networks, cultivate broader external ties beyond kinship structures, facilitated by greater mobility and the necessity of engagement in labour and community-based resource sharing. Class further complicates this pattern: families' aspirations for social and economic mobility and differences in women's labour lead to substantial variation both within and across communities. By mapping these variations, this study highlights the intersection of caste, class, and gender in shaping women's social networks, offering a comparative perspective on the relational dimensions of social stratification in rural South Asia.

Trans Complex Healthcare (TCH) Pathways

Nolwazi Nadia Ncube, Martin Anderson, Mark McCann, George Burrows, Mahnoz Illias

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Introduction

The TCH Pathways study examines linear and non-linear pathways into and beyond the Gender Identity Clinic. The aim was to map out the social ecosystem including other NHS, private healthcare, community and third sector services; identifying common sequences.

Methods

An ego network design was used to collect data on participants (egos) and the services they accessed for transgender affirming healthcare (alters). Services were grouped into broad categories, such as GPs and Gender Identity Clinics. Directed edges between alters were captured to represent referral pathways. Distinct pathways were counted. A

single network was created to include all identified referral types, weighted by frequency of occurrence. Logistic multilevel modelling was used to predict the ego and alter level characteristics associated with service ratings.

Results

GPs were a frequent point of contact and referral to elsewhere, particularly direct referrals from GP to trans affirmative care, counselling, and GICs. However, there is a frequent GP to GP pathway, indicating a loop of multiple GP visits before being referred elsewhere. There is a notable pathway from GIC to trans affirmative care (albeit the long waiting lists). Statutory organisations seem to refer the patient-participant to informal support significantly. Finally there is a repeated referral between different forms of informal support. These complex healthcare pathways are a result of prolonged waitlists; symptomatic of an 'Ailing administration' that TNB and gender questioning people have grown to mistrust. As a result they take recourse to other hormone sources and ensuring that they present an acceptable gender story in order that they would be referred to the GIC by a GP and psychiatrically diagnosed so that they can be progressed to specialist services and receive gender affirming care.

The Interplay of Female Leadership and Board Interlocks on Corporate Governance in UK companies.

Claudine Salgado, Heather McGregor, Dimitris Christopoulos

Heriot-Watt University, United Kingdom

This study investigates the impact of board interlocks on the relationship between female-chaired boards and corporate governance in UK companies, using both agency and resource dependency theories as theoretical frameworks. The research explores whether board interlocks, particularly those formed by companies sharing female directors, can mediate or enhance the association between female leadership on boards and governance scores. The findings suggest that board interlocks do not act as a moderator but rather as a positive amplifier, boosting the relationship between female-chaired boards and corporate governance scores. Specifically, companies with female chairs and board interlocks involving both male and female directors tend to exhibit higher corporate governance scores. This indicates that interlocks between companies can enhance the positive effects of female leadership on governance. In contrast, the analysis reveals that board interlocks involving only female directors do not show significant effects, and for companies with male chairs, an increase in interlocks with female directors results in a decrease in governance scores. The study also contrasts the perspectives of agency theory, which views board interlocks as detrimental due to the potential dilution of directors' monitoring capacity, with resource dependency theory, which regards interlocks as beneficial sources of knowledge and resources. The results underscore the importance of both the type and extent of board interlocks, particularly those involving a mix of male and female directors, in shaping corporate governance outcomes. Ultimately, the study contributes to understanding how the board interlocks, especially when combined with gender diversity, influence corporate governance structures.

OS-43: Network Indicators for Group and Team Performance

Location: Room 204 Session Chair: Brian Rubineau

Do Leadership Networks Predict Team Dynamics? Analyzing Cohesion and Communication in Sports

<u>Alexander Ochoa</u>, Devika Kumar, Alyssa Mendoza, Isabella Leone, Jalyn Correia, Mot Dhanaprasidhikul University of San Francisco, United States of America

Understanding how leadership functions within teams is critical to improving cohesion, communication, and overall performance. While prior research has focused on psychological and behavioral indicators of effective teams, less is known about how network structures of leadership evolve within teams and whether specific patterns correspond to stronger team dynamics and performance outcomes. This study applies social network analysis (SNA) to examine leadership structures in collegiate sports teams across multiple seasons.

Using a valued network approach, we analyze pre- and post-season leadership nominations alongside measures of team cohesion (GEQ) and communication effectiveness (SECTS) to explore whether network properties—such as density, centralization, reciprocity, and leadership stability—correlate with reported team dynamics. Leadership stability is assessed through the persistence of leadership nominations over time, identifying whether teams maintain consistent leadership structures or experience frequent shifts in who is perceived as a leader.

By tracking how leadership roles emerge and evolve over a season, this research investigates whether highly interconnected leadership structures promote stronger cohesion and adaptability or if certain network patterns, such as over-centralized leadership, present challenges for team function. The study contributes to ongoing discussions

on network indicators of group effectiveness and offers insights into how leadership development can be assessed through structural rather than purely psychometric measures.

Findings from this research have implications for coaches, organizations, and scholars interested in optimizing leadership structures and fostering effective team environments.

Dynamic Events & Performance In Healthcare Team Networks: An Application of the HREM

Mark David Tranmer¹, Mary Lavelle², Beth Fylan³, Juergen Lerner⁴, Janet Anderson⁵

¹University of Glasgow; ²Queen's University Belfast; ³University of Bradford; ⁴University of Konstanz; ⁵Monash University

Interprofessional teamwork is critical in healthcare. However, research to date neglects the dynamic aspect of teamwork from a network perspective. Through analysis of a data on 17 inter-professional teams, managing simulated medical emergencies, we describe and apply the Hierarchical Relational Event Model (HREM) to investigate: the network features of dynamic clinical teams; the similarities and differences in these features across teams; the impact of professional groups, and discuss ways to the relationship of network dynamics with externally assessed clinical performance. The results have implications for team training in healthcare and designing interventions for improving healthcare teams.

Boosting Surgical Team Performance: Insights from Social Network Analysis

<u>Giulia Verdoliva</u>¹, Andrea Fronzetti Colladon²

¹University of Perugia, Italy; ²Roma Tre University, Italy

In recent years, the healthcare community has increasingly recognized the need for innovative approaches to enhance both clinical outcomes and the experiences of patients and employees. Among these, Social Network Analysis has emerged as a powerful tool for optimizing healthcare performance.

This study examines key factors influencing the performance of surgical teams, focusing on team composition within a large hospital setting. Analyzing data from more than 20,000 surgeries performed over the past five years, we build two distinct networks: one representing surgical team members and their connections based on the number of joint procedures, and another mapping individual surgeries as network nodes, connected through shared team members.

Our findings reveal significant associations between network centrality measures and surgical performance metrics, such as deviations from optimal procedure durations. In addition to traditional metrics like Betweenness and Closeness centralities, we analyzed the network positions of both employees and surgery nodes using innovative measures, including Distinctiveness Centrality and Rotating Leadership, to assess team efficiency and dynamics. Results provide valuable guidance for researchers and healthcare facility managers, demonstrating how network analysis techniques can inform more effective surgical scheduling and workforce management. By leveraging network-based strategies, hospitals can enhance patient care quality and efficiency.

Acknowledgments

This research project was funded under the agreement between the Department of Engineering of the University of Perugia and the USL Umbria 2 company, having as its object the "Development of efficiency models, both economic and in terms of service level in the management of production and organizational processes and in the management of patients in a complex health care facility".

The funding organizations had no role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Social Relatedness in Primary Care Teams and Health Outcomes and Costs for Patients with Cardiovascular Disease

Marlon Mundt

University of Wisconsin-Madison, United States of America

Context: Primary care teams play a critical role in providing high-quality value-added care to patients with cardiovascular disease (CVD). However, limited evidence exists on how social relatedness within primary care teams—defined as a sense of belonging and connection within the team beyond simple work interactions— contributes to the team's ability to deliver high-quality CVD care at lower medical costs. This study fills this gap in

the literature by investigating how social relatedness within care teams relates to CVD care delivery in US primary care settings.

Objective: To evaluate the association between social relatedness within primary care teams and healthcare utilization outcomes and medical costs for patients with cardiovascular disease.

Design: A total of 143 physicians and staff from five urban, suburban, and rural primary care clinics in Wisconsin completed a sociometric survey regarding how well they knew other team members. The survey asked, "Would you say that you and the other clinicians and clinic staff know about each other's personal lives (e.g., family, hobbies, and interests outside of work)?" with a yes/no response. A dichotomous (0/1) social relatedness matrix was created for each team, and the density of social relatedness within each team's social network was calculated based on the survey results. Cardiovascular disease diagnoses were identified by the presence of two validated ICD-9 codes (401.0–401.9, 428.00–428.02, 414.01, 430.0–438.9, 410.9, 427.89) on two separate occasions within the past three years. Health outcomes for patients with cardiovascular disease, including urgent care visits, emergency department visits, and hospital days in the past 12 months, were extracted from electronic health records (EHRs). Healthcare-related costs were estimated by applying average medical expenses from published reports to the utilization counts. A three-level generalized linear mixed model (GLMM) was used to assess the relationship between the density of social relatedness within team social networks and healthcare utilization and costs for the team's patients with cardiovascular disease (N = 6,534). The model adjusted for patient-level covariates (age, gender, insurance status, diagnoses, and comorbidities including the Charlson Comorbidity Index) and clinic-level fixed effects.

Results: The density of social relatedness within team social networks ranged from 0.26 to 0.58, with a mean of 0.41 (SD = 0.09). A one standard deviation increase in team social relatedness density was associated with 23% fewer urgent care visits (OR=0.77, p=.034), 31% fewer emergency room visits (OR=0.69, p=.017), 39% fewer hospital days (OR=0.61, p=.001) and \$390 lower health care costs (95%CI: [\$159, \$621], p<.001) for the care team's patients with CVD in the past 12 months.

Conclusions: Interventions aimed at fostering stronger social relatedness and a sense of belonging within primary care teams may be a cost-effective strategy to improve the quality of care for patients with cardiovascular disease and reduce associated medical costs.

Cultural and temporal structural holes: empirical evidence of broker behavior in cross-cultural global virtual teams

Marc Idelson¹, Yuki Yasuda²

¹HEC Paris, Morocco; ²Kansai University, Japan

Focus of Sunbelt 2025 communication.

We plan to share our structural analysis of broker behavior within global virtual teams working simultaneously and independently on a standardized set of tasks over a set period in order to produce a standard output. The 4,135 team members, based in 88 countries, were assigned to 924 teams randomly at session start. 824 successfully produced a report.

For this prime exploration of the first dataset in this context designed from a network perspective, we will limit our empirical investigations to static structural multilevel network analysis, including node, structural, dyadic, and triadic traits (e.g. network constraint, density, mutual tie density, or asymmetric triad ratio) and their mutual interplay with team-level traits (such as cultural breadth, time zone range, report creativity, or report quality) and individual traits (such as negative affectivity, cultural intelligence, or English fluency), focusing specifically on brokerage potential.

Among the novel hypotheses to be explored are :

- cultural structural holes predict leadership roles;
- temporal structural holes moderate perceived leadership effectiveness;
- work relationship structural holes has a curvilinear effect on team task performance.

Empirical context.

Several times a year, X-Culture operates a two-sided platform where undergraduate and postgraduate students produce in global virtual teams an international business plan for an existing company to enter a new country with an existing or new offer. At session start, the X-Culture platform forms teams with 5 or 6 members, based in 5 or 6 countries. Participants fill an initial survey prior to team assignment. For the next 8 weeks, team members progress on intelligence gathering, analysis, and report writing, and fill surveys weekly within which they assess their peers.

After the team files its report, a final survey with more peer assessment is undertaken to wrap up the session. An exclusion process also exists.

In order to study brokerage causes and effects, we collected 14,700 non null peer-to-peer data sets measuring, per our specifications, closeness of working relationship, frequency of communications, coordination and leadership roles, and conflict, as well individual traits such as Big5. Peer-perceived creativity, amiability, topical expertise, English fluency, and cultural intelligence, among others, were also measured during the session.

OS-38: Network Analysis for Textual Data in Social Media

Location: Room 206 Session Chair: Giuseppe Giordano Session Chair: Maria Prosperina Vitale

Enhancing Sentiment Analysis Using Formal Linguistic Tools

Mario Monteleone^{1,2}

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Generative Artificial Intelligence (GAI) text production is crucial to research fields as Data Science (DS) and Network Textual Data Analysis (NTDA), the main purposes of GAI being to simulate human language production, exploiting both Machine Learning (ML) and Large Language Models (LLMs).

However, as pre-trained probabilistic models, LLMs are biased when built on non-perfectly balanced data as for retrieval sources, taxonomy, ontology interconnections and linguistic inference. This is most relevant to DS and NTDA, as it can contribute in social media to spreading fake news, conspiracy theories, counterproductive narratives, and online hate speech. Equally relevant is GAI being devoid of a reality formal model (Pearl and Mackenzie, 2018), causing GAI to have no ethics, as it cannot identify and correct its inaccuracies. This brings LLMs and GAI to suffer from effectiveness and reliability issues, showing tendency to prompt incorrect and discriminatory information, and hallucinations.

Newborn Neuro-Symbolic Artificial Intelligence (NSAI) tries to cope with these issues building elementary ontologies to integrate human symbolic reasoning principles with ML and Artificial Neural Networks (ANNs). Here we will demonstrate that better results come integrating also formalized morphosyntactic and semantic information, as those relating to Italian negation grammar. Therefore, to tackle on-line hate speech, we propose here a method of Sentiment Analysis (SA) that uses NooJ software (Silberztein 2016) to build formal ontologies and syntactic grammars within graphs representing finite state automata/transducers. While ontologies will conceptualize sets of word having contiguous contextualized meanings, syntactic grammars will parse texts using Italian formalized morphosyntax and semantics.

Considerations and Challenges in Dealing with Online Italian Content Related to Social Issues: Constructing Datasets of Online Opinions for Human Annotation.

Alex Cucco¹, Emiliano del Gobbo², Lara Fontanella¹, Sara Fontanella³, Luigi Ippoliti¹

¹University G. d'Annunzio Chieti-Pescara; ²University of Foggia; ³Imperial College London

Ensuring a diverse representation of opinions, sentiments, and topics in social discourse is essential when curating data for machine learning and statistical models, particularly in contexts requiring explainability. Online comments offer a rich source of public opinion; however, they often exhibit an imbalanced distribution of perspectives, amplifying specific viewpoints while underrepresenting others. Such biases can lead to unfair models that reinforce stereotypes and reduce the reliability of analytical outcomes.

To address this challenge, we propose an approach able to capture a wide spectrum of sentiments and topics, facilitating the creation of a balanced dataset for human annotation and further analysis. Our approach focusses on targeted sampling strategies leveraging on network analysis and node sampling techniques to ensure comprehensive topic and sentiment representation.

We illustrate the effectiveness of this method through a simulated case study and an application analyzing online discourse on migration, leveraging social media data. We introduce a refined sampling technique aimed at improving coverage across different viewpoints. By adopting this approach, we seek to support the development of fair and transparent models capable of accurately interpreting complex social debates.

Enhancing Sentiment Analysis Using Formal Linguistic Tools

Mario Monteleone

Dipartimento di Scienze Politica e della Comunicazione, Università degli Studi di Salerno, Italy

Generative Artificial Intelligence (GAI) text production is crucial to research fields as Data Science (DS) and Network Textual Data Analysis (NTDA), the main purposes of GAI being to simulate human language production, exploiting both Machine Learning (ML) and Large Language Models (LLMs).

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Exploring Semantic Networks to Assess Latent Attitudes Toward Migrants

Alex Cucco¹, Lara Fontanella¹, Giuseppe Giordano², Michelangelo Misuraca², <u>Annalina Sarra¹</u> ¹University "G.d'Annunzio" of Chieti-Pescara, Italy; ²University of Salerno

The growing influence of social media platforms has provided an unprecedented opportunity to assess public sentiment and attitudes toward various social issues, including migration. While traditional methods, such as questionnaires, are commonly used to retrieve latent traits about attitudes, the increasing volume of free text on social media presents a dynamic, alternative data source. Questionnaires that include both open-ended responses and scales such as the Semantic Differential and the Bogardus Social Distance Scale allow for the measurement of respondents' attitudes and their similarity-based semantic expressions in free text regarding migration. These latent traits, estimated through models like the Graded Response Model (GRM) within Item Response Theory (IRT), offer valuable insights into public perceptions. However, social media comments provide an additional layer of data, capturing spontaneous expressions and shifting sentiments in real time.

This study aims to explore the connection between latent attitudes derived from questionnaire responses and the language used in social media posts. By evaluating the semantic networks within public comments, the study investigates whether the latent traits of social media users can be inferred from their online discourse. This approach leverages publicly available data to assess migration-related attitudes, an area traditionally reliant on structured surveys. Specifically, the study examines the potential of textual network analysis for this purpose and evaluates a semi-supervised approach to improve the assessment of online latent traits.

How to Trigger Public Figures' Engagement on Social Media

Shahar Lavian¹, Gilad Ravid¹, Alon Bartal²

¹Industrial Engineering and Management Department, Ben Gurion University of the Negev, Israel; ²The School of Business Administration, Bar-Ilan University

Public figures such as celebrities, politicians, and influencers who post online attract numerous replies from users but only respond to selective users. The factors influencing public figures' selective engagement are largely unknown. We analyzed a dynamic network of public figure interactions with specific users who replied to posts of a public figure. These networks are sparse since most users' replies to the original posts of a public figure remain unaddressed by the public figure. Given a user who replied to an original post of a public figure, our goal is to predict if a public figure will engage with a user's reply. To define this population, we employed a filtering methodology using ranking lists from reputable sources, such as Forbes and TIME, alongside an American filter. This approach ensures that the selected public figures hold significant influence and visibility, making their engagement behavior on social media particularly relevant for the study.

We analyzed 250,000 user replies to posts originated by public figures on X, collected between 2022 and 2024. Each user reply is labeled as 'engaged by the public figure' (1) or not (0), allowing a systematic examination of engagement patterns. To explore potential homophily in digital discourse, we construct a multi-dimensional user similarity graph incorporating linguistic features, emotion intensity, and temporal engagement patterns. We apply k-nearest neighbors (k=50) to link users who communicate in similar ways, filtering edges based on cosine similarity (<0.3). Our network analysis reveals a high assortative coefficient (0.6799), suggesting strong homophily. Users with similar emotional tone, linguistic complexity, and response timing tend to receive similar levels of engagement from public figures.

To predict whether a public figure will respond to a user reply, we trained 3 classifiers, incorporating network-based attributes, emotion-based attributes, and time between a post and a reply. We trained XGBoost, Random Forest, and a Hybrid Siamese Convolutional Network (HSCNN). XGBoost outperformed all other models with an ROC-AUC score of 0.96. The most important predictive factors include the time interval between an original post and a reply, the intensity of anger expressed in the reply (dominant anger levels), and the complexity of language used (lexical diversity). We find that public figure engagement is shaped by systematic patterns in user communication styles and response behaviors.

By integrating social network analysis with predictive modeling, this research advances our understanding of the selective engagement of public figures in online discourse. Future work should explore temporal evolution in engagement homophily and examine cross-platform variations in reply behaviors.

OS-165: Network and Music: Empirical Approaches 2

Location: Room 105 Session Chair: Myriam Boualami

Genre complexes and cultural globalization: A network approach

<u>Tod Stewart Van Gunten</u>, Aybuke Atalay University of Edinburgh, United Kingdom

Genres are aesthetic and social categories that organise the production and consumption of cultural objects, such as music. Previous research has described genre complexes in music and examined how genre unconventionality relates to the success or failure of musical styles. This paper will extend these approaches by asking how genre complexes influence cultural globalization using a network analytic approach to defining the genre space. We use data from Spotify on the daily top 200 most streamed songs from 68 countries between 2017 and 2021 (about 100,000 songs and 38,000 unique artists). Spotify assigns multiple genre labels to artists; our data include about 3000 unique degree descriptors. To reduce the dimensionality of these genre data, we define a bipartite artist-genre network and community detection methods to identify genre complexes, or clusters. The analysis explores the robustness of this approach to different community detection methods. To determine how genre affects cultural globalization, we define cultural success at the global scale as the number of countries in which a song reaches the top 200 (or alternative thresholds). We estimate zero-inflated negative binomial models of this county count outcome using these network-defined genre complexes as a key predictor. We find that genre complexes substantially explain variation in global cultural success.

Groove Robbers: The Impact of Copyright Litigation on Artists' Collaboration Networks in Music

Arushi Aggarwal¹, Elisa Operti²

¹ESSEC Business School, France; ²ESSEC Business School, France

Abstract

This study examines the impact of **negative ties**, specifically copyright litigation, on artists' collaboration networks in the music industry. While negative ties, such as lawsuits, are typically associated with reputational damage and social isolation, we argue that they can also serve as catalysts for network reconfiguration and growth. Using a quasiexperimental matched units difference-in-differences (DiD) design, we analyze collaboration patterns of Billboard Hot 100 artists before and after they were sued for copyright infringement. The dataset includes 242 artists (121 sued, 121 matched controls) and 3,400 artist-year observations, with collaboration data sourced via web scraping from MusicBrainz. Our findings suggest that lawsuits trigger a process of **network repair**, wherein sued artists expand their collaboration networks to counteract the negative repercussions of legal disputes. However, this expansion is not uniform; sued artists are more likely to collaborate with **less experienced** and **differently specialized** alters, who perceive greater benefits and lower risks in such partnerships. These results contribute to the literature on **negative ties** by demonstrating how event-type disruptions interact with state-type ties, influencing both animosity and collaboration. Additionally, this study advances research on creativity by showing how copyright disputes shape artistic collaboration beyond legal consequences. By bridging theories of **negative ties**, network evolution, and creative industries, our findings offer novel insights into the unintended yet strategic responses artists adopt in the face of reputational threats.

Music Production and the Structuring of Collaborative Networks: Relational and Creative Dynamics Between Rappers and Beatmakers in Moroccan Rap

Ines Oudadesse^{1,2}

¹Université Sorbonne Paris Nord, France; ²LabSIC

This presentation is part of the exploratory research for my doctoral thesis on the international circulation of rap music from Morocco and Egypt, and aims to present the initial findings related to the question of collaborations between rappers and beatmakers and the dynamics of creative innovation in their musical practices

The digital age has profoundly transformed the dynamics of musical production and its processes, especially with the rise of digital production software (Walzer, 2016), and the advent of social media that are reshaping interactions between players in an industry where relational connections play a central role (Budner & Grahl, 2016). These technological tools provide artists and beatmakers with new means to foster creativity and integrate collaborative networks.

The central question in this study is therefore:

How do the dynamics of musical production and the relationships between artists and producers stimulate creative innovation and structure collaborative networks?

This research focuses on the Moroccan rap scene and examines two axes: the relationships and power relations between rappers and beatmakers in the context of their collaborations; and the innovation aspect in these players' creative practices (particularly through computer-assisted music software). This study seeks to understand how these dimensions influence the evolution of collaborative networks and new forms of musical creation.

The study will be based on interviews with five Moroccan rappers and five beatmakers, an analysis of specific collaboration cases based on these discussions, and a literature review on innovation in the creative field as well as artist-producer relationships.

Networked Tastes: Music Preference Similarity and Evolution in Online Listening Behaviors

Marta Moscati², Xinwei Xu¹, Markus Schedl²

¹ETH Zurich, Switzerland; ²Johannes Kepler University Linz, Austria

Information on social networks has been incorporated into music recommendation systems to improve music recommendation quality. The underlying assumption is that social connections between users indicate similar music listening profiles. Existing cultural sociological research supports the notion that one's network patterns correlate with one's taste profiles. However, the questions of to what extent preference similarity relates to social connectedness, and whether social connections broaden users' consumption profiles, are both underexplored. Our work aims at filling these gaps by answering the following research questions. (1) Does music taste similarity correlate with social connectedness? Can we predict users' taste similarity based on their social closeness, and vice-versa? (2) How do music tastes evolve over time and to what extent does the evolution relate to social connections? We address these questions with a quantitative analysis of a large-scale dataset of 17,680 users of Last.fm. The dataset includes following-follower relationships information as well as users' listening events. Our findings will reveal whether social proximity is a reliable predictor of music preference similarity, and whether social networks facilitate or constrain music exploration. These insights on how social networks shape cultural consumption patterns will inform the design of more socially aware music recommendation systems.

Regional Identity in Music Production: Mapping Collaborative Networks in Beijing's Music World Shan Shi

The University of Manchester, United Kingdom

Beijing has long been the center of China's independent music ecosystem. However, uneven regional development and the household registration system (hukou), which ties access to social resources to one's registered place of residence, shape musical practices within the scene, where Beijing locals hold a relatively distinct advantage nationwide. This research investigates the role of regional identity in shaping collaborative networks among artists and support personnel in Beijing through a case study of BADHEAD, a sub-label under Modern Sky, one of China's most influential music companies. BADHEAD has been instrumental in promoting rock-infused alternative music since 1999. By examining the collaborative networks formed by all artists and support personnel involved in BADHEAD's album productions from 1999 to 2023, this research explores how regional identity influences the formation and dynamics of these networks.

Using a mixed-methods approach, this study constructs a relational database from the credits of albums released by BADHEAD during this period. Exponential Random Graph Models (ERGMs) are employed to model the networks. The study also incorporates archival materials on the history of Chinese music and interviews with participants. This research examines whether the collaborative networks evolve to exhibit a "local-nonlocal" divide over time and whether nonlocal musicians rely more on institutional support compared to their local counterparts.

This research sheds light on how structural inequalities embedded in regional identity intersect with music production, contributing to a further understanding of the interplay between social institutions and artistic collaboration in creative industries.

OS-195: Social networks and health in low- and middle-income setting 2

Location: Room 106 Session Chair: Maya Ronse Session Chair: Claudia Nieto-Sanchez

Peer and personal transactional sex among men in rural Uganda: population-based, sociocentric social network study

<u>Sarah Sowell Van Dyk</u>¹, Alison B. Comfort², Emily N. Satinsky³, Scholastic Ashaba⁴, Charles Baguma⁴, Bernard Kakuhikire⁴, Viola Kyokunda⁴, Benjamin Martin Tweheyo⁴, Alexander C. Tsai^{5,6,7}, Jessica M. Perkins^{1,8}

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Background: Transactional sex is a critical public health concern given its associations with HIV/STI transmission and sexual violence. Little scholarship has focused on social networks as drivers of transactional sexual behavior.

Methods: We collected sociocentric network data from all adult men (age ≥18 years) who resided in eight villages in southwest Uganda. Network ties were elicited through five locally-adapted name generator questions on health, financial, emotional, food sharing, and leisure relations. Our outcome was self-reported engagement in transactional sex (i.e., exchanging money or gifts for sex) in the last year. Explanatory variables were having at least one male alter who engaged in transactional sex, total out-degree, perpetration of violence against women, and adverse childhood experiences. We used a multivariable logit regression model with cluster-correlated robust standard errors to estimate the association between transactional sex and these explanatory variables, adjusting for age, age at sexual debut, HIV status, marital status, and education.

Results: Of 791 participants, 93 (12%) engaged in transactional sex; and 240 (44%) had at least one male alter who had engaged in transactional sex. Participants with an alter who engaged in transactional sex were more likely to engage in transactional sex themselves (adjusted odds ratio [AOR]=1.91, 95% CI 1.13-3.23). Perpetration of violence against women (AOR=2.37, 95% CI 1.49-3.78) and adverse childhood experiences (AOR=1.12, 95% CI 1.01-1.25) were also associated with engaging in transactional sex.

Conclusion: Peer behavior may be an important driver of men's engagement in transactional sex, suggesting the need for network-based, sexual health interventions.

Social network typologies and sexual and mental health in rural South African youth

Dorottya Hoor¹, Vuyiswa Nxumalo², Guy Harling¹ ¹UCL, United Kingdom; ²AHRI, South Africa

There has been substantial research on the impact of social relationships on health. However, most studies focus on isolated aspects of individuals' social networks, e.g., size, contact frequency, composition or perceived support. And most are conducted in high-income settings. We therefore examined personal network data from 1176 rural South Africans, mostly young adults, and used a network typology approach to simultaneously account for structural (size, density, overall support) and compositional (gender, location, kin) network characteristics. Using Wards-linkage hierarchical clustering we identified four distinct network types: single-alter low support, few-alters low support, fewalters moderate support and many-alters high support. We then used regression models adjusting for sociodemographics to assess the association of network types with key sexual and mental health outcomes: HIV and HSV-2 serostatus; risky sexual behaviour; self-reported knowledge of, misinformation on and capacity for safe sexual practices; and mental health and wellbeing. We found that while many-alter high support individuals were not less likely to be living with HSV-2 or HIV, they had the best mental wellbeing and were at lowest risk for almost all sexual health risk factors. In contrast, individuals with low support networks had significantly higher sexual risk behaviours and poorer mental health. These findings highlight the potential for identifying at-risk youth based on social network characteristics, even in a population with limited overall social support and very high health burden. They also suggest that social networks may play an important role in mitigating sexual and mental health harm amongst youth in resource constrained settings.

Social Networks as Relational Wealth: Food Insecurity Among Pregnant and Postpartum Tharu Women in Nepal During the COVID-19 Pandemic

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Food insecurity disproportionately affects pregnant and postpartum women, particularly those in structurally marginalized communities. Social networks are known to buffer against food insecurity, yet their role during crises remains understudied, particularly in low- and middle-income country contexts. This study explores the lived experiences of food insecurity among indigenous Tharu women in Nepal during the COVID-19 pandemic, with a focus on the structural and qualitative aspects of their social networks. Drawing on semi-structured interviews with ten women, we employed thematic analysis to examine how social networks shaped pathways into, experiences of, and coping strategies for food insecurity. Findings highlight how pre-existing structural vulnerabilities, including gendered power relations, economic dependency, and restrictive cultural norms, were amplified during the pandemic, increasing reliance on social ties that, in some cases, failed to provide support. Women with strong kinship-based networks exhibited greater resilience, leveraging relational wealth, the collective resources embedded in their social ties, to mitigate food insecurity. However, disrupted networks and negative social ties, particularly within patrilocal households, exacerbated food insecurity and emotional distress. Our results underscore the importance of incorporating social network-based interventions into maternal and child health programs, particularly during periods of crisis. Applying a qualitative social network approach, this study contributes to understanding how intersecting vulnerabilities shape women's ability to navigate food insecurity and highlights the critical role of social networks as both protective and constraining forces.

Comparing Peer Leader and Friendship Networks in a School-Based Smoking Intervention in Southeast Asia

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¹University of Glasgow, United Kingdom; ²Gadjah Mada University, Indonesia; ³De La Salle University, Philippine; ⁴University of Stirling, United Kingdom; ⁵Evidence to Impact, United Kingdom This study examines the structural similarities and differences between opinion leader and friendship networks in a 2024 school-based smoking intervention in the Philippines and Indonesia. It explores how these networks may shape the spread of intervention messages, as intervention participants are embedded within them. Prior research in the US and Europe suggests that selecting either popular or trusted students as peer leaders effectively reduces health-risk behaviours. However, it remains unclear whether these strategies function similarly across different cultural contexts and how peer leader networks compare structurally to organic friendship networks.

Two key questions guide the study: (1) How do the structural properties of peer leader and friendship networks differ? (2) How do these patterns vary across schools and countries? ERGMs are used to model tie formation based on network properties, homophily in student attributes, and individual nodal characteristics such as gender and smoking behaviours.

Preliminary findings suggest that network structures show modest variation between peer leader and friendship networks within schools. Students with extremely high in-degree do not form significantly more ties in either network. While both friendship and peer leadership networks exhibit similar densities, peer leader network contains more closed triads. Smoking and gender homophily are key drivers of friendship ties, whereas peer leader nominations in the studied schools are less influenced by these factors. This indicates that while peer leadership networks share some structural features with friendship networks, their formation mechanisms differ, offering insights for optimising intervention message dissemination in schools.

Network Size and Adoption of Novel Exogenous Information in Rural Honduras

<u>Ana Lucia Rodriguez de la Rosa, Ana Karina Raygoza Cortez</u>, Marne Decker, Nicholas A. Christakis Yale University, United States of America

For at least two centuries, the idea that population (or network) size would be a necessary asset for the acquisition and maintenance of complex socio-cultural knowledge at the population level has been generally accepted (Simmel, 1902; Carneiro, 1986). In the past 20 years, fields ranging from archeology (Shennan, 2001; Powel et. al. 2009; Marquet, et al., 2012; Vaesen, et.al., 2016; Collard et al., 2005; Henrich, 2017) to psychology (Caldwell, et. al, 2010; Kempe, et al, 2014; Muthukrishna et al, 2014) have explored this topic with experimental, modelling, observational, and social network analysis designs. This work has sustained an ongoing debate about the relevance of population size, including as it relates to how complex tasks or knowledge might actually be defined in diverse settings. Here, we use uncommon data from a field experiment that involved the implementation of a maternal and child health intervention in a long-duration RCT (Christakis & Airoldi, 2024). We also implemented a participatory methodology in which local community experts (N=15) were part of a consensus-building workshop (Brown & Isaacs, 2005) and ranked the knowledge outcomes included in the RCT as "easy" or "hard to remember" and as "complex" or "simple to learn." Hence, using data for 8,050 people in 88 villages of varying sizes (20 to 400) in Honduras, we tested the relationship between population size and health knowledge uptake at the population level with respect to 18 diverse health attitudes and beliefs (ranging from newborn care to respiratory illness prevention, and of varying levels of complexity), measured over 8 years. After controlling for demographic, social network, and village characteristics, we find that population size did not affect knowledge uptake or persistence, regardless of the level of complexity of the outcomes. In the context of traditional, rural, and resource-limited populations living in a Low- and Middle-Income Country, our findings contradict the notions supported by social learning theory, diffusion of innovation theory, and demographic assessments that assert that having a larger pool of individuals to share newly acquired knowledge and beliefs would enable populations to adopt and sustain more complex and difficult forms of knowledge. Our work adds to the ongoing debate regarding population size and cultural evolution through a real-world experiment in the context of face-to-face social networks.

Identification of venues for HIV prevention interventions through overlapping HIV transmission and venue elicitation networks

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Background

Assessing the overlap between venue and HIV molecular networks can guide targeted interventions, potentially disrupting transmission.

Methods

From 07/2019-12/2022 persons newly diagnosed/living with HIV in Mexico City participated in a survey (asking where they met sex partners) and donated a blood sample. HIV partial pol sequences obtained via Sanger sequencing were used to infer a molecular network (pairwise genetic distance threshold <1.5% using Seguro HIV-TRACE). Individual risk scores were classified by sexual risk (sexual minority identity, drug use during sex, and <100% condom use). A value of '1' was assigned to each (index averaging 0-3). Degree, eigenvector centrality, and compactness were characterized to assess venue co-affiliation network structure. Chi-squared tests and ANOVAs were used to compare the population by cluster status.

Results

Among 7502 participants, 50.9% were in HIV clusters, and 14.7% named venues. Participants in HIV clusters were significantly more likely to name venues (χ 2(1)=24.3,p<0.001). Participants who named internet cafes had the highest mean risk score (Mean=1.67,SD=0.50), followed by nightclubs/bars (Mean=1.65,SD=0.59) and cabinas (Mean=1.59,SD=0.64). Sex work streets, community centers, and markets had the largest proportion of people in HIV clusters. The overall median degree, eigenvector centrality, compactness scores for venues were 15, 0.05, and 0.01. Public transportation had the highest degree and eigenvector centrality (indicating it is both popular and connects people), and community centers, centro commercial, and internet cafes had the highest compactness score (indicating nominations by an insular group).

Conclusion

Engaging both public transportation and internet cafes in HIV prevention interventions would be highly effective.

OS-37: Negative Ties and Signed Graphs

Location: Room 107 Session Chair: Giuseppe Labianca Session Chair: Zachary Neal

Dynamic media bias: evolving the political leaning of a media organization in response to perceptions in a network of political allies and opponents

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Evidence suggests that consumers prefer media products that align with their political beliefs. Hence, a media organization is economically incentivized to tailor their output to the political leanings of their consumers. At the same time, consumers shape their perceptions of the political bias of a media organization by reacting to published outputs (e.g. daily newspaper editorials) and observing each other's opinions (e.g. as conveyed on social media). Hence, there is a two-way feedback loop between networked consumers and the media organization, which controls how media bias and people's perceptions about it co-evolve.

To model the above scenario, the complex problem of inferring the political bias of a media organization is mapped onto the idealized problem of inferring the evolving bias of a coin. A network of Bayesian learners is constructed, where the beliefs of each agent about the coin bias obey a probability distribution. The beliefs are updated in response to (i) observations of the coin toss, and (ii) "peer pressure" from political allies (positive ties) and opponents (negative ties). Simultaneously, the coin (media organization) "surveys" the agents by sampling their beliefs and shifts its bias towards the sample mean. Monte Carlo multi-agent simulations are conducted to study the co-evolution of the bias and beliefs and answer important two-sided questions about the long-term behavior, e.g., (i) does the bias stabilize or fluctuate? And (ii) do the beliefs exhibit turbulent nonconvergence or intermittency, as for a static coin?

Exponential-family models for signed polytomous networks

Alberto Caimo, Isabella Gollini

University College Dublin, Ireland

Modelling signed polytomous network data is crucial for understanding complex relational structures in systems where edges between nodes vary not only in strength (multiple weight categories) but also in nature (positive or negative associations). Such networks are common in fields like social networks, political alliances, and collaborative systems, where interactions can have both supportive and adversarial dynamics.

We introduce a novel framework based on exponential-family random graph models for signed polytomous networks, where the joint probability of the network is modelled as the product of two components: a baseline categorical process that captures the unweighted signed connectivity structure, and a conditional dissolution process that models the dynamics of edge dissolution based on the polarity of connections. To estimate model parameters and make inferences, we adopt a comprehensive Bayesian approach, offering flexibility in modelling and robust uncertainty quantification. We demonstrate the effectiveness of our model through empirical analysis on real-world signed polytomous networks, showcasing its utility for relational inferential tasks.

Information dissemination and confusion in signed networks

Eckhard Steffen¹, Ligang Jin²

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We introduce a model of information dissemination in signed networks. It is a discrete-time process in which uninformed actors incrementally receive information from their informed neighbors or from the outside. Our goal is to minimize the number of confused actors - that is, the number of actors who receive contradictory information.

We prove upper bounds for the number of confused actors in signed networks and in equivalence classes of signed networks.

In particular, we show that there are signed networks where, for any information placement strategy, almost 60\% of the actors are confused. Furthermore, this is also the case when considering the minimum number of confused actors within an equivalence class of signed graphs

Modeling echo chamber effects in signed networks

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Echo chamber effects in social networks are generally attributed to the prevalence of interactions among like-minded peers. However, recent evidence has emphasized the role of hostile interactions between opposite-minded groups. We investigate the role of polarization, identified with structural balance, in the formation of echo chambers in signed networks. To do so, we generalize the Independent Cascade Model and the Linear Threshold Model to describe information propagation in presence of negative edges. Antagonistic connections do not disrupt the flow of information, but instead, alter the way information is framed. Our results show that echo chambers spontaneously emerge in balanced networks, but also in antibalanced ones for specific parameters. This highlights that structural polarization and echo chambers do not necessarily display a one-to-one correspondence, showing instead a complex and often counterintuitive interplay. The robustness of our results is confirmed with a complex contagion model and through simulations in different network topologies, including real-world datasets.

Spatial Proximity to and Prevalence of Antagonistic Ties and Health

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The role of social ties on health and well-being is well-documented, but the association between antagonistic ties and well-being is incompletely understood. Using longitudinal data of health outcomes and sociocentrically mapped networks of 19,777 residents of 176 villages in the rural highlands of Honduras, we explore how the existence of, and spatial proximity to, antagonistic social ties is associated with subsequent mental and physical health outcomes. We find that while the existence of incoming antagonistic ties does not affect mental or physical health, both the existence of outgoing negative ties, and their proximity to respondents, is associated with self-reported mental health two years later. Social interactions can be not only salubrious, but also deleterious, which can have far-reaching implications for well-being.

OS-192: Social Networks & Inequality 2 Location: Room 108

Session Chair: Gianluca Manzo

Social Networks and Fertility Differentials Across Socioeconomic Groups

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In many low-fertility countries, individuals with higher socioeconomic status (SES) have recently started to have more children than those with lower SES. However, the reasons for this shift are still not fully understood. Recent research increasingly highlights the role of social networks in fertility decisions, yet their role in explaining SES differences in fertility remains largely unexplored. To address this gap, this study uses population-level, multiplex social networks derived from Swedish register data to examine network mechanisms that could explain SES differences in fertility. Focusing on a random sample of women employed in small workplaces (< 50 employees) between 1990 and 2022, we analyse how exposure to workmates' childbirth events affects the focal individual's probability of having a child and how the effect differs across SES groups. Additionally, we employ instrumental variables to disentangle social influence from other contextual factors and use agent-based simulations to assess their macro-level consequences. In this study, we find evidence for two well-established inequality-producing mechanisms. First, women are primarily exposed to childbirth events among same-SES workmates, reinforcing baseline fertility differences. Second, workmates who share the same SES category influence each other's fertility to a greater extent than those who do not, further deepening baseline fertility differences. These preliminary findings underscore how social networks shape fertility differentials, offering new insights into the mechanisms underlying SES differentials in childbearing behaviour in contemporary low-fertility societies.

Socioeconomic segregation in friendship networks: Social closure in US high schools.

Ben Rosche

Princeton University, United States of America

Adolescent friendship networks are characterized by low interaction across both socioeconomic and racial lines. Using data from the National Study of Adolescent Health and a new exponential random graph modeling approach, this study examines the degree, pattern, and determinants of socioeconomic segregation and its relationship to racial segregation in friendship networks in high school. The results show that friendship networks are overall less socioeconomically segregated than they are racially segregated. However, the exclusion of low-SES students from high-SES cliques is pronounced and, unlike racial segregation, unilateral rather than mutual: many friendship ties from low-SES students to high-SES peers are unreciprocated. The decomposition of determinants indicates that about half of the socioeconomic segregation in friendship networks can be attributed to differences in socioeconomic composition between schools. The other half is attributable to students' friendship choices within schools and driven by stratified courses (about 13 percent) as well as racial and socioeconomic preferences (about 37 percent). In contrast, relational mechanisms like triadic closure – long assumed to amplify network segregation – have only minor effects on socioeconomic segregation. These results highlight that SES-integrated friendship networks in educational settings are difficult to achieve without also addressing racial segregation. Implications for policymakers and educators are discussed.

Stronger together? The homophily trap in networks

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Homophily is ubiquitous—people tend to associate with similar others in different settings of social life, from education to relationships to employment. This preference for in-group ties is a trade-off: it strengthens social groups

through segregation. While homophily nurtures a feeling of belongingness, it can also limit the access to out-group opportunities and exacerbate inequalities. Although this trade-off is a core building block of social networks, it remains poorly understood and analytically unexplored.

The homophily trade-off is particularly critical in networks with minorities. When minority members favor in-group ties, they inherit not only the opportunities but also the limitations of their group. For instance, at social gatherings, homophily within small social groups limits individuals' contact pool, resulting in fewer connections on average for these numerical minorities [1]. These inherited limitations may also stem from the social capital of a group. For example, immigrants relying on intra-ethnic contacts to find jobs might end up in low-wage positions, potentially leading to an ethnic mobility trap that hinders upward social and economic mobility [2]. Nevertheless, despite the negative effects on minority groups, this trade-off remains poorly understood, lacking an analytical approach to identify its underlying mechanisms and understand how intrinsic structural limits in networks sustain it, producing inequalities.

In this work, we explore homophily in networks analytically to disentangle its inherent trade-off. We investigate when homophilic ties are detrimental to minority groups, introducing the concept of the homophily trap—scenarios where increased homophilic interaction among minorities negatively affects their structural opportunities within a network. To study these scenarios, we use a generative network model to construct networks of different group mixing and minority sizes. We show that homophily traps arise when the minority group size falls below 25% of a network. Below this threshold, higher homophily within the minority group leads to fewer structural opportunities for the group: ingroup ties come at the expense of lower structural visibility. This trade-off makes it difficult for numerical minorities to both maintain a high number of connections and belong to homophilic social groups. By disentangling the trade-off of homophily analytically and systematically, we build a foundation for understanding how homophily shapes structural opportunities in networks.

[1] Oliveira, M. et al. Group mixing drives inequality in face-to-face gatherings. Communications Physics 5, 1–9 (2022).

[2] Wiley, N. F. The ethnic mobility trap and stratification theory. Social Problems 15, 147–159 (1967).

The Overlooked Role of Communication for the Emergence of Interpersonal Status Orders <u>Marius Kaffai¹</u>, Mark Wittek²

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Interpersonal status orders are a ubiquitous feature of human societies. Social scientists usually explain the emergence of prestigious, highly popular elites as a functional adaptation of social systems, as a result of cognitive biases and network mechanisms, or as a consequence of actors hoarding resources and power.

We add to previous work by arguing that status orders can emerge as an unintended by-product of communication. To explore this theoretical argument, we build an agent-based model that simulates face-to-face encounters in which agents talk about absent others and form status evaluations afterward. Our model demonstrates that the simple assumption that actors discuss others can produce highly skewed distributions of status and a systematic decoupling of status from quality. Moreover, our model yields that actors tend to misperceive the quality of others more strongly if they are further away in the network of face-to-face interactions. Model explorations also show that inequality and decoupling are amplified by large and highly connected networks and cognitive biases occurring in communication and status evaluations.

In sum, our study adds a new facet to the longstanding debate on the emergence of status orders by exploring the interplay between communication, networks, and cognitive biases with agent-based simulations for the first time. Thereby, we arrive at the surprising conclusion that the seemingly trivial act of talking about others in their absence could be an important driver for the emergence of status orders in human groups.

Socioeconomic Inequality in Social Capital and Communication Behaviour on Twitter

Yuanmo He

London School of Economics and Political Science

The pervasiveness of socioeconomic inequality could extend into social media platforms like Twitter. However, relevant empirical evidence remains rare and fragmented. This study leverages a recently developed method for estimating Twitter users' individual socioeconomic status (SES) based on the brands they follow to examine socioeconomic inequality in social capital and communication behaviours on Twitter. First, this paper establishes that higher SES Twitter users exhibit higher social capital across multiple measures, including degree, reciprocity, topological diversity, local clustering coefficient, and effective size. As a result, the paper advances efforts to quantify

the relationship between socioeconomic outcomes and social capital in large-scale digital networks. Second, compared with the existing scattered evidence, this paper provides a more comprehensive picture of the relationship between SES and communication behaviours on Twitter. The analysis demonstrates that higher SES users use more complex and future-oriented language in their tweets. Also, while high and low SES users mostly talk about similar topics, they diverge in hashtag usage and attitudes toward immigration. These findings suggest that socioeconomic inequalities are not only reflected but also potentially reinforced on social media, underscoring the critical roles of social capital and communication behaviours in perpetuating inequality. The study highlights the need for further research to explore the underlying mechanisms and integrate SES as a critical factor in social media research.

OS-17: Crime and Networks

Location: Room 109 Session Chair: Tomas Diviak

Ties of Terrorism: Bipartite Network Analyses of Terrorist Violence

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Last year global deaths from terrorism increased by over 20% (GTI 2024), amplifying the need for careful scientific studies of this pernicious problem. Traditional scholarly approaches to terrorism frame violence as instrumental the result of an individual-level, rational choice (Arendt 1969). We apply a social network framework to better understand the phenomenon of radical violence, which is helpful at identifying flows in relationships between groups, organizations, and nations (Chua 2024). Terrorism research, however, has been comparatively slow to adopt social network analysis, because relationships between groups are hard to observe (McMillan, Felmlee, & Braines 2020). Bipartite terrorist studies apply social network analysis to actors connected indirectly by the attributes of their actions, such as their 1) attack locations, 2) attack target, and 3) methods of violence. Several advantages include: 1) the ease of visualizing terrorist group two-mode networks, 2) identifying central actors, locations, methods, targets, and 3) detecting terrorist network subgroups. Bipartite networks also can capture largely invisible relationships between terrorist groups to understand better which groups are allies, splinters, and adversaries (Yarlagadda, Felmlee, Verma, & Gartner 2018). Such an approach uncovers the critical underlying, structural dynamics that drive effective counter terrorism policy (Corradi, Felmlee, & Gartner 2024; Verma et al. 2019). We discuss how to apply this approach to address critical terrorism study questions. We provide illustrations using data from multiple countries, demonstrating the insights gained from using bipartite analyses, and showing how this approach complements traditional terrorism studies, rational choice narratives, as well as newer artificial intelligence research.

Beyond Profit: The Social Fabric of Online Drug Markets

<u>Camille Roucher</u> Université de Lorraine, France

In its report dated March 27, 2017, Transnational Crime and the Developing World, Global Financial Integrity estimated the revenues of the illicit drug market to range between \$426 billion and \$652 billion, making it the second most lucrative illicit market in the world. This figure, largely driven by traditional drug trafficking, is also influenced by virtual drug markets on the darknet, which have been in existence for over a decade. Yet, this area remains relatively underexplored in humanities research.

Started in 2023, my investigation relies on more than forty semi-structured interviews conducted with darknet users via specialized forums and cryptomarkets—an empirical dataset that is nearly unparalleled in social sciences research on the darknet at an international level (as confirmed by scholars such as James Martin, Rasmus Munksgaard, and Kyung-Shick Choi). By adopting an ethnographic approach, I contextualized these interviews with in situ observations of platform dynamics and user interactions.

The existence of such networks, which manage to endure over time, raises questions about how relationships between their various actors are formed and maintained. It also implies the establishment of a stable digital infrastructure that is not only technical but also social, and even ideological.

My contribution will illustrate how these criminals succeed in forging lasting connections that go beyond mere illegal transactions for financial gain. It will then demonstrate how they contribute to disrupting the conventional understanding of drug trafficking.

Brothers in crime: co-offending, hierarchy, status, and mentorship in three generations of outlaw motorcycle gangs

<u>Arjan Blokland</u>, Ida Adamse, Sjoukje van Deuren NSCR, Netherlands, The

In the outlaw biker world, established members act as mentors to novice affiliates. Mentorship may be limited to subcultural mores, but may also include criminal tutelage. This study applies a new measure of criminal mentorship based on observed patterns of co-offending to examine the prevalence of criminal mentorship in the OMCG member population, and the extent to which that mentorship aligns with the club's formal organization. To ascertain the importance of formal hierarchy and informal social status we estimate a series of logistic regression quadratic assignment procedure (LR-QAP) models including measures of dyadic similarity in formal rank and degree centrality (Krajewski, Dellaposta and Felmlee, 2022). We next describe the distribution, stability and diversity of OMCG members' co-offender choice, using the co-offending stability measure (CSM) (McGloin et al, 2008) and weighted co-offending ego network diversity (Adamse, Blokland and Eichelsheim, 2024). Finally, we apply the TF*IDF dyadic difference (TIDD) (Adamse, Blokland and Eichelsheim, 2024) to assess the relative importance of each member of a co-offending dyad in the others' co-offender stability. Co-offender stability however, shows substantial individual variation, and TIDD findings suggest criminal mentorship among OMCGs.

A learning-based link prediction model for human trafficking networks

Hasini Balasuriya, Monica Gentili

University of Louisville, United States, United States of America

Human trafficking is considered a significant global crisis, with the 2024 UNODC Global Report on Trafficking in Persons estimating that 27 million individuals are exploited for labour, services, and commercial sex. Due to the hidden and decentralized nature of trafficking operations, the available data on these networks is highly limited, sparse, and fragmented. This lack of comprehensive data complicates efforts to understand trafficking operations and analyze their dynamics. To mitigate these challenges, we utilize a key tool in Social Network Analysis—link prediction methods—to infer missing or future links within a trafficking network with the aim of providing a more complete network structure for further analysis. Our approach introduces a novel learning-based link prediction algorithm that applies a graph-based deep learning model to uncover hidden connections in a real-world human trafficking dataset. We compare the model's performance against traditional link prediction methods, such as similarity-based measures and probabilistic methods. By identifying missing connections, our approach reconstructs a more complete network representation. This enriched network model would enable law enforcement agencies to prioritize high-risk connections, track evolving trafficking patterns, and disrupt the network more effectively. Additionally, policymakers could leverage these insights to implement more targeted and data-driven intervention strategies. Our findings highlight the advantage of learning-based link prediction approaches over traditional methods in analyzing trafficking networks, providing a powerful support tool for strengthening anti-trafficking efforts.

Applying the Ising Model and Network Comparisons to Identify Criminal Desistance Pathways

Jorge Fábrega¹, Mauricio Olavarria²

¹Universidad del Desarrollo, Chile; ²Universidad de Santiago, Chile

Criminal desistance—the process by which individuals cease engaging in criminal behavior—remains a critical challenge in criminology and public policy. This study applies the Ising model, network comparison tests, and econometric regressions to analyze different pathways of recidivism and desistance using a dataset of more than 17,000 incarcerated individuals assessed through a validated risk factor instrument. The dataset includes 43 binary risk indicators covering criminal history, personality traits, education, substance abuse, social background, among other dimensions.

By modeling the statistical dependencies between risk factors using the Ising model, we identify key activation patterns that distinguish risk profiles. We further apply network comparison techniques to examine whether different subgroups exhibit structurally distinct risk networks. Finally, we incorporate logistic regression models to assess how these network structures predict recidivism outcomes. This multi-method approach allows us to move beyond traditional summative risk assessments by revealing interaction effects and latent structures within risk factors.

Preliminary findings suggest that certain risk factors act as structural hubs maintaining criminal behavior, while others serve as critical tipping points for desistance. This integrated network-based and econometric approach

provides a novel framework for understanding the mechanisms underlying desistance and has direct implications for tailoring rehabilitation policies to different risk profiles.

By leveraging advanced statistical and network models, this study contributes to criminology and public policy by offering a data-driven perspective on recidivism prevention, highlighting the complex interdependencies shaping criminal trajectories.

OS-170: Networks, Collective Action, and Social Movements 2

Location: Room 112 Session Chair: David Benjamin Tindall Session Chair: Mario Diani

How Protests Spread: Diasporas, Wide Bridges, and the Transnational Diffusion of Un Violador en tu Camino

Juliette Saetre

European University Institute, Italy

How do localized expressions of dissent become global? This paper answers this question by studying the diffusion of Un Violador en tu Camino—a protest performance against gender-based violence born out of the 2019 Chilean uprisings—as a case of complex contagion. Combining protest-event and survey data, I show the pivotal role of the Chilean diaspora's network structure in its diffusion. The anthem initially resonated with diaspora communities who staged solidarity performances. Direct exposure to these performances, facilitated by shared ties, subsequently inspired non-Chilean locals to adapt it to their contexts. As local adaptations proliferated, initial cultural differences were overcome, rendering Chilean intermediaries unnecessary for further adoption. Essentially, the formation of the Chilean diaspora in the 1970s created a transnational network that, decades later, facilitated the diffusion of Un Violador en tu Camino through clusters of individuals with multiple ties to both Chile and their host societies. This reveals a broader phenomenon in which historical emigration patterns inadvertently create latent global infrastructures for diffusion.

Introducing Concepts and Measures for the Study of Temporal Dynamics in Collective Action Processes: Sustained Co-participation and Turning Point in Brokerage

Pietro Casari, Alice Ferro

Scuola Normale Superiore, Italy

How to empirically address the temporal dimension of collective action (CA) phenomena through social network analysis represents one of the main issues at stake in the current debate.

The multimodal approach has proven fruitful to shed light on the role of events in explaining CA phenomena by addressing the duality of events and actors over time. Events are social settings in which ties among collective actors transform (forming, maintaining, or dissolving), and at the same time can be intended as non-agentic entities revealing the unfolding of CA processes' structure. The relevance of the orderability of events, however, remains an under-investigated assumption.

Building on the reflections presented at last year's conference and our ongoing doctoral research cases (i.e., the digital rights field in Europe and the mobilization of Fridays for Future in Italy), this contribution aims to present new advances in the application and elaboration of the bi-dynamic linear graph model (BDLGM) to fill this gap.

We propose two concepts and related measures: sustained co-participation and turning point in brokerage.

Leveraging the opportunities deriving from the structural layout resulting from the application of the BDLGM, the first aims to introduce a score capable of identifying the sequentiality of events in order to assess the impact of coparticipation in the process.

The second, building on the concept of turning point as an event during which a brokerage mechanism activates, applies distance measures in order to identify the joint role of events and their participants in shaping the relational structure configuration.

LGBTQIA+ Rights Movements in South Africa: International Treaties and Norms as Tools

San Lee

University of Connecticut, United States of America

How do LGBTQIA+ activists use international human rights instruments to advance their rights? This research explores how LGBTQIA+ activists use international human rights instruments to advance their rights, with a focus on South Africa as a unique case to understand the legalization of same-sex marriage. In this regard, I pose a hypothesis that South Africa's anti- and post-apartheid movements, along with international human rights advocacy and women's movements, played a key role in advancing LGBTQIA+ rights. Specifically, I focus on the causal process observations, starting with queer rights movements aligning with anti-apartheid and women's rights movements under international human rights pressure. This coalition then became involved in post-apartheid reconstruction efforts and was critical in driving the legalization of same-sex marriage through engagement with international human rights norms and transnational actors in the 1990s. The research is divided into two periods: (1) anti-apartheid movements before 1994 and (2) the push for same-sex marriage between 1994 and 2006. This division highlights the evolution of activism and the changing landscape of rights advocacy. The study focuses on how activists leveraged CEDAW reports, non-U.N. international LGBTQIA+ instruments, and regional documents from the African Commission on Human and Peoples' Rights (ACHPR) and the African Charter on Human and Peoples' Rights. Ultimately, this research is expected to contribute to the fields of international relations and social movements by examining how international law is used both in theory and practice to internalize human rights norms at the domestic level.

Spaces of coordination: economic protest coalitions in localities

Jiri Navratil¹, Tereza Mensikova²

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Intensification and restructuring of neoliberal economies led to inquiries related to the societal responses to these transformations. Many aspects of socio-economic mobilizations became an object of inquiry: repertoires of action, effects of political and economic context, actors' organizational attributes, or collective action frames. While acknowledging the importance of these inquiries, we aim to contribute to the research on a less studied yet important dimension of economic protest: the link between its inter-organizational coordination and social space. Previous studies have already addressed spatial aspects of economic protest, such as the diffusion of economic protest (Hedström 1994; Biggs 2005), its scaling up and down (Tarrow 2005; Della Porta, Mattoni 2014) or shift and concentration (Silver 2003; Beissinger 2022). Building primarily on the relational perspective in the study of collective action (Crossley 2011; Diani 2015), we aim to analyze the role of localities in the inter-organizational coordination of economic contention.

We conceptualize economic contention as a collective action field where diverse collective actors follow their goals, make various claims, employ different repertoires and cooperate/compete with each other. While such relational meso-level order of collective action is structured by social relations and interactions among collective actors, it also has an irreducible spatial dimension with its autonomous logic. It has been suggested that large urban areas and political centers attract mobilizations with broad (typically "new social movement") protest coalitions, long ago industrialized regions on the political semi-periphery are the storage of more exclusive traditional labor repertoire "managed" by the unions and workers, and economic peripheries remain silent with occasional outburst of "isolated" radical right/ethnic/civic mobilizations and counter-mobilizations. More specifically, we aim to show the role of urbanization, industrialization, socio-economic conditions or political insularity of localities in the coalition-making at economic protest events which are situated in these localities.

We aim to link relational and spatial aspects of economic contention in the Czech Republic. Focusing on the protest in specific sites (villages, towns, cities), we combine existing statistical data with SNA metrics related to the cooperation of the collective actors in the specific location. We apply a network-analytic approach to economic protest event data (1989-2022) (N= 2042), identify and analyze co-occurrence networks of collective actors in specific site within specific time period, and relate these to their socio-spatial context.

The impact of social bots on online protest network: evidence from Black Lives Matter

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Social media plays an important role in large-scale protests, enabling communication, coordination, and mobilisation through online social networks (OSNs). Protest participants form social ties that shape digital civic engagement.

However, social bots—automated accounts designed to mimic human behaviour—are increasingly influencing these networks, particularly in political events. Despite their growing presence, little research has explored their prolonged impact on human protest networks or how different bot types affect human interactions.

In this presentation, we hope to share our analysis of the 2020 George Floyd protests, focusing on the influence of social bots in Black Lives Matter (BLM) discussions. Using network analysis, we identify distinct bot-driven structures, shaped by varying motivations. While some bots—used by activists, news media, and neutral communities—amplified protest news and fundraising efforts, others aimed to disrupt mobilisation by spreading anti-BLM narratives, partisan content, conspiracy theories, and spam.

We will discuss how anti-protest bots were linked to a decline in human communication, weakening both individual and community-level interactions. Their impact was most pronounced among pro-protest users, altering engagement and reducing network cohesion.

Through this presentation, we aim to contribute to the understanding of how social bots influence digital activism, demonstrating that their disruptive potential extends beyond formal political events to grassroots movements. By highlighting the vulnerabilities of activists and pro-protest communities to bot influence, we hope to spark discussion on the need for greater awareness and policy measures to protect online civic participation

OS-187: Scientific Collaboration Networks: data collection and quality, methods, models, and empirical application 2

Location: Room 114 Session Chair: Luka Kronegger Session Chair: Alejandro Espinosa-Rada Session Chair: Viviana Amati Session Chair: Marjan Cugmas Session Chair: Susanna Zaccarin

Networks, margins, and the hierarchies of knowledge production

Ariane Agunsoye², <u>Bruce Cronin¹</u>, Juvaria Jafri³

¹University of Greenwich, United Kingdom; ²Goldsmiths College, University of London; ³University of East Anglia

We explore hierarchies in knowledge production by analysing the extent to which institutions in the global South receive research funding, vis-à-vis their counterparts – and collaborators – in the global North. We use ESRC data on grants, excluding fellowships, from between 2015 and 2020, to create a dataset of collaborations that receive funding.

A social network analysis or SNA approach allows us to assess which institutions have more influence, based on their capacity to collaborate internationally. A core assumption of SNA is that that social ties matter because they influence behaviour or transmit information and resources. As such, using SNA allows to enhance our understanding of phenomena that emerge from the interaction of individuals or institutions, particularly outcomes that depend on 'social capital' or, more generally, on the form and quality of collaboration between actors.

Global South collaborations.

Unsurprisingly, we find a core-periphery structure in ESRC-funded projects involving international collaboration, with funding centred on elite UK universities and Global South partners in peripheral positions. But interestingly we find some Global South institutions in intermediary positions between the core and the periphery. We also find distinct clusters of partners generally each centred on an elite UK university but with distinctive Global South nationalities and distinctive project themes. The study adds depth to our understanding of international hierarchies of knowledge production.

Relational hyperevent models for the coevolution of scientific networks in three different Italian disciplines

Amin Gino Fabbrucci Barbagli¹, Jürgen Lerner², Viviana Amati³, Domenico De Stefano¹

¹Univeristy of Trieste, Italy; ²University of Konstanz, Germany; ³University of Milano-Bicocca, Italy

Scientific collaboration has been recognized as an important relationship that facilitates the sharing of expertise and knowledge, significantly contributing to research advancement and innovation. Consequently, national and international policies promote such partnerships across various sectors and institutions. In this work, we investigate how co-citation, keywords co-occurrence, and co-authorship networks influence each other within three Italian Academic Communities (IAC): sociologists, statisticians, and Management scholars from 2012 to 2022. We collect

data from the Italian Ministry of Education and Scopus and apply the Relational Hyperevent Model (RHEM) to analyze the collaboration networks of the IAC over time. Additionally, we introduce a new hyperedge covariate, the geometrically-weighted subset repetition (GWSR), as a smoothed version of the formerly defined subset repetition to capture the persistence of groups in a more parsimonious model. The analysis illustrates the complexities of scientific collaboration and differences in collaboration strategies among IAC.

Science in Balance? Gender Dynamics in Collaboration Among Political Scientists and Sociologists in the Netherlands

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Gender inequalities within academia are widespread. Women publish less, are less likely to hold prominent author positions, and their contributions are overlooked compared to men. In the Netherlands, women are increasingly represented at the doctorate level. But while women are as likely as men to start an academic publishing career after obtaining a doctorate, their publishing careers are shorter. This in part explains why women remain underrepresented in the professoriate.

To shed more light on the impact of gender in publishing careers of scholars, in this paper, we will investigate the role of gender in collaboration networks among political scientists and sociologists in the Netherlands (N>500). Do scholars prefer to work (i.e. co-publish) within same-sex collaboration teams? To what extent does previous track record (e.g. citation scores) and seniority influence decisions who to work with and is this impact conditional on the gender of the potential collaboration partners?

To answer these and other questions we collected the names and positions of faculty members for all political science and sociology departments in the Netherlands in the period 2021-2025. We enriched these web-scraped data with information on faculty member's gender, ethnicity, seniority, publishing careers, online presence, etc.

We constructed complete, longitudinal collaboration networks (consisting of over 50.000 ties) and tested our hypotheses with RSiena.

The division of labor in North-South medical research collaborations

Ting Xiao, Andrew C. Herman, Mathias W. Nielsen

University of Copenhagen, Denmark

Global North-South disparities persist in science, yet our understanding of the mechanisms sustaining them remain limited. Focusing on North-South research partnerships, this study examines how the division of labor within medical research teams contributes to these disparities. We harvested article metadata from PLOS ONE alongside CRediT contributorship data, and then applied a new TF-IDF-based method to account for variation in the prevalence and distribution of contributor roles across authors. In linear probability models, adjusting for authors' prior publication output and impact, gender, scientific age, medical specialization and TF-IDF adjusted contributor roles, we find that GS researchers are more likely to assume first authorships but have substantially lower representation in last and corresponding authorships compared to their GN team-mates. Subgroup analyses reveal that this regional disadvantage is most pronounced for researchers from Africa, Latin America, and Southeast Asia, while those from East and South Asia are underrepresented in all lead-authorship roles, including also first authorships. This pattern also holds across national income levels, with clear disparities observed between researchers from lower- and higherincome countries. We also find that while leadership roles generally increase the likelihood of assuming first-, lastor corresponding authorships, GS scientists with such roles remain less likely to obtain last authorships. These findings expose a consistent misalignment between contributions and authorship positions in North-South collaborations and highlight the need for experimental research to clarify the causal pathways through which these imbalances arise.

Think tank citation networks and the structure of the British knowledge regime

Jordan Soukias Tchilingirian

University of Bath, United Kingdom

Network methods have played a central role in the study of think tanks and policy expertise. Political scientists have examined think tanks to explore elite cliques engaged in ideological projects within specific political parties, while

sociologists have focused on how these organisations leverage cross-professional networks to frame and stabilise political-economic problems through ideologically palatable policy solutions. However, little is known about the intellectual life within the broader think tank community or how these organisations interact with one another. Existing research tends to take a metaphorical approach to think tank networks, often neglecting formal qualitative and quantitative network analysis.

This paper addresses these gaps by analysing British think tank citation networks to: (1) map the intellectual networks that generate ideas and evidence in British public policy; (2) assess community cohesiveness; and (3) identify intellectual authorities shared across the broader think tank community and within specific cliques. This also presents a novel approach to studying how knowledge regimes—the institutional arrangements that shape the production and use of policy expertise—are structured. By applying this methodological framework, the paper offers new insights into how think tanks are organised, how they interconnect, and what forms of knowledge are considered authoritative within the British knowledge regime

OS-36: Modeling Network Dynamics

Location: Room 116 Session Chair: Stepan Zaretckii Session Chair: Tom A.B. Snijders Session Chair: Christian Steglich

The Life of a Tie: Social Origins of Network Diversity

Patrick Park, Henry Xu, Kathleen Carley Carnegie Mellon University, United States of America

This study examines the survival and evolution of 443K bidirectional mention ties on Twitter by merging datasets collected before 2015 and in the first few months of the COVID-19 pandemic (February to June, 2020). We hypothesize that strong pre-existing ties, marked by frequent communication and shared identities, endure and tolerate cognitive and stance differences over time. Our findings show that surviving ties are stronger than average pre-2015 ties but exhibit greater cognitive distance in COVID-19 discussions, suggesting that strong ties can tolerate different and even opposing opinions on contentious topics. This challenges traditional models of social influence and homophily, which predict increased cognitive similarity within strong ties. The findings imply the potential for old ties to function as network bridges, reducing political divides by connecting dissimilar social groups.

Co-evolution of the global research collaboration network and the performance of nations in science and technology

Travis A Whetsell, Jane Yang

Georgia Institute of Technology, United States of America

Despite extensive research on the relationship between international research collaboration (IRC) and research performance in science and technology (S&T), existing research has mostly examined single or comparative case studies, relatively small samples composed of developed countries, and uni-directional relations between empirical indicators. Although large scale network studies of IRC are becoming more common, 1) drivers of IRC network formation and 2) effects of the IRC network on policy-relevant performance outputs tend to be analyzed separately. Large scale analysis of the reciprocal dynamic relationship between IRC and national performance has yet to be conducted.

This research tests network effects on performance and vice versa simultaneously using a longitudinal co-evolution model on three decades of global S&T network and performance data. We employ the stochastic actor oriented model (SAOM) framework, also known as Siena models, to analyze data on 166 countries from 1993 to 2022. Yearly IRC networks are constructed from Web of Science's XML database. Corresponding national S&T performance data is gathered from Elsevier's fractional field-weighted citation index (FWCI), which disentangles national from internationally attributed citation impact. The models also account for geographic distance, national wealth, population metrics, political governance, and endogenous network processes.

The preliminary results support the hypotheses with positive and significant estimates for both effects. However, geographic distance appears to play a critical role in the transmission of the social effect of performance on the IRC network. Indeed, not controlling for geographic distance renders this effect insignificant in the face of the endogenous network dynamic of preferential attachment. Further analysis will be conducted incorporating different sensitivity tests in addition to tests for disciplinary and temporal heterogeneity.

Analyzing the Evolution of Group Structures in Over-Time Social Network Data

<u>Larry Richard {Rick} Carley</u>, Kathleen Mary Carley Carnegie Mellon University, United States of America

Results of applying an Incremental Fuzzy Grouping algorithm on several real-world social media data sets will be presented. Fuzzy Grouping is a method of extracting group structures in which individual actors can be in multiple groups with different weights, at each point in time. Results of the developed Incremental Fuzzy Grouping algorithm will be compared with conventional grouping algorithms such as Leiden Grouping, K-Means Grouping and Spectral Clustering, applied on the same social media data set using various temporal window sizes. The ability of the proposed method to efficiently extract fuzzy groups over time, even for large scale data sets will be demonstrated through testing on data sets of different scale. In addition, the approximate computational cost and how that computational cost scales with data set size will also be compared between the proposed algorithm and conventional algorithms.

Note, the proposed fuzzy grouping algorithm does NOT operate on time windows pulled from the data set. Instead, it operates incrementally on the time stamped social media data set, overcoming one of the major challenges in analyzing over-time social media data using the conventional grouping algorithms. In addition, the proposed fuzzy group over-time tracking algorithm can employ an incremental algorithm for determining the "best" number of groups at any point in time. An advantage of the proposed algorithm is that it does not require the human user to select the time aggregation window or the desired # of groups.

Change and Stability in Temporal Collaboration Networks

Manoj Shrestha

University of Idaho, United States of America

Temporal changes in relationships are common in social networks. Do network structures change too or remain stable? Studying temporal change and stability in networks is especially important when actors engage in cross-sector collaboration over time to address complex public problems. This study argues that actors maintain regularities in temporal network structures and explores social processes underlying such regularities. Data constitute cross-sector collaboration ties, gathered through interview, that were created by 125 rural communities in Nepal with organizations in 2007 and in 2014 to help meet community needs. Data for 2007 captured such ties regarding the planning of drinking water projects for funding from the Rural Water Supply and Sanitation Program aimed at improving access to potable drinking water. Sixty-six communities received one-year funding whereas fifty-nine communities did not. Data for 2014 constituted post-funding collaboration ties between all 125 communities and organizations.

Network descriptives of collaboration networks for 2007 and 2014 are compared first. Next, bipartite exponential random graph models are estimated to determine network structures and nodal attributes affecting forming collaboration ties. Network structures include a tendency for popular organizations to become more popular and for communities and organizations to be part of network closure. Community attributes considered are size, remoteness, and future collaboration. Organization attributes include operative level (village, district, and central) and organization type. The estimates involve collaboration networks of all communities and of funded and unfunded communities with organizations separately for 2007 and 2014. The preliminary results indicate the existence of changes in collaboration ties along with stability of popularity structure. This adds to our knowledge that actors combine both change and structural stability in cross-sector collaboration networks.

Equilibrium Patterns in Time-Evolving Social Structures

Angel Sánchez^{1,2}, <u>Miguel A. González-Casado¹</u>, Andreia Sofia Teixeira³

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The dynamics of personal relationships remain largely unexplored due to the inherent difficulties of the longitudinal data collection process. In this work, we analyze a dataset tracking the temporal evolution of a network of personal relationships among 900 people over the course of four years. We search for evidence that the network is in equilibrium, meaning that all macroscopic properties remain constant, fluctuating around stable values, while the

internal microscopic dynamics are active. We find that the probabilities governing the network dynamics are stationary over time and that the degree distributions, as well as edge and triangle abundances match the theoretical equilibrium distributions expected under these dynamics. Furthermore, we verify that the system satisfies the detailed balance condition, with only minor point deviations, confirming that it is indeed in equilibrium. Remarkably, this equilibrium persists despite a high turnover in network composition, suggesting that it is an inherent characteristic of human social interactions rather than a trait of the individuals themselves. We argue that this equilibrium may be a general feature of human social networks arising from the competition between different dynamical mechanisms and also from the cognitive and material resources management of individuals. From a practical perspective, the fact that networks are in equilibrium could simplify data collection processes, validate the use of cross-sectional data-based methods like Exponential Random Graph Models, and inform the design of interventions. Our findings advance the understanding of collective human behavior predictability and our ability to describe it using simple mathematical models.

OS-76: Social Capital themed session

Location: Room 125 Session Chair: Heather McGregor

The Impact of Soft Skills On the Modern Workplace and Social Capital Network Development

<u>Gina Neugebauer, Rick Mask</u>

Southern New Hampshire University, United States of America

This proposal addresses the significant contribution of soft skills to career and higher education progression and their growing impact on the modern workplace. The paper centers on key interpersonal competencies such as open communication, problem-solving, and emotional intelligence as they gain more recognition for being instrumental to academic and workplace success. This review centers on case studies and evolving employer needs, investigating how higher education can purposefully incorporate soft skills into curricula to prepare students for real-world challenges. Additionally, discrepancies between the modern workforce and traditional subject-based education, underscoring the need for holistic educational practices are examined. By taking various approaches, such as project-based learning, experiential learning, and role-play, the study suggests that the incorporation of soft skills in curricula can enhance student leadership development and build social capital. Through evaluation of the role of higher education in soft skills development and social capital building, there is room for continuous improvement and professional development.

"Bringing People Together": Social Capital and the Integration Strategies of the Hungarian St. Stephen's Ball in Montréal

<u>Éva Huszti</u>, Balázs Venkovits

University of Debrecen, Hungary

The organizations and events established by immigrant groups in the host society play a key part, besides other factors, in which acculturation strategies (Berry, 1974, 1997) are followed by them and how successful their integration can be. One of the challenges is how immigrants can maintain their social ties with their own ethnocultural community and culture of the country of origin, while also integrating successfully into the host society. In this presentation we provide a case study of the Hungarian St. Stephen's Ball organized in Montreal between 1959 and 2013, an event whose key objective was to bring together Hungarians and non-Hungarians, facilitating the "harmonious integration" of immigrants into the Montreal-Canadian society. Based on archival research and interviews, the paper analyzes how organizers achieved their objectives by activating social capital, relying on strategies and models outlined by Berry (1974, 1997), Lin (2008) and Granovetter (1973) decades later, revealing a two-way process of integration, whereby, in parallel with the acculturation of Montreal Hungarians into the majority society, this ethno-community was continuously expanded by means of the conscious building of social relations and social capital, with members of the host society occupying key community-forming positions.

Does Social Capital Matter for Subjective Well-Being in a Least Developed Country Context? Using A Novel Pseudo-Panel Approach

Kelemu Fenta Gebeyehu^{1,2}, Yuying Tong¹, Migbaru Workneh³, Lei Jin¹

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Social capital is recognized as a key predictor of psychosocial well-being, yet its effects in least-developed countries, like Ethiopia, remain unclear. Current cross-sectional studies overlook the well-being effect of various aspects of social capital and face endogeneity issues. Using World Gallup Poll data collected from Ethiopian households between 2013 and 2020, we rigorously examined the influence of different aspects of social capital on subjective well-being using an innovative pseudo-panel approach. To this end, we fitted several models of Arellano and Bond's system generalized method of moments (sys-GMM) using a stepwise model selection procedure.

This study reveals that regardless of socioeconomic and demographic attributes and time, at least one aspect of social capital significantly affects life satisfaction and emotional well-being. Interestingly, the various aspects of social capital are differently associated with the two aspects of subjective well-being. While almost all indicators of social capital significantly predicted emotional well-being, a single indicator significantly affected life satisfaction. Finally, it uncovered that the current perception of life satisfaction and emotional experiences are significantly associated with past satisfaction and experiences.

Therefore, apart from confirming the typical hypothesis that social capital is a significant predictor of subjective wellbeing, the pseudo-panel approach provides a new avenue to improve the causal explanation of well-being by accounting for the temporal ordering of past experiences. It also unlocks opportunities to transform the readily available cross-sectional data into a meaningful pseudo-panel dataset that links micro- and aggregate-level issues. This perspective can help policymakers recognize the relationship between past and present well-being for targeted interventions.

Social Capital Activation in Uncertainty: a model of humanitarian responses in natural disasters

Claire Travers

Hanken School of Economics, Finland

During a humanitarian response, the salient feature of social capital is not simply it's mere presence, but its accessibility (Travers, 2024). When one cannot access their social networks, the social capital an individual has is mute. Therefore the moment of activation presents a unique lens to understand the ways in which social capital are leveraged. Following a decade of humanitarian response interventions, the paper presents a casual loop diagram of the ways in which individuals affected by natural disasters draw on their social capital. The findings support an understanding of social capital as a dynamic resource, and theorizes the compounding influence of uncertainty.

Social Capital, Social Structures, and Triads

<u>Tristan Claridge¹, Lindon Robison²</u>

¹Institute for Social Capital; ²Michigan State University

This paper examines the role of social capital within triadic social structures, extending traditional dyadic analysis. Drawing on Georg Simmel's theories of dyads and triads, as well as foundational insights from balance theory and signed network analysis, we extend traditional network theories by conceptualizing relationships along a continuum from empathetic to antipathetic rather than treating them as binary (positive or non-existent). In doing so, this study contributes to ongoing discussions in social network research by emphasizing the role of relational quality in shaping institutional stability, collective action, and the exchange of relational goods. The bipolar continuum of empathy and antipathy introduced here provides a rich framework for analyzing social structures and their role in mediating economic and social exchanges. The resultant ten triadic structures highlight how combinations of empathetic, indifferent, and antipathetic relationships shape social capital dynamics. In doing so, it critiques the assumption that triads naturally resolve into balanced states and instead suggests that structural persistence depends on the embeddedness of social capital—understood here as the emotional connections of trust, regard, and empathy. This conceptualization aligns with Heider's focus on attitudes such as liking, valuing, and esteeming, and their opposites, which form the basis of social cohesion or division. By examining how these structures facilitate or hinder the exchange of relational and attachment-value goods, the paper underscores the practical implications of social capital in various contexts, including families, workplaces, political institutions, and broader societal formations.

OS-48: Networking in the integration of Social Services: What connections for valuable

interventions Location: Room 202 Session Chair: Daria Panebianco Session Chair: Sara Nanetti

Navigating the Emerging Field of Death Doulas in Russia: Structures, Mechanisms, and Discursive Formations

Ekaterina Bochanova

Higher School of Economics, Russian Federation

Death doulas operate within an intimate and sensitive domain of individual life, providing support to enhance the daily quality of life for those confronting their own mortality or the death of others. This social field is characterized as "emerging," reflecting its ambiguous boundaries and the lack of state legitimization within the Russian context.

The aim of this study is to examine the structure of the social space of death doulas and the mechanisms shaping this field. To achieve this, a cross-sectional, mono-method research design is employed, incorporating qualitative indepth interviews, qualitative network analysis, and semantic network analysis. The empirical data consist of interviews with 19 death doulas in Russia.

Within this field, specific conceptualizations of death are constructed, emphasizing the heightened value of life, the ritualization of death through "rites of passage," and the rationalization of death via the normalization of its representations and discursive practices. The homogeneity of these representations is shaped by Foucauldian discursive formations that circulate through networks of power within the community, producing specific understandings of death and the role of death doulas. The influence of these power structures is further demonstrated through a semiotic network analysis of recurring linguistic and metaphorical constructs.

This study introduces the examination of Russian death doulas into the international academic discourse, laying the groundwork for cross-border collaboration among doulas and contributing to a clearer delineation of their professional boundaries.

Service collaboration and care provision in Belgian mental health service networks

<u>Mégane Chantry</u>, Pablo Nicaise, Vincent Lorant UCLouvain, Belgium

The mental healthcare system should provide a comprehensive set of collaborating services to improve care continuity and support the individuals' quality of life and social integration. In Belgium as in other countries, mental health service networks (MHSN) were established fifteen years ago to ensure collaboration across service types, meet individuals' needs, and promote community care. As part of a study evaluating these MHSN, we examined the structure of collaboration and care provision for individuals with mental disorders (MD) in five Belgian MHSN. We conducted an online whole-network survey with 194 services. We collected data on user referrals between services as well as on the organisational characteristics of the services. We analysed the probability of ties between services using Exponential Random Graph Models. The final model includes covariates that account for network density, transitivity, service attributes (type, care function, and exclusion criteria), and homophily effects. The model revealed low density and high transitivity. Specialised addiction services and hospital units were more likely to have ties. While MHSN tended to be homophilous based on service type and care function, they were heterophilous based on service exclusion criteria. These findings suggest that care provision, despite the establishment of MHSNs, remains organised in silos and is predominantly hospital-centred, appearing to prioritise care providers' interests rather than the needs of individuals with MD. Enhancing collaboration between different services and expanding community-based services are essential steps towards a more integrated and person-centred care system.

The Effect of Social Networks on Wellbeing of Informal Caregivers: A Qualitative Comparative Analysis

Marco Carradore¹, Gaetano Gucciardo²

¹Università Cattolica del Sacro Cuore, Milano, Italy; ²Università degli Studi di Palermo, Palermo, Italy

The rapid ageing of the population has increased the demand for both healthcare and long-term care, creating an urgent need for caregivers. However, the capacity of the social services to address this issue is limited, making the role of informal caregivers essential. Furthermore, it is evident that informal caregivers require social support to ensure their own wellbeing, fundamental for them to persevere in the caregiving role.

The objectives of the present research, the analysis for which is currently underway, are twofold: first, to explore, using the novel technique qualitative comparative analysis (QCA), how the social networks of informal caregivers affect their wellbeing; second, to highlight how different methodological approaches, namely social network analysis,

qualitative methods and QCA, can be combined to obtain in-depth knowledge about the wellbeing of informal caregivers.

The data originate from a nationwide mixed-methods study conducted in Italy and funded by the Recovery and Resilience Plan, which commenced in 2024 and is scheduled to conclude in 2025. The study comprised 30 caregivers, and their social network data were collected through online interviews utilizing a name generator, name interpreter and name interrelator. Information regarding their wellbeing was collected via an online dyadic interview method. The dyads were composed of caregivers and their supporters (e.g. spouses, other relatives or friends). QCA is applied to identify which social network conditions (e.g. size of the social network support, density and reciprocity) affect the wellbeing of informal caregivers.

The role of participatory and social initiatives in generating relational capital and supporting family foster care in Poland

<u>Renata Pomaranska</u>

THE JOHN PAUL II CATHOLIC UNIVERSITY OF LUBLIN, Poland

The paper concerns the role of participatory and social initiatives in generating relational capital and their impact on supporting family foster care in Poland. The aim of the study is to understand how the cooperation of various entities - foster families, non-governmental organizations, public institutions and local communities - contributes to building a support network that aims to improve the quality of life of children deprived of parental care.

The analysis is based on the assumption that relational capital, understood as a set of positive social bonds, provides an opportunity to support families in crisis and is of key importance for the effective functioning of the foster care system. The study indicates the positive effects of cooperation, which translate into the stability and effectiveness of foster care, while identifying challenges related to the implementation of participatory initiatives, such as the lack of coherent policy, limited financial resources and difficulties in integrating various actors in the system.

Networking in the context of the topic discussed refers both to the network approach (social networking) as a variety of the systemic approach, but also to networking in the colloquial, business sense. The aim of such action is to propose forms of participation in local communities, indicating the role of social capital and informal self-help bonds.

The paper constitutes a contribution to the development of social policy and practice supporting family foster care in Poland.

OS-47: Networks in Agriculture

Location: Room 203 Session Chair: Gilad Ravid

Analysis of systematic risks and the social network of farmers and agricultural organizations

Zohreh Moghfeli

The Open University, United Kingdom

Agriculture around the world is affected by systemic risks, including production, market, financial, organisational, personal, and climatic challenges. To adapt to these risks and improve productivity, farmers rely on both formal and informal social networks. Through relationships and collaborations with peer farmers and agricultural experts, specialists, and organisations, farmers benefit not only from strong ties of trust and mutual support, but also from access to advanced scientific knowledge, infrastructural and financial resources and support through weaker ties with external actors. Along with this, the social network of agricultural organizations plays a vital role in facilitating farmers' access to knowledge and resources and to support them in facing risks and issues. Thus, analysing the structure and characteristics of these networks and identifying key actors involved in policymaking and developing strategies that strengthen farmers' resilience and adaptation is crucial. This study examines the social network of farmers and agricultural organisations involved in pistachio production in Central Iran. Pistachio is among the most significant agricultural products in this region, playing a significant role in economy, society, and culture of this area. However, producers face diverse risks, particularly water shortage and market-related challenges. By identifying the systemic risks affecting pistachio production and applying both qualitative and quantitative analysis of social network of local farmers and organisations, this study aims to provide insights into how different networks influence farmers' adaptation to those risks and issues and their productivity.

Ethiopian agricultural networks and the diffusion of climate adaptation strategies

Dylan Munson

Duke University, United States of America

Prior research indicates that in developing countries where agriculture is economically significant, links between farmers are important for transmitting information and generating social capital and support. This is especially the case in rural Ethiopia, which is also one of the countries most at-risk from climate change. To study how linkages between farmers impact adaptation behavior and climate resilience, an egocentric network survey using snowball sampling was launched in four Ethiopian kebeles (local administrative divisions) to study informational and support networks. The survey is part of a larger follow-up survey to a baseline household questionnaire conducted in additional kebeles. Results from the baseline survey and a geospatial model indicate that household responsiveness to livelihood shocks is highly localized, perhaps indicating a role for village networks in supporting resilience. In the network survey, we find important differences between kebeles in terms of access to extension services and output markets. We also find that, while informational and support networks are topologically similar within kebeles, cross-kebele differences are notable. In the next steps of the project, I simulate full networks from our partial network data, and then will use an agent-based model of diffusion to study how adaptation strategies propagate differently through these various networks. This work contributes to a growing literature on the importance of networks to learning and capacity-building in sub-Saharan Africa, as well as the relevance of such networks to climate change adaptation. Our results will also help to inform interventions targeting at-risk households and communities.

Knowledge brokers and innovation towards zero pesticides: inter and intra cluster dynamics in the biological seed treatment

Youssef Saadé, Armelle Mazé

Paris Saclay University - INRAE, France

This paper explores the knowledge network and flow within the seed treatment sector, focusing on the development of alternative biological solutions for seed protection in response to the French Regulation's 2018 EGALIM law (Article 83), which prohibits the use of unapproved plant protection substances. The purpose of this paper is to examine how diverse stakeholders, including seed producers, research laboratories, and biocontrol companies, collaborate to develop innovative biological seed treatments, addressing the complexity of this innovation that spans seed, seed technology, and biological sectors.

The study models the networks connecting stakeholders within Vegepolys Valley, a French innovation cluster specializing in plant breeding and agricultural solutions. Tools like RStudio and UCInet are used to quantify knowledge flows, with metrics such as centrality and density assessing the influence of individual actors and the cohesiveness of the network. The analysis also identifies key knowledge brokers and gatekeepers who control and facilitate information flow, shaping innovation pathways. The study further examines how knowledge moves between clusters within France, Europe, and globally.

The contributions of this paper are twofold. First, it provides a unique focus on biological seed treatment as a complex, multi-sector innovation involving collaboration across the seed, seed technology, and biological industries. Second, it applies quantitative methods to analyze knowledge flow within a heterogeneous cluster, emphasizing the economic and organizational dimensions of seed treatment innovation. This offers new insights into how regional clusters foster sustainable agricultural solutions in response to regulatory changes.

Modeling Crops' Pests and Diseases as Networks for Smart Agriculture

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Periodic monitoring of pests and diseases in crops is essential for early detection, enabling preventative agrotechnical interventions while minimizing treatments in disease-free areas (Jeger et al., 2018). However, monitoring is often hindered by resource limitations, leading to delayed detection and unaddressed outbreaks, resulting in excessive pesticide use, escalating costs, environmental damage, and risks to worker and consumer health (Savary et al., 2019). This study employs social network analysis (SNA) to model the spatiotemporal dynamics of biotic stressors in two distinct agroecosystems (Garrett et al., 2018).

We investigated two systems: [1] the two-spotted spider mite (TSSM, Tetranychus urticae), affecting screenhousegrown sweet peppers (Capsicum annuum) in southern Israel (Weintraub & Palevsky, 2008); and [2] white mold (WM, Athelia rolfsii), damaging open-field peanuts (Arachis hypogaea) in northern Israel (Dafny-Yelin, 2022). These systems represent contrasting environments and pathogen types, allowing for comparison across agricultural contexts.

During 2015–2017, TSSM abundance was monitored weekly in four pepper screenhouses by examining every 20th plant in every fifth row . In 2024, seven WM-infected peanut fields were monitored weekly or bi-weekly using a 20 × 1 m grid system.

To construct network models, each monitored field divided into grid. Each grid cell represented by a node. Directed edges (e_ij) between nodes indicated pathogen detection in grid cell i at time t followed by detection in grid cell j at time t+1 (Parry et al., 2014). Edge weights were calculated as the inverse distance between cells, reflecting proximity's influence on transmission probability (Sanatkar et al., 2015).

Statistical analysis using exponential random graph models (ERGMs) revealed probabilities of edge formation between grid cells (Robins et al., 2007). The models incorporated spatial covariates. Other covariates such as environmental parameters, and crop-specific factors can be added (Silk et al., 2017).

Results showed both common patterns and system-specific differences. In both networks, infection spreading to western grid cells had lower probability (p < 0.01). However, in TSSM networks, edge probability increased with distance, suggesting long-range dispersal capabilities possibly aided by human movement or equipment (Skirvin & Fenlon, 2003); conversely, in WM networks, edge probability decreased with distance, aligning with soil-based transmission through mycelial growth and localized sclerotia germination (Xu et al., 2012).

Network centrality measures identified 'hotspot' locations disproportionately influencing overall infection dynamics (Pautasso et al., 2010).

This research demonstrates the potential of applying SNA methodologies to agricultural crop protection (Shaw & Pautasso, 2014), offering a framework for optimizing sampling strategies by identifying high-risk locations and transmission pathways, enabling more efficient resource allocation in pest and disease management (Cunniffe et al., 2015).

Networks in Agri-Food Systems: Configuration, Transformation and Lessons from the "AgriLAC Resiliente" Initiative

<u>Diana Katherine Quintero Cano</u>, Byron Alejandro Reyes, Diana Carolina Lopera Alliance Bioveristy-CIAT, Colombia

Agri-food systems in Latin America face critical challenges arising from demographic exploitation, climate change, and migration. To address these, it is essential to understand the social structure embedded in these complex systems. However, there is a knowledge gap in how power dynamics, collaboration, and reciprocity within these networks affect the efficiency of these systems. This study addresses this gap by combining the Social Network Analysis method and "usable past" approach to assess the impact of CGIAR's "AgriLAC Resiliente" Initiative implemented in Honduras, Guatemala, Colombia, Mexico, and Peru, on the transformation and configuration of collaborative networks in the agricultural sector. This approach allows understanding structural properties of the network by analyzing the relationships between actors before the intervention, which we used as a baseline for evaluating changes in the structure, connectivity, and collaboration dynamics among actors. The results show a significant expansion of the network, with increased participation of actors and connections, which has facilitated a more efficient flow of information, reduced distances between actors, and increased transitivity, suggesting better collaboration, knowledge generation, and innovation. Challenges include low network density and decreased reciprocity, highlighting the need to promote more equitable exchanges and deepen actor integration to strengthen long-term resilience. We provide empirical evidence on how network-based interventions facilitate exchange, collaboration, and innovation in agri-food systems to respond to major challenges, along with recommendations for improving the dynamics in the social structure of agri-food systems. These results can be used to inform public policies oriented at promoting more equitable and sustainable collaboration.

OS-207: Network Indicators for Group and Team Performance 2 Location: Room 204

Session Chair: Brian Rubineau

Influential partnerships and teamwork in Association Football

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In Association Football, attacking players have traditionally been ranked according to the number of goals they score, and / or the number of goals they create for others. The disadvantage of this ranking system is clear: it does not account for the strengths of an opposing team. Here, we address by establishing the concept of a 'par' for each opponent: the average number of attacking contributions against that team. In this way, we are able to standardise measures of each player's attacking contribution.

We use these standardised data to construct models of player influence in the teams of the 2011/12 English Premier League season. This allows us to assess not just a player's level of contribution, but a duo's level of contribution to the team's attacking output. The resulting scores represent the combined strength of each attacking duo, allowing coaching staff to identify the strongest and weakest attacker combinations. Interestingly, the mean of these 'duo scores' appears to be a good predictor of a team's position in the final Premier League standings. In fact, just one club recorded a top-half mean duo score, but a bottom-half final standing and we offer an explanation for this.

Viewing players as nodes in a network, with weighted, directed, edges between them illustrating influence, proves instructive for the team as a whole. For instance, algorithms grounded in Max-Plus Algebra can facilitate the identification of the strongest attacking duos, triumvirates and larger groups, all of which correspond to circuits in the network. The simplicity of this work makes it ripe for wider applicability and nuanced model development. Moreover, team structures are crucial to organisational success and, since our tools to identify key employees and groups are easily transferable to non-sporting organisations, we expect this work to be beneficial to management on a wider scale.

Success in First-Time Partnerships: Optimal Expertise Diversity and Divergent Ideation

<u>Alina Lungeanu</u>¹, Ryan Whalen², Neelam Modi³, Leslie DeChurch³, Noshir Contractor³

¹Northeastern University; ²University of Hong Kong; ³Northwestern University

Collaboration is of fundamental importance to modern scientific and technological development, and expertise diversity has emerged as an important factor in predicting the success of collaboration. While expertise diversity has typically been seen as the knowledge attribute of a group (e.g., between collaborators), we provide an additional theoretical and empirical conceptualization that considers whether collaborators' network knowledge is similar to the knowledge domain of their research output. Specifically, experience diversity or similarity can be assessed in at least two ways: between collaborators (dyadically) and between the researchers themselves and the substance of the research they engage in. We refer to these concepts as expertise diversity and divergent ideation. Expertise diversity measures the extent to which collaborators have distinct professional backgrounds, while divergent ideation represents how much the new research product diverges from what collaborators have previously worked on. While extensive research has explored the relationship between expertise diversity and innovation, few studies have examined how expertise diversity and the nature of the project (divergent ideation) jointly influence the success of first-time collaborations. This study addresses this gap by examining how these two factors—expertise diversity and divergent ideation—jointly influence both the impact of collaborative output and the likelihood of sustained collaboration.

To answer our research question we use data from 158,012 first-time partnerships recorded in the US Patent Office between the years of 1976 and 2012. We use natural language processing to estimate areas of expertise and to develop measures of expertise diversity based on inventors' collaboration networks. Specifically, we use a Doc2Vec model on granted US utility patents to produce a 300-dimension embedding that represents the content of each patent. First, we use the embeddings of an inventor's inventions to estimate their area of expertise (i.e. inventor's topical focus). Topical focus is operationalized as the centroid of inventors' prior work and is computed as the mean vector representation across all their outputs. Next, we operationalize expertise diversity as the cosine distance between a pair of inventors' topical foci and divergent ideation as the average cosine distance between a pair of inventors' prior expertise and the embedding location of their invention. Finally, we examine two distinct measures of partnership success—success in generating a high impact research output and success in establishing a lasting collaborative relationship.

Results show that collaborations exhibiting a high degree of expertise diversity produce more impactful products, while collaborations exhibiting a low degree of expertise diversity are more likely to collaborate again. Further, collaborations exhibiting a high degree of expertise diversity and a low-to-moderate degree of divergent ideation are most likely to create the highest impact inventions, but they are less likely to sustain their collaboration. We conclude our study by outlining the implications of our findings to the literature on diversity and technological innovation.

OS-164: Network Analysis for Textual Data in Social Media 2

Location: Room 206 Session Chair: Giuseppe Giordano Session Chair: Maria Prosperina Vitale

Invisible ties: Shared Content Exposure on Twitter Among Survey Participants

Paulo Matos Serôdio

University of Essex, United Kingdom

How independent are our online content exposures? Using data from Understanding Society's Innovation Panel Twitter Study (2007–2023), we reconstruct shared exposure networks of survey participants based on their engagement with tweets, accounts, and topics. This approach enables us to assess the extent to which two randomly selected individuals from a nationally representative sample are connected online—even when offline links are remote. Our preliminary analysis reveals that, on average, 32% of the Twitter accounts respondents engage with are shared with other survey participants,. We further explore how shared exposure varies by the type of platform behaviour (e.g., retweets and replies), while controlling for engagement metrics to mitigate biases from viral content. In addition to account-based networks, we construct content-based networks by leveraging transformer models and word embeddings to derive latent topics from retweeted content. Each individual's topic profile is created by aggregating the topic distributions of the tweets they engage with, allowing us to cluster users based on the mix of content they consume. We then examine whether these content clusters are independent of—or driven by— socioeconomic gradients such as age, occupation, and income. Our findings challenge traditional assumptions of respondent independence in survey research and offer novel insights into how digital environments both reflect and transcend offline social structures. Implications for social network research and digital survey methodologies are discussed.

Online Incivility: An Exploration of Brexit 2016 Discussions on Twitter

<u>Cristina Chueca Del Cerro</u>¹, Kyriaki Nanou¹, Moritz Osnabrügge¹, Julio Amador Diaz Lopez² ¹Durham University, United Kingdom; ²Independent researcher

Social media platforms have become a frequent forum for uncivil discourse. We conceptualise incivility as language containing ill-mannered expressions, insults, swear words, or disrespectful attacks against a person or group. This language undermines democratic discourse and contributes to the fragmentation of public conversation. This paper explores the use of uncivil language on Twitter during the Brexit referendum campaign (6 January - 23 June 2016). This was a period of renegotiating the UK-EU relationship that greatly divided the UK public. We analyse the temporal patterns of uncivil language using 23M Tweets, tracking how the tone of public conversation shifted as the referendum date approached. To classify Tweets, we fine-tune the BERTweet model on 30,000 annotated Tweets, which were created using professional annotators from Appen. The analyses revealed significant regional differences in the prevalence of incivility, which fluctuated as key political events and statements shaped public sentiment. To further understand the dissemination of uncivil language, we visualise retweet networks, mapping how public officials became the target of incivility over time. Our findings demonstrate that while incivility was pervasive throughout the campaign, its intensity varied by region and was strongly influenced by interactions with political elites.

Investigating the Structure of Racist and Xenophobic Discourse: A Causal Inference Approach

Anthony Cossari¹, Paolo Carmelo Cozzucoli¹, <u>Michelangelo Misuraca</u>² ¹University of Calabria, Italy; ²University of Salerno, Italy

The alarming rise of hostile rhetoric targeting both (im)migrants and marginalised groups has permeated online discussions, particularly across social networking platforms. These digital arenas, notably popular sites like Facebook and X, have unfortunately become breeding grounds for the dissemination of prejudiced views and intolerance, often fueled by misinformation and divisive narratives. This research critically examines the prevalence of intolerance and xenophobic discourses within the Italian social media landscape. By systematically collecting freely posted comments, we employ a community detection procedure on a term-by-term matrix to uncover the primary issues that emerge from these online debates. Furthermore, we use a Bayesian Belief Network (BBN) to elucidate, from a probabilistic perspective, the intricate relationships between these issues and other relevant covariates, including the discourse's emotional valence and propagation dynamics. This comprehensive integration

not only facilitates a causal inference approach but also unveils the key drivers and amplifiers of hateful and racist discourse, thereby underscoring the urgent need for informed intervention strategies against digital hate.

This work is part of the research project PRIN-2022 PNRR "Identification and Critical Analysis of Online Racism and Xenophobia against (Im)migrants and Roma people" (Project Code: P2022APKJL), funded by the European Union – Next Generation EU.

When Deep Learning Meets Social Network: A Hybrid Approach to Manage Online Incivility

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¹Institute of Service Science, National Tsing Hua University, Taiwan; ²Information System Department, Universitas Kristen Duta Wacana, Indonesia

Introduction

Online incivility disrupts digital interactions, negatively affecting users' mental well-being and engagement. Current detection methods rely on natural language processing (NLP) and keyword-based filtering, often producing high false positive rates. This study integrates Graph Neural Networks (GNN) with Social Network Analysis (SNA) and NLP to enhance incivility detection while minimizing impacts on everyday discourse.

Literature Review

Prior research highlights the detrimental effects of incivility, including increased polarization, emotional distress, and disengagement. Traditional NLP-based classifiers primarily focus on textual content but fail to consider relational context and user interactions, leading to misclassification of sarcasm, nuanced discussions, and indirect hostility. Although Graph Neural Networks (GNNs) and Social Network Analysis (SNA) have been used separately in social computing, there is a lack of studies integrating these techniques to enhance context-aware incivility detection. Our research addresses this gap by combining text-based, network-based, and deep learning-based approaches to improve accuracy.

Research Methodology

We collected 3,210 comments from Reddit's "worldnews" subreddit and labeled them. Our GNN model incorporated NLP-derived sentiment scores as edge features and SNA metrics (e.g., centrality, in-degree) as node features. The trained model was evaluated using F1-score, precision, and recall.

Findings

Our GNN model achieved an F1-score of 78.42%, outperforming traditional NLP models. Integrating network metrics significantly improved incivility detection accuracy, reducing false positives while maintaining high recall.

Discussion and Contributions

This study advances computational social science methodology by integrating deep learning and network structure approaches to moderate online incivility in social media. Our approach leverages existing methods by offering a hybrid method to manage online incivility. Practically, our approach can improve content regulation strategies, providing a hybrid approach for managing civility on social media

OS-224: Social Networks & Inequalities panel

Location: Auditorium Session Chair: Gianluca Manzo

OS-225: In memoriam Barry Wellman

Location: Auditorium Session Chair: Bernie Hogan

OS-226: In memoriam Harrison White

Location: Auditorium Session Chair: Jan Fuhse Session Chair: Michel Grossetti Session Chair: Philippa Pattison

OS-231: Hospitality suite (Zamansky Tower, Panoramic room, 120 persons, with rotation)

Location: Hospitality suite (Zamansky Tower, Panoramic room, 120 persons, with rotation)

OS-166: Network and Music: Empirical Approaches 3 Location: Room 105 Session Chair: Myriam Boualami

Songify Your Day: Modelling Interaction During a Co-Creative Musical Workshop

Chiara Broccatelli¹, Jürgen Lerner², Mary Broughton³

¹Universitat Autonoma Barcelona, Spain; ²University of Konstanz; ³University of Queensland

"Songify Your Day" was a collaborative songwriting project led by the University of Queensland's School of Music in partnership with the Moreton Bay Regional Council and the Community Action for a Multicultural Society program in Caboolture, a regional Queensland community. Guided by a renowned Bollywood singer and a celebrated Queensland-based composer, 25 participants from diverse cultural and linguistic backgrounds, aged 18 to 82, took part in an immersive week-long workshop. The experience culminated in a live performance featuring 13 original songs reflecting their native and English languages, cultural identities, and personal memories spanning 13 countries.

This interdisciplinary research project aimed to enhance creativity as a means of fostering human flourishing, promoting psychosocial well-being, and strengthening social engagement. Social network research (SNR) played a key role in uncovering the social dynamics intertwined with songwriting. To map these processes, we applied Relational Hyper Event Models (RHEMs), analysing group interaction and activities such as singing, movement, dancing, playing instruments, discussions, and collective decision-making. These activities were grouped into three interaction types: talking, singing, and cheering. After systematically recording who interacted with whom and when, we applied RHEMs to trace the evolving social connections that drove participants' engagement in artistic songwriting. Our analysis accounted for hierarchical structures, pre-existing relationships, and individual psychological status measured by the Mental Health Continuum Short Form (MHC-SF). The findings provided new insights into how SNR offered valuable theoretical and analytical contributions to understanding collective music-making practices.

Statistical modelling of Australian improvised musician networks

Lekshmy Hema Nair, Simon Chambers, Roger T. Dean

The MARCS Insitute for Brain, Behaviour, and Development, Western Sydney University, Australia

This study employs statistical modelling to investigate the evolution of the Australian improvised musician network over four periods (1970-1990, 1991-1997, 1998-2004, 2005-2023), with particular attention to the period following the introduction of the Creative Nation policy (1998). Using The Jazz Discography (TJD) dataset, which provides extensive data on Australian jazz musicians, the research aims to identify the processes that shape the formation of the network and, potentially, the improvisatory interactions within it. Notably, the period from 1998 to 2004 saw the highest number of recordings, which coincides with a significant restructuring of the network, possibly influenced by the policy's impact. To model the network's evolution, Exponential Random Graph Models (ERGM), Bayesian Exponential Random Graph Models (BERGM), and Latent Order Logistic Regression (LOLOG) models were applied. ERGM identified key network formation processes but revealed limitations, particularly in its tendency to exhibit degeneracy in triangle-based models, leading to the adoption of LOLOG. LOLOG offered a more flexible approach by accounting for network dependencies within a full probabilistic framework. Additionally, BERGM was utilized for cross-validation, ensuring that most predictors provided moderate to high acceptance with the observed network and aligned well with the prior expectations. A custom metric, "minTriadicClosure", was developed within the LOLOG package to measure the number of nodes participating in specified minimum numbers of triadic closures among collaborating musicians, highlighting isolated trios, and network islands disconnected from the larger clusters (a common scenario present among musicians collaborating frequently). The results demonstrate significant shifts in network connectivity, especially during the 1998-2004 period, where an increase in collaborative ties might suggest that cultural and policy shifts played a crucial role in reshaping the Australian improvised music scene, though questions remain about the lasting effects of these transformations.

Uncovering overlapping music streaming practices at several scales and beyond the seas

<u>Elina Marvaux¹, Marion Maisonobe¹, Thomas Louail¹, Robin Cura²</u> ¹UMR Géographie-cités, CNRS, France; ²UMR PRODIG, Université Paris 1 - Panthéon Sorbonne, France

Music worlds and especially the dynamics of local and translocal scenes are of interest for social network scientists as well as the influence of homogamy and sometimes propinquity to understand processes of musical taste formation and transmission (Crossley et al., 2015). Among SNA researchers, while the spatiality of music worlds is considered, it is rarely the main focus of research. In computational social science, recent works are taking the spatiality of music worlds into account. Way et al. (2020) analysed an adjacency matrix between music listening practices by country and the geographic origin of the artists listened to in each country. They show that both common official language and geographic proximity between countries increasingly shape listener streams during the 2014-2019 period. Computing similarity matrices, Lee et al. (2024) found a decrease in the co-occurrence of music discovered ("Shazamed") within post-soviet republics after the outbreak of the 2022 Russo-Ukrainian War at both the country and the city levels.

In this communication, we aim at measuring the extent to which musical streaming practices vary geographically on several scales and to explore the specific case of French overseas territories. Considering that musical streaming data have become an interesting source to measure socio-cultural proximities between territories, we rely on a dataset of 2.3 B of musical streams across 16 M of users on Deezer between 2020 and 2023. First, we study the co-occurrence of listened artists across countries at the world level using similarity measures. Second, we focus on the case of French departements and compare their patterns of musical listening taking into account the role of geographic distance in the observed results. Finally, we focus on the 5 French Overseas Territories having a departemental status. Sharing a common remoteness from mainland France, they all possess dynamic music scenes and traditionnal genres of their own, whereas, at the same time, being connected to the French and transnational music industry. To better characterise the linkages between these territories, 3.1) we measure the overlap between listening practices across them and 3.2) we compare the networks of co-listened artists in each one of them. By extracting subgraphs resulting from the difference between each pairs of networks, we intend to capture local sub-structures. Finally, 3.3) we consider the songs associated to more than one artist that are listened to within these French overseas territories. We partition this network to identify a common collaboration space between the most popular artists of these territories which could partly foster the proximity between them.

OS-46: Networks and Culture

Location: Room 106 Session Chair: Shan Shi Session Chair: Christian Stegbauer Session Chair: Iris Clemens

Competition and Collaboration among Indian Independent Musicians in the Platform Economy

Aditya Lal

University of Leeds, United Kingdom

An emerging scholarship has interrogated the changing nature of creative work under the influence of digital platforms; evaluating how "platformisation" may not only reshape how creative workers compete, but also how they cooperate for mutual benefit. Yet, this literature is generally Eurocentric, overlooking how the implications and dynamics of digital platforms may play out differently for creative workers in other contexts. This article investigates independent musicians in India; a country with a vast, influential, and distinctive music industry which is poorly understood in Global North scholarship. Through interviews with 41 Indian musicians and industry actors, it argues, firstly, that the dominance of film (especially Bollywood) music in India has constrained the infiltration of Western music platforms; secondly, that this dominance of Bollywood music has generated particular forms of selfexploitation, hyper-competition, and exclusion; and thirdly, that platforms have proven an opportunity- albeit ambivalent- for forms of cooperation among those excluded from opportunities in film music. The article makes two contributions to the sociological literature on creative work, and the role of platforms therein. It underlines the limits to platformisation when confronted with established and dominant institutions, where the latter continue to shape the experience of work and terms of the labour market; something not widely recognised in much of the discourse on the topic, especially in under-researched contexts in the Global South. It also sheds new light on the complex ways in which musicians respond to platforms, which in the Indian context both counteracted and reinforced hierarchical and hypercompetitive industry dynamics.
A mail art experiment as a socially engaged art practice as well as an SNA study

Jun Kanamitsu

Kyoto Sangyo University, Japan

Mail or correspondence art is an experimental art performance in which invited and/or noninvited participants are asked to send small-scale works through the postal service. During the 1960s-70s, Fluxus, an avant-garde Neo-Dada artists' network, performed several mail art events. Mieko Shlomi, who performed nine mail art events from 1965 to 1975, was a key figure. The Milgram's small-world experiments might have been scientific counterparts to these art events.

Mail art has sometimes been utilized to raise political awareness and protest oppressive governments, but too often, it was just for fun. Art forms vary from photo collages to visual poetry and artists' stamps. During the last Japanese general election period, I performed a preliminary political mail art event involving college students who took my sociology class. The students (n=270) were asked to draw a mind map of political issues randomly assigned from a list of ten political problems. A participant was instructed to email and connect with any listed student within a week. In the process, a famous mail artist participated as a mediator of the experiment and intervened in the event. Pre- and post-experiment surveys were conducted to test the effects of mail art activities. Eighty-one of one hundred eighty chains were connected, and just two were completed. The maximum length of chains is eight, with an average of 2.3. Mail art participation has a slight positive effect on political awareness; however, it does not positively affect voting in the election.

Artists, Artworks, and Galleries. A Socio-Semantic Network Analysis of Contemporary Art Production in Early Artistic Careers

Roberto Velázquez-Quiroz

Pontificia Universidad Católica de Chile - UC Chile, Chile

This presentation examines the social embeddedness of cultural production through a two-mode network perspective. Building on the duality approach (Breiger, 1974; Basov, Breiger, Hellsten, 2020), it explores contemporary art production from a socio-semantic standpoint, analyzing how the relationships between artists, artworks, and galleries shape the structural properties of the field. Specifically, the study tests hypotheses drawn from three key bodies of literature: (1) research that attributes contemporary art production primarily to power dynamics linked to individual characteristics such as gender, class, and educational credentials; (2) studies emphasizing the role of institutional networks in providing artists with social connections, framing art production as a function of visibility capital; and (3) perspectives that highlight the immaterial and content-driven nature of contemporary art, downplaying the role of artists in favor of the autonomous influence of artistic ideas.

The dataset comprises 1,520 artists and their artworks, along with records of 22,789 galleries where these pieces were exhibited. It was compiled using archival documentation from Chile's Ministry of Culture, Arts, and Heritage, specifically related to COVID-19 economic support policies in 2020. Artist-level variables include gender, public pronouncements, education, and sponsorship. To assess organizational dynamics between artists and galleries, an additional "visibility" variable was estimated following Lizardo's approach to Two-Mode Relational Similarity (Lizardo, 2024).

Methodologically, the study constructs a two-mode network linking artists to art topics, employing Structural Topic Models (STM) to identify themes from the 1,520 artwork descriptions provided by the artists. Topic estimation incorporates prevalence-level variables to account for document-level conditions affecting artistic content, such as materiality, critical reception, and market valuation. Artists represent the social dimension of the network, while topics capture the semantic structure. To test the proposed hypotheses, Exponential Random Graph Models (ERGMs) are applied to assess relational mechanisms that evaluate the impact of market dynamics on the emergence of new trends and genres in contemporary art.

The findings underscore the importance of a socio-semantic approach to cultural production and highlight the value of the duality framework and computational methods in the study of artistic forms.

Cultural Capital and Social Networks: An Ethnographic Study of Sex workers

Surbhi Dayal Indian Institute of Management Indore, India This paper provides an in-depth ethnographic examination of the practice of sex work among the Kanjar community in the rural areas of India, through the lens of social networks and cultural capital. Historically, Kanjar women were traditional entertainers during their nomadic or semi-nomadic periods. This study specifically focuses on the contemporary involvement of unmarried Kanjar women in sex work and how their social networks shape and sustain this practice. The research traces the historical trajectory of the Kanjar community, highlighting their precolonial role as entertainers, their classification as a criminal tribe during the colonial era, and their postindependence transition to a settled and denotified tribe in India.

The study delves into the transformation of Kanjar women from traditional entertainers to modern-day sex workers, exploring how social networks facilitate the transmission and perpetuation of cultural capital associated with this occupation. It also examines the influence of technological advancements and media exposure on the practice of sex work among the Kanjars, emphasizing the role of social networks in adapting to these changes. The research reveals the emergence of new forms of entertainment occupations, such as dance bar girls and performers at parties in Middle Eastern countries. The paper concludes that the cultural sanction of the occupation, the right to property for unmarried women engaged in occupations related to traditional entertainment, and their autonomy in decision-making are reinforced by their social networks, providing these women with a sense of security. This ethnographic study focuses on the role of community networks in preserving and promoting the culture and traditions of the Kanjars by making necessary adaptations in their occupation. It challenges the prevailing assumptions of governmental and NGO policies, as well as popular media representations, which often erroneously presume a need for their rehabilitation.

Deviations from Cultural Consensus about Occupations: The Duality of Occupation Meanings and Americans' Meaning Communities

<u>Aidan Combs</u>^{1,2}, Gabriel Varela³, Lynn Smith-Lovin³, Dawn T. Robinson⁴, Stephen Vaisey³ ¹University of Bamberg, Germany; ²The Ohio State University; ³Duke University; ⁴University of Georgia

We examine ratings of 642 occupations by a national online sample of U.S respondents in 2019 (Freeland et al. 2020). We analyze the respondents' ratings of occupations on three dimensions of cultural meaning-evaluation (good versus bad), potency (powerful versus powerless), and activity (lively versus quiet). We take deviations of respondents' individual ratings from population means, focusing on deviations from consensus rather than consensus itself. Drawing on Brieger's (1974) work on duality, we examine two projections of the initial rectangular matrix of correlated deviations. Our two projections represent (1) the cultural communities that people form when they differ from consensus in similar ways, and (2) the clusters of occupations that move in similar ways across those subcultures. Correlations among the residuals at the person level are indicators of shared subcultural differences from the mainstream-different ways of meaning-making about what is valuable and worthy about occupational work. At the occupation level, the structure represents schemas for which occupations share common elements and move together when those elements are evaluated differently. We use dyad models to investigate what metrics of occupation similarity predict similarity in deviations from consensus. We find that similarity in affective meaning (evaluation, potency and activity), material requirements, rewards, and work characteristics all predict clustering at the occupation level. Demographic composition of occupations is less important. We find that older respondents, White respondents, and higher income respondents tend to discriminate more between occupations on evaluation and potency. Respondents who are more similar in age have more similar patterns of deviations. However, occupation-level variables are in general much stronger predictors of residual structure than respondent-level variables.

OS-61: Political Networks

Location: Room 107 Session Chair: Manuel Fischer Session Chair: James Hollway Session Chair: Mario Diani Session Chair: Dimitris CHRISTOPOULOS

Actor Networks and Coalition Formation in a Nascent Subsystem Over Time

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In nascent policy subsystems, political actors have a hard time identifying coalition partners, given that knowledge about subsystem boundaries (both in terms of relevant issue and actors) are unknown, and the belief systems and

policy preferences of potential coalitions partners (as well as opponents) are difficult to assess. Actors in such subsystems are known to rely on prior knowledge and deep core beliefs for forming coalitions. With developing coalition structures, actors are further known to rely on the devil shift as a cue to structure the actor constellations and coalitions around them. In this paper, we trace the development of actor constellations and coalitions based on actors' shared problem perceptions, actors' shared blame attribution to others, actors' shared solution propositions, and actors' shared responsibility attributions to others. We expect coalitions to start forming based on the first, and continue forming around the four dimensions over time, in the order we discuss. Methodologically, we rely on texts from public media (two newspapers per country / subsystem) that we coded and transform into networks of actors' similar profiles with respect to problems, blame, solutions, and responsibility. We thus analyse four network layers over four periods, in two subsystems that differ on the institutional setup but share the substantive issue of AMR.

Brexit, Borders, and Buzzwords: Unravelling the Networks of EU Messaging in UK Media

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This study examines how the European Union's messages have been disseminated in the United Kingdom over five years using a network-based approach to analyse their representation in three selected newspapers (The Times, The Guardian and Metro). By integrating text mining, natural language processing, and social network analysis, the structure, diffusion, and reception of EU-related discourse in British media were investigated.

It is argued that this representation played a substantial role in fostering anti-EU sentiment, ultimately leading to Brexit. Amid challenges in EU communication and anti-EU feelings on the rise, alongside notable divisions within the bloc, there is an urgent call to gain a more thorough understanding of these developments. This study addresses this urgency by examining the dynamics between EU communication and the perspectives presented in the media.

While existing research has extensively explored the portrayal of the EU in the press and media discourse (Coleman et al., 2022; Krzyżanowski, 2019; Maccaferri, 2019; Simpson & Startin, 2022; Walter, 2019; Zappettini & Krzyżanowski, 2019), very little attention has been paid to the relationship with the EU's own communication efforts. Previous studies have explored aspects such as framing, discourse, patterns and external drivers of media coverage (Brosius et al., 2019; Gattermann, 2013; Schuck et al., 2014; Vliegenthart et al., 2008), as well as looked into messages sent by the European Commission (Rauh, 2022). While insightful, existing research has predominantly focused on media-centric analyses, overlooking the influence of the EU's communication strategies on media portrayal and vice versa. This study explores this interplay, particularly in the pre- and post-Brexit landscape, to uncover the dynamics of this interrelationship.

Drawing upon previous agenda-setting research and employing a network theory approach, this study examines communication dynamics during the Brexit negotiations. It identifies key actors and recurring narratives that have shaped public perceptions of the EU, while also tracing how messages spread across various news sources. Additionally, the research explores the role of intermedia agenda-setting in shaping media coverage. Through network visualisation and centrality measures, the study reveals clusters within the networks, finds co-occurring themes and ideological alignments, and the impact of the EU's communication on media framing. The investigation is grounded in the examination of the EU's communication and publications in the British media, spanning the period pre- and post-Brexit, up to the Windsor Framework agreement (2018 – 2023).

The findings contribute to a deeper understanding of how institutional messaging operates within national media ecosystems, shedding light on the mechanisms of information diffusion and public discourse formation, as well as organisations' agenda-building powers. This study also advances methodological discussions on the integration of network theory and text analysis, demonstrating their potential for examining media influence and information flows. Finally, it uncovers the complex network of political communication dynamics during a period of significant geopolitical change.

Discussion Networks in Conflict: Whom to Talk to and What to Discuss?

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In the aftermath of violent intergroup conflicts, this article examines the role of interpersonal discussion networks in shaping intergroup contact and collective action. Taking a cue on discussion networks for political action, the paper underscores the significance of localized, interpersonal communication channels in providing new insights into the conflict-related beliefs of both minority and majority groups.

These networks are thought to foster social embeddedness by influencing individuals' worldviews and sense of agency, while facilitating ongoing social interactions that serve both as conduits and filters for information. Through the exchange of ideas and information, discussion networks create opportunities for action, emphasizing the well-documented impact of political discussions on mobilization.

Using a unique dataset on interpersonal communication (N= 1500) in Sri Lanka (2017–2020), we first map these discussion networks and describe their characteristics—specifically, whom individuals talk to and the issues they discuss. Second, we analyze the features of discussion networks within minority and majority groups to reveal their correlation with beliefs and forms of action. Our preliminary findings suggest that network size negatively influences the attitudinal openness of minority groups, while a growing subset of discussion partners focused on the war increases support for compensatory rights and preferential policies. Ultimately, the study of these networks contributes to building resilience against ethnic opposition in post-conflict environments.

Do Transboundary Crisis Managers Learn from Past Experiences? Comparing the EU Responses to Two Cyclones in Mozambigue

<u>Carlos Bravo-Laguna</u>, Wout Broekema Leiden University, Netherlands, The

Despite the increasing scholarly attention to relational dynamics concerning the coordination of transboundary crisis responses, we still have too little evidence concerning the evolution of the structures managing these incidents. To address this literature gap, this study examines the humanitarian responses to two emergencies caused by two of the deadliest disasters affecting the Southern Hemisphere in recorded history, namely Cyclones Idai and Kenneth in 2019 and Cyclone Freddy in 2023. More specifically, it compares the policy networks involved in the reactions to these episodes in Mozambique. The analysis will specifically focus on how the EU Member States and supranational organizations coordinated themselves and with other actors during these episodes. While longitudinal crisis network studies are rare due to their demanding data collection requirements, they allow for linking structural changes over time to different policy outcomes. To do so, this paper relies on a combination of Temporal Exponential Random Graph Models (TERGMs) and semi-structured interviews. Data was extracted from a survey distributed among individuals managing these episodes. This study has relevant implications for practitioners and theorists alike, since it provides a greater understanding of the extent to which transboundary crisis network managers replicate successful patterns and apply lessons learned from previous incidents.

OS-16: Corporate Networks

Location: Room 108 Session Chair: Roy Barnes Session Chair: Mohamed Oubenal Session Chair: Roberto Urbani

Community Structure Networks and Business Group Boundaries: Evidence from Listed Companies in Taiwan

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Business groups are widely recognized as a prominent feature of East Asian economies. However, how to define the boundary of a business group remains a question. Deviating from previous studies that defined business groups by ultimate control, this study approaches the issue from an angle of community network structures. Using director interlocking networks among Taiwanese publicly listed companies from 2010 to 2020, we apply the method of community detection to delineate corporate communities and compare the results with those by traditional definition. Our finding suggests that while there are substantial overlaps between two methods, community structures have better power of prediction for outcomes. Firms associated with corporate communities exhibit greater performance advantages than to the business group defined by ultimate control. Given the rapid transformation of East Asian capitalism, we believe community structure is a better method to analyze business groups and more studies need to be done.

Corporate Clubmen of New York: Social Capital at the End of the Gilded Age

Roy Barnes

UM-Flint, United States of America

Recent commentaries (notably popularized by Robert Reich) have referred to the political economy in the United States today as the "Second Gilded Age." While America's first Gilded Age was characterized by a tremendous concentration of wealth and power, it also represented an era during which exclusive private clubs provided meeting spaces and served as indictors of their members' prestige. This paper examines the role such prestigious social clubs played in integrating the corporate elite at the end of the first Gilded Age in the United States. Utilizing board interlock data from 1904 and the social club memberships that were listed in Rossiter's Club Men of New York (1901-2), the initial analyses demonstrate that membership in the 61 social clubs listed in the Social Register (1896) greatly increased director centrality and reduced social distance. The second portion of the paper interrogates further a potential division of labor among social clubs as a mechanism of cohesion among the directors of the nation's largest corporations. By focusing the effects of membership in clubs emphasizing wealth, ancestry, culture or politics, the results show that these clubs make unique contributions to the integration of the social network of interlocking directors - that is, the four different types of clubs form non-redundant ties among these corporate elites. However, just because an individual lists a membership in these exclusive clubs does not necessarily mean substantive interactions occur between fellow club members or on the premises of these clubs. To assess the class formation effects of these social clubs, the final set of results moves beyond the structural conditions for interaction, to analysis of the how one prominent member used his memberships. Through an analysis of J. Pierpont Morgan's Day Books, these data support the assumption that elite social clubs mattered. These results bolster the argument that ties formed through mutual affiliations in these bastions of exclusive power and prestige did in fact contribute mightily to the cohesion of the corporate directors at the end of the United State' first Gilded Age.

Kinship and bureaucracy in organizations: An examination of informal boundary spanning ties under two organizing systems

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Research has examined the relationship between formal bureaucratic structures and informal network structures within organizations. However, bureaucracy is not the only set of rules that governs organizations. Kinship has an important influence on how many small firms are organized and from a global perspective it also has an influence in large firms. In this paper we examine how informal organizational structures—specifically advice seeking networks—combine with kinship and bureaucracy in organizations.

Informal advice relations across units in an organization have been shown to incorporate knowledge that leads to greater productivity, innovation, and competitive advantage. However, boundary spanning ties require time and energy to create and maintain. Research has focused on understanding the mechanisms that underlie cross-unit ties in the context of bureaucratic formal rules and structures. In this paper we expand this focus to examine what occurs when there are two potentially competing sets of rules within an organization.

Our baseline hypothesis is that advice seeking is more likely to be seen within organizational boundaries and less likely to cross organizational boundaries. However, reciprocity within the informal advice network creates a level of trust that facilitates advice seeking across organizational boundaries. We then theorise that shared kinship membership facilitates advice seeking across organizational boundaries.

We gathered data on 604 employees in a financial institution located in West Asia. We use an exponential random graph model (ERGM) to analyse our data. Our initial findings suggest support for our hypotheses.

Losing Sight of the Big Picture? How Hierarchy and Networks Shape Strategic Discussions in R&D Projects

<u>Marie Ritter</u>, Freya Grimme, Kristien Klaka, Simone Kauffeld TU Braunschweig, Germany

Collaborative R&D projects tackle major societal challenges, such as sustainability and the circular economy (CE). However, as projects progress, day-to-day operations can overshadow strategic goals. While leaders are expected to focus on long-term objectives and employees on execution, it remains unclear how hierarchy and network structures influence engagement in big-picture discussions. This study examines whether strategic goals remain central in project interactions or become confined to specific parts of the network—and how hierarchical position and network structures shape these discussions.

Using longitudinal network data from two interdisciplinary R&D projects in CE ($N_1 = 79$, 29.1% leaders; $N_2 = 54$, 40.7% leaders), we analyze conversational patterns during project meetings. Participants reported whom they spoke with and whether their discussions focused on operations, future projects, or big-picture topics (e.g., sustainability, CE).

Preliminary results suggest that big-picture discussions were limited to small, isolated cliques rather than widely shared across the network. Surprisingly, hierarchical position and network centrality had little impact, indicating that formal leadership alone does not ensure a sustained strategic focus. Instead, strategic discussions often remained disconnected from broader collaboration.

These findings underscore the need for leaders to monitor when strategic goals fade and actively reinforce the project's broader transformation efforts. To ensure meaningful contributions to circular supply chains, leaders must embed large-scale objectives in daily collaboration. At the same time, strategic discussions should extend beyond central figures, empowering peripheral members to engage and ensuring that big-picture goals remain an integral part of project efforts.

A class apart? Social networks and political donations of the UK financial non-financial business elite.

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With the upsurge in scholarly and policy interest in elites and inequality since the 2008 financial crisis, particular attention has been paid to finance and financiers as key structures and agents driving economic inequality. But while there have been many critical studies of financialisation, and several influential ethnographies of the financial sector, there have been few systematic empirical studies examining financial elites. This paper examines the financial elite in the UK - which has historically had a highly influential financial sector and remains an important hub for global finance - along with a comparator population of non-financial UK business elites. It details the demographic character of both these groups; the degree of cohesion of each via board interlocks in business and the third sector; the level of integration between them; as well as the nature and extent of their political engagement via an analysis of their political donations.

Token-based gender bias in network exchanges and the role of agency

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Tokenism theory explains how individuals from underrepresented groups experience bias in professional networks. This paper extends tokenism theory to network exchanges, arguing that gender bias in network benefits is influenced by women's numerical representation and individual agency. We hypothesize that women in maledominated networks receive fewer network benefits than men, but this disadvantage diminishes once women's representation crosses a critical threshold. We further explore the role of agentic behaviors in mitigating these disadvantages. Specifically, we argue that increasing visibility and reducing information asymmetries help women counter biases that limit access to resources and referrals.

Our study contributes to tokenism theory by demonstrating how proactive behaviors can alter token dynamics in networks, shifting the focus from structural disadvantage to individual agency. Additionally, we advance network theory by highlighting how an individual's status within their alters' networks—not just their own network composition—shapes access to benefits. Our findings suggest that while agentic behaviors can reduce bias, they do not fully eliminate structural barriers.

This research has practical implications for fostering gender equity in professional networks. Organizations should create environments that encourage women's participation and facilitate strategic interactions to mitigate bias. Future research should examine how these behaviors interact with network structures, perceptions of agency, and long-term career outcomes. By integrating agency into tokenism and network theories, this paper offers a dynamic perspective on how gender disparities in networks can be addressed.

OS-130: Crime and Networks 2 Location: Room 109 Session Chair: Tomas Diviak

Co-evolution of Cooperation and Conflict among Organized Crime Groups

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Deals among organized crime groups (OCGs) can turn sour and may lead to conflict – sometimes violent. Yet, conflicts can be set aside when a new, maybe lucrative, joint opportunity arises. Building on previous works on cooffending and network violence among OCGs, we bring together cooperation and conflict and study their coevolution over time. For this, we leverage police record data (2004-2015) provided by Thames Valley Police – the largest non-metropolitan police force in England and Wales. The data consist of 25,977 organized crime-related events in which at least one OCG member was involved. In the study, we focus on 147 OCGs, who were involved in 79 cooperation and 141 conflict events.

We study these events using relational event analysis through dynamics network actor models (DyNAMs). These models were proposed for relational event analysis from an actor-oriented perspective. To be able to study the rate of cooperation in this modeling framework, we propose new methodology to estimate rate models for undirected relational events using ideas from multiple imputation. Having estimated both rate models and partner choice models for cooperation and conflict, we find a strong interdependence between the two criminal networks among the OCGs. Yet, the event rate and partner choice of the groups are differentially affected by their network position (e.g., degree, embeddedness) and partner characteristics (e.g., primary criminal activity) for the two types of relational events. As the co-evolution of cooperation and conflict in the criminal context so far remained largely unexplored, this study fills a gap in our understanding of the dynamics underpinning organized crime operations.

Exploring the Dynamic Interplay between Communication and Co-offending Using Relational Hyperevent Data on Italian Mafia Networks

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Aims

This study explores the duality between criminal actors and relational hyperevents in an Italian mafia network, focusing on co-offending and communication. Relational hyperevents, defined as time-stamped interactions between two or more actors, provide a granular view of network evolution.

We distinguish two ontologically different event types: communication (sharing information/resources to commit a crime) and co-offending (the crime's realization). We argue that these event types are mutually constitutive— communication precedes co-offending in organizing criminal activity. This reasoning extends beyond criminal networks to scientific, political, and artistic networks, where collaborative interactions (e.g., communication) precede outcomes (e.g., publications, legislation, or artistic productions).

To test this, we analyze three multiplex relational mechanisms—triadic closure, interaction repetition, and interaction accumulation—alongside their uniplex counterparts and exogenous factors (gender, age, leadership, locale affiliation, and kinship). Gender, age, and leadership are examined through selection/activity and homophily, while kinship and locale affiliation are assessed in relation to communication and co-offending.

Data & Methods

We use court records from Italian mafia investigation Infinito. Infinito documents the 'Ndrangheta's drug-trafficking and territorial expansion in Lombardy, comprising 353 actors and several hundred events.

We apply Relational Hyper-Event Models (RHEM), which conceptualize polyadic interactions as hyperedges in a hypergraph. RHEM, combined with high-temporal-resolution data, allows us to model the interplay between cooffending and communication. Using the eventnet software package, we operationalize relational mechanisms and generate alternative (unobserved) non-events. We then estimate effects via a Cox proportional hazards model, identifying what characteristics make future events more or less likely.

Results

Preliminary results indicate that the network is held together primarily by communication ties, while co-offending is fragmented, sometimes occurring as single-actor crimes. Ignoring the relational hyperevent nature of the data could lead to significant information loss. Communication events (meetings and phone calls) are moderately correlated, and co-offending lags behind communication events.

Our RHEM analysis supports our hypothesis: communication precedes co-offending, especially in interaction repetition (within actor subsets). Notably, we find no evidence of triadic closure, contradicting existing social and criminal network research. Instead, interaction repetition explains observed closure effects. Additionally, uniplex interaction repetition and age- and leadership-based activity and homophily are significant for both event types.

Conclusions

We demonstrate RHEM's utility in criminal network research and propose that traditional triadic closure effects may be artifacts of data aggregation rather than genuine actor tendencies. This has implications for criminal network studies using archival data.

Our findings bridge the gap between literature on the social organization of crime and co-offending networks, with potential applications in law enforcement, particularly in designing time-sensitive intervention strategies. Lastly, we suggest that distinguishing between process-oriented and outcome-oriented events can enhance network research in various domains, such as scientific collaboration and co-authorship analysis.

The impact of city attractiveness on urban crime

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Urbanization has profoundly reshaped population distribution, with over half of the global population now living in cities, and has created new challenges in understanding urban issues such as crime. Despite this urban shift, the interplay between population dynamics, mobility, and crime remains poorly understood. In this work, we investigate how commuter flows, as a proxy for human mobility, can quantify the attractiveness of cities and shed light on differences in crime rates across urban regions in Great Britain.

We use commuting pattern data to explore criminological theories connecting population dynamics with crime [1]. While cities attract more people, they also experience higher levels of social anonymity, reduced community cohesion, and increased opportunities for crime [2, 3]. We employ journey-to-work census data for over 8 million workers in the UK to construct a directed network where nodes represent cities and edges capture commuter flows. We hypothesize that city attractiveness, as measured through the network, explains the non-linearity in how crime scales with population. We perform probabilistic scaling analysis [4] to assess the non-linearity in the relationships between attractiveness, commuter numbers, and crime types.

Our results reveal a positive correlation between commuter attractiveness and crime rates, with significant variations across crime types. Hub cities with high commuter inflows exhibit higher crime rates, supporting theories that transient populations weaken social control. Interestingly, certain crimes, such as theft, display superlinear scaling with attractiveness, while others, like burglary, align more closely with static population metrics.

This work advances the literature on urban crime by combining mobility network data and scaling analysis with criminological theories. By quantifying city attractiveness and examining its influence on crime, we present a novel framework for exploring the mechanisms underlying urbanization.

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Understanding Youth Violence in the UK: A Latent Space Approach

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Crime is a complex phenomenon influenced by social, spatial, and contextual factors. Traditional statistical methods have long been used to analyse crime data, yet network-based approaches remain underexplored despite the inherently relational nature of criminal activity. Representing crime data as a network enables a more comprehensive understanding of its structure, capturing interactions between crimes, locations, and offenders that traditional methods often overlook.

This study examines a mid-size British police force dataset containing offender-victim relationships from crimes committed over a 46-months period. Given the dataset's richness, two network representations are constructed: a co-offending network, where a link between two suspects is established if they participated in the same crime event, and a directed network that links offenders to victims. To uncover latent structures within the data, we apply latent variable models that help provide deeper insights into broader crime patterns.

Specifically, we investigate how exposure to violence influences the behaviour of non-violent offenders by assuming that an individual's propensity for violent acts is influenced by the violent behaviours of connected actors and their position within a latent social space. Moreover, recognising that offender connections often arise from shared social, spatial, or contextual factors, we also cluster network edges to reveal underlying structures. This approach would allow to better understand the latent environments in which criminal associations form and explains why offenders participate in the same events. Ultimately, these methods offer valuable insights into the mechanisms driving criminal behaviours, providing a clearer, more nuanced perspective on UK crime patterns.

Was it a Washout? Analyzing the influence of a high intensity, countywide gang crackdown on the formation of new co-offending relationships

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Purpose: In 2021, the US Marshals Service (USMS) partnered with law enforcement agencies across Galveston County, TX to conduct Operation Washout (OW), a 10-day operation intended to reduce violent crime through the execution of arrest warrants targeting gang members, firearm, and drug law violators. This study examines the impact of OW on the co-offending relationships of OW arrestees.

Methods: Arrest data for all of Galveston County are scraped from Police2Citizen Daily Bulletins and used to construct pre- and post-OW co-offending networks. These networks consist of individuals arrested during the intervention period, as well as all co-offenders within the first two neighborhoods. Stochastic actor-oriented models are estimated to model the rate that new co-offending relationships form following OW.

Results: Fugitives arrested as part of OW occupied brokerage positions in the network. Arrest during the intervention precedes a reduction in the rate that new co-offending relationships are formed. However, the rate that fugitives established new co-offending relationships was largely resistant to arrest.

Conclusions: Consistent with research on Operation Triple Beam, USMS-led fugitive operations appear to resemble broker targeting strategies proposed by network criminologists. Despite the selection of appropriate operational targets, fugitives' ability to forge new co-offending relationships remains unimpeded by OW arrest.

Detection of fraudulent practices in the Mexican public procurement network

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Corruption, collusion, and fraud in public procurement (PP) have a long history in research (Fazekas et al., 2016; Dávid-Barrett and Fazekas, 2020); however, only some studies have accounted for the relational aspects of these phenomena—specifically, the network created by government agencies and suppliers linked through the common signature of a contract (Wachs and Kertész, 2019; Lyra et al., 2022).

Our study continues the analysis of PP as a network phenomenon, using national-level datasets released by the Mexican government over twelve years (2011–2022). We developed a method based on corruption indicators, network information, and sanction data to detect likely fraudulent contracts. We investigated the application of Positive-Unlabeled Learning (Jaskie and Spanias, 2022), a specific machine learning task that handles cases with only a subset of positive examples. We integrated different estimations of the unknown true proportion of the positive class (sanctioned suppliers) and evaluated their performance against a random model. Our methodology achieves an average precision score between 75% and 85% in the top 5% of prediction scores, compared to 30% for a random classifier.

Moreover, since we are interested in public policy interventions against fraud and corruption, we analyzed the feature importance of the model using Shapley Additive Explanations (SHAP) values (Lundberg and Lee, 2017). We discovered that the most influential features in the model are the clustering properties of the network. For example, the neighborhood proportion of direct contracts –contracts assigned with no competition–, the neighborhood average corruption risk index (Fazekas et al., 2016), and competitive clustering –the number of cycles over the number of paths of length three for a buyer (Wachs et al., 2021; Fazekas and Wachs, 2020)– are the three most important features of the model.

By analyzing the SHAP dependence plots of the model, we observed a non-linear relationship between SHAP values and the network features. For instance, in the neighborhood proportion of direct contracts, most likely positive (fraudulent) contracts are concentrated at middle-high levels of the feature, with a sharp decline in values close to one. This indicates that contracts in neighborhoods composed entirely of direct contracts are not necessarily the most fraudulent.

In conclusion, by combining multiple data sources and applying advanced machine learning techniques, we significantly improve the identification of high-risk contracts and suspicious players in the PP market, highlighting the relevance of network and contract characteristics.

OS-211: Networks, Collective Action, and Social Movements 3

Location: Room 112 Session Chair: David Benjamin Tindall Session Chair: Mario Diani

"In fact, there's a Taylor Swift song that explains this": The Chilean Swiftie Community and Social Media Activism Against Gender-Based Violence.

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The main objective of this study is to analyze how Taylor Swift's fan community, globally known as Swifties, leverages the power of social media to take political stances on gender issues. A qualitative research methodology was employed through thirteen semi-structured interviews to achieve this goal. The findings reveal that Taylor Swift and her artistic expressions play a fundamental role in how the Swiftie community responds to the issue of gender violence. This phenomenon is closely related to the identification process with the artist and the values she represents, manifesting in constructing parasocial relationships. Additionally, it was identified that the WhatsApp platform is used to organize among community members. At the same time, other social networks such as Instagram, Twitter, and TikTok serve as public platforms for addressing issues related to gender violence, highlighting the power of digital platforms in activism.

Digital Castes: social media networks and the reinforcement of caste-based cultural identity in India

Dhyan Singh

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Social networks play a crucial role in shaping and sustaining cultural identity, particularly in caste-based societies like India. This study examines how caste identity is maintained and reinforced through social media networks, focusing on digital communities on platforms such as Facebook, WhatsApp, and Twitter (now X). Using social network analysis (SNA) and discourse analysis, we explore how caste-based cultural norms, traditions, and narratives are shared, debated, and transformed within online networks.

The study employs mixed methods, combining computational text analysis with in-depth interviews of Dalit and upper-caste users to understand the role of digital spaces in cultural preservation, resistance, and change. Prior research has highlighted the dual impact of digital platforms both as spaces for empowerment and as tools for reinforcing hierarchical social structures. Our findings indicate that while social media provides a platform for marginalized communities to assert their identity and challenge hegemonic narratives, it also fosters echo chambers that reinforce traditional caste hierarchies.

By analyzing hashtag activism, closed-group discussions, and influencer networks, we demonstrate how castebased discourse is mediated in digital spaces and how it impacts social mobility and activism. This study contributes to the growing field of digital caste studies by mapping power dynamics within online communities and assessing their broader implications for social justice movements. The paper discusses the implications of these digital caste networks for social mobility, activism, and the future of caste-based social relations in India.

Keywords: Social media networks, caste identity, digital communities, cultural preservation, social mobility

The Relative Importance of Social Media Ties and Organizational Affiliation Ties for Explaining Environmental Activism.

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The social movements literature has established that social networks are important for the micromobilization of individuals for participation in collective action and social movements (both for initial recruitment, and for ongoing participation.) However, there continues to be uncertainty and debate about the relative importance of virtual and non-virtual network ties to these processes. This study utilizes social survey data and Twitter data, from environmental movement participants, to examine the relationship of social media ties and organizational affiliation ties to environmental activism. These data are analyzed using social network centrality analysis and fuzzy set qualitative comparative analysis. We consider the extent to which these different types of ties are involved in unique pathways to activism. We briefly discuss the implications of our findings for social movement organizers. We also consider the implications of the changing nature of the social media landscape for the processes we examine.

OS-188: Scientific Collaboration Networks: data collection and quality, methods, models, and empirical application 3

Location: Room 114 Session Chair: Luka Kronegger Session Chair: Alejandro Espinosa-Rada Session Chair: Viviana Amati Session Chair: Marjan Cugmas Session Chair: Susanna Zaccarin

Towards a Network Ecology of Scientific Fields: Contextual Moderators of Network Processes in Biomedical Research between 1980 and 2020.

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Scientific networks are key to understanding knowledge creation, and a rich tradition of studies investigates how networks of individual researchers or teams influence their success and creativity. However, less attention has been paid to the question of how networks vary between fields. In this study, we investigate how network processes-such as preferential attachment, homophily, and selection, as well as influence based on similar intellectual orientations-vary across scientific fields for the first time. We introduce a theoretical framework that extends a network ecological perspective to the domain of science and test it by analyzing collaboration and citation networks among ~4.8 million authors and ~12.5 million research articles in over 800 scientific fields derived from the PubMed knowledge graph and OpenAlex. We use relational hyper-event models (RHEMs) to study which contextual moderators-e.g., size, demographic composition, funding type and volume-foster certain network processes. For instance, our analysis allows us to investigate whether preferential attachment in collaboration and citation networks is stronger in fields that rely more on external funding or whether fields with an unbalanced gender composition show more gender homophily in collaborations. Our study makes two primary contributions: first, it provides the first large-scale analysis of network processes in biomedical research; second, it examines how these processes vary across fields. Our results are of interest to scientists and policymakers alike, as they allow us to map which contextual characteristics contribute to detrimental network processes, such as strong gender homophily or an excessive accumulation of resources by scientific elites.

Two decades of reporting practices in social and personal network research: insights from REDES journal

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In this comprehensive study, a group of researchers evaluated the reporting practices of relational data across 363 articles published in the REDES journal from 2002 to 2023. The approach involved a meticulous analysis of keywords, themes, and network metrics documented in these articles, followed by an assessment against 18 established reporting recommendations. This method allowed us to identify best practices and potential areas for standardization enhancement in future publications.

The findings reveal a broad range of network metrics and significant diversity in reporting styles. These variations underscore a critical challenge in ensuring comparability and replicability across studies, highlighting the pressing need for standardized reporting formats. A detailed examination shows inconsistent implementation of existing guidelines, pointing towards opportunities for refining these standards to improve their practical application.

The results emphasize the necessity of clear and coherent guidelines that aid in peer review processes, help train emerging researchers, and enhance consistency in scholarly outputs. The proposed recommendations advocate for precise definitions of network boundaries, thorough descriptions of data collection methods, and clear operationalization of network links. Adopting these practices will enhance the transparency and quality of network research, ultimately supporting more robust, replicable, and theoretically sound studies.

The researchers advocate for ongoing revisions of these guidelines to keep pace with methodological advancements in network analysis and evolving academic needs.

Uncovering core and periphery structures in scientific collaboration through a community-based analysis of Italian academic scholars

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The growing complexity of networks has driven the development of various methodological approaches to uncover structural patterns, with applications across multiple fields. In the context of scientific collaboration, these methods offer valuable insights into the pathways of knowledge transfer.

This study introduces a novel approach for analyzing scientific collaboration by applying community detection and core-periphery analysis to a co-authorship network, where nodes represent authors and edges represent co-authored publications. Our analysis examines the collaboration patterns among Italian academic scholars from three distinct fields (statistics, sociology, and business) over a ten-year period (2012–2022). The study utilizes publication data sourced from Scopus and the Ministero dell'Istruzione e del Merito (MUR).

Unlike traditional core-periphery detection methods that focus on the classification of individual actors, our approach identifies core and peripheral communities within the network. To achieve this, we develop an innovative methodological framework building on a stochastic block model and optimizing an objective function that incorporates both inter-community connection density and strength. We further examine how author-specific characteristics, i.e. the academic field, influence community formation.

Our findings provide a foundation for assessing collaborative trends, knowledge diffusion, and the role of cohesive subgroups, contributing to a broader understanding of research networks.

Using SNA to Untangle the Lineage of Ambiguous Ideas in Literature

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An ambiguous idea rarely remains confined to a specific domain. Some, like free speech, values, and diversity are applied to broad swaths of society, becoming relevant to a wide array of citizens in many different contexts. The wide application of ambiguous ideas creates different emergent and evolutionary pathways for their development and use, resulting in a proliferation of literature and competing or even contradictory terminology. Developing insight into such ideas that diverge or coalesce within a community requires tools capable of untangling their lineage across a wide array of academic disciplines over several decades.

We will present three innovative applications of Social Network Analysis (SNA) methods to explore the emergence and evolution of accountability in higher education across a collection of 450 peer-reviewed articles published from 1974-2017 and their corresponding 12,270 references. First, we integrate qualitative data from articles and references into new interactive joint displays called Narrated Network Diagrams, creating opportunities to more accurately assess themes and meanings in literature by connecting structures in co-citation networks with relevant relational stories. Second, we elevate time in the analysis procedure to capture the dynamism of knowledge formation. Third, underutilized descriptive network statistics are applied to the co-citation network analysis to generate new insights such as different mechanisms for authors gaining influence in a knowledge community. Ultimately, we will present an innovative longitudinal Mixed Methods Social Network Analysis (MMSNA) approach to systematic literature reviews, significantly advancing previous SNA methods integration in this critical research practice.

OS-150: Modeling Network Dynamics 2

Location: Room 116 Session Chair: Stepan Zaretckii Session Chair: Tom A.B. Snijders Session Chair: Christian Steglich

Estimation of Dynamic Network Actor Models on incomplete data

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Relational event models (REMs) are statistical models for the analysis of sequences of relational observations. Estimating these models is straightforward (albeit potentially computationally demanding) when the exact sequence of events is known, such as in the case of phone call records. However, sequences of relational event data may be incomplete or difficult to gather, e.g., when online platforms only provide aggregated data on user behaviors or when networks derive from cognitive perceptions of relationships, like friendship perceptions. Those perceptions are typically collected through survey panels that do not gather instantaneous network changes.

We present an application of the Expectation-Maximization algorithm to estimate the parameters of a REM variant, the Dynamic Network Actor Model (DyNAM), when the sequences are partially observed. We consider the evolution of an incomplete sequence as the result of two conditionally independent DyNAM processes, one governing the event creation and the other the event deletion. The generalized Expectation-Maximization is considered for imputing missing data and generating a sequence of proposals that do not necessarily maximize the objective function. The Expectation step is computationally intractable and approximated by random samples of plausible event sequences aggregated following Multiple Importance Sampling schemes.

Additionally, we show that this implementation is not limited to the analysis of incomplete sequences of relational events but can also be applied to analyze the co-evolution of network panel data and relational event data. We illustrate the method by analyzing data on friendship networks collected in a panel design and online interactions.

Just a Numbers Game? How Gender Composition Shapes Cross-Gender Friendships

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Gender homophily is one of the most robust patterns in friendships, yet we lack clear insights into how structural factors shape this pattern. While extensive research has established that group composition influences patterns of homophilous associations, previous work has largely focused on ethnic contexts, where additional factors such as socioeconomic status and residential segregation complicate interpretation. Gender composition in schools provides a useful test case because, unlike ethnicity, it is usually unrelated to socioeconomic or residential barriers. We test two competing mechanisms for how gender composition shapes cross-gender friendship formation. The first suggests that increased mixing leads to more cross-gender friendships by providing greater opportunities for interaction. The second proposes a curvilinear relationship, where extremely imbalanced gender compositions may reduce cross-gender friendships due to heightened identity threat perceptions and stronger needs for group distinctiveness. Using random coefficient multilevel Siena models with sienaBayes, we analyze longitudinal friendship networks from two datasets: CILS4EU (794 classrooms across four countries) and Hungarian secondary schools (40 classrooms). This methodological approach allows us to examine how gender composition shapes the evolution of friendship ties while accounting for structural network dependencies. Our preliminary results reveal that the effect of gender composition may be gender-specific: while boys' preferences remain stable in response to the gender composition, girls' friendship choices vary. At moderate boy ratios, girls form more cross-gender

ties, but in highly male-dominated classes, they cluster together and strengthen same-gender preferences, reinforcing gender-segregated structures.

Marginal Effects for the Stochastic Actor-Oriented Model

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The Stochastic Actor-Oriented Model (SAOM) is a model of network evolution, where estimated coefficients represent the timing of decisions and the propensity of actors to form or maintain relationships over time. One notorious challenge about these models is that the coefficients are on a latent rather than probability scale. As a consequence, they suffer from the same scalability issue as many generalized linear models, where the value of coefficients is affected by non-collapsibility due to unobserved heterogeneity. This makes them hard to interpret and to compare across models or datasets.

To address these interpretational challenges, we propose employing effect size measures based on empirical and counterfactual differences in predicted probabilities, thus calculating marginal effects, which avoid scaling issues. This is particularly challenging for network data however, as the interdependency of network statistics necessitates considering higher-order derivatives and discrete differences. We show that averaging over these marginal effects can differ in magnitude and sign compared to the original (latent scale) coefficients.

Since SAOM models unobserved decision sequences between network observations, researchers might either want to interpret effects at observation moments or take the simulated chains into account. We develop a flexible simulation-based method to allow combining either approach with different quantities of interest to be averaged over. An analysis of empirical data demonstrates differences between coefficient-based and marginal effect size interpretations for predicted tie and change probabilities.

These new tools will not only support mediation and meta-analysis for longitudinal network models but facilitate answering new research questions with SAOM.

Modeling brokerage orientations: Bridging structure and process

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Brokerage is a central concept in organizational network research, describing the influence actors exert by connecting or separating otherwise disconnected individuals. Traditionally, brokerage has been measured through structural positions in networks, often using Burt's (1992) constraint measure. More recently, attention has shifted to brokerage orientations, reflecting semi-permanent behavioral tendencies such as tertius iungens (connecting others) and tertius gaudens (maintaining separation). Despite theoretical advancements, methodological approaches in network analysis have lagged. Most management studies still rely on non-network regression models that overlook tie interdependence, potentially leading to flawed interpretations. At the same time, while network models such as stochastic actor-oriented models (SAOMs) offer powerful tools for modeling network dynamics, they provide limited options for capturing complex brokerage behaviors beyond basic betweenness measures.

Our study addresses these gaps by conceptualizing brokerage as a dynamic process based on personal preferences and introducing novel SAOM effects that capture different brokerage orientations and the impact of brokerage positions on actor behavior. Using a unique dataset, we illustrate the application of these effects and offer practical guidance for interpretation. Our contributions include (1) integrating brokerage orientations into a widely-used network modeling framework, enabling researchers to study brokerage as behavioral trajectories without relying on trait-based data, as is necessary when modeling interorganizational relations; (2) providing a method to estimate the impact of brokerage positions while accounting for network interdependencies; and (3) fostering a coevolutionary perspective on brokerage, aligning network dynamics with brokerage outcomes and advancing research on organizational networks.

More nominations, less reciprocation: Modeling an "overchoosing" phenomenon in large social networks

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Social network researchers often assume that mutual nominations between actors are more likely to occur than one-sided nominations. However, this assumption does not always hold, particularly in large social networks. Actors who nominate many others often do not achieve complete reciprocation from all their nominees. In this presentation, we introduce a new parameter termed "overchoosing," which integrates reciprocity and outdegree popularity effects as their product. This parameter captures an endogenous tie-formation process not adequately represented by existing network configurations. We hypothesize a negative estimate for the overchoosing parameter, indicating that the greater the number of outgoing nominations by an actor, the lower the likelihood that each nomination will be reciprocated. To test this hypothesis, we implemented the overchoosing parameter within stochastic actor-oriented models (SAOM). Analyses of secondary school friendship networks (N > 1000, two waves) demonstrated that the model including the overchoosing parameter provided a better fit to observed data compared to a model without it, as evaluated by the triad census goodness-of-fit indices—particularly for the triadic out-star without reciprocation (021D). We also present and discuss findings from additional analyses of online social networks and bitcoin trust networks (Ns > 500, number of waves > 100) by Bayesian SAOM optimized for parallel computation on supercomputers (Chan et al., 2022). These insights help refine our understanding of how reciprocal relationships form or dissolve in larger social networks.

OS-4: Alcohol and Substance Use in Social Networks

Location: Room 125 Session Chair: Kathryn M Barker Session Chair: Jessica M. Perkins

Friends, crushes and substance use: A social network analysis of adolescent peer influence

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Adolescent substance use is shaped by social relationships, but most research has focused on friendships and romantic relationships, overlooking the role of pre-dating romantic interest. Adolescents may adjust their substance use behaviors in response to crushes, friends, and extended social circles, such as friends of friends, potentially adopting behaviors modeled by these peers.

This study examines whether the substance use of crushes, friends and friends of friends influences adolescents' own behaviors. Using two waves of social network data from the Peers and Emergence of Adolescent Romance (PEAR) study (2,159 Dutch high school students), we apply Stochastic Actor- Oriented Models (SAOMs) to distinguish peer influence from selection effects. Influence is modeled by the average substance use of social connections, and we test whether higher levels of alcohol, tobacco, and marijuana use among peers are associated with increases in adolescents' own use. Preliminary results from one school show that both friends and friends of friends influence drinking, while friends of friends also influence smoking. Additionally, we will explore age differences in peer selection and influence, and test whether these mechanisms play a greater role in early or later years of secondary education. By integrating both direct and indirect social ties, this study extends research on peer influence and provides new insights into early risk factors for adolescent substance use.

Caring Networks in Tanzanian Heroin Use and Recovery

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We examine care networks altered by heroin in the western Tanzanian border cities of Mbeya and Mwanza to see how drug-using mutual aid groups and their relations to non-users differ or are similar in the two settings. Tanzanian heroin users' mutual aid groups are a phenomenon we are unaware of in the West. We are interested in how drug users, alone and in their mutual aid groups, negotiate connectivity, obligation, and relations of dependence and belonging. Our social network analysis investigates trust, care and sharing in personal networks of care as the intersection of those affected by heroin through distribution, consumption, caring, recovery, and relapse experiences. We examine the connections surrounding methadone clinics and Sober Houses within the socioeconomic and political context of Tanzania. The cross-sectional personal network survey captures the people in the participant's life, those people's characteristics, and those people's relationships to one another. In each city, our sample includes 60 people actively using, and 60 in recovery through methadone, sober houses, or other mechanisms (total ~240). In our examination of caring, trust, and sharing we compare of behaviors, perspectives,

network characteristics, outcomes and perspectives between, for example, recovery vs. current user, new vs. longtime user, or different categories of alters. To tease out shared meaning and both transitory and stable activities, we join the nodes of a domain (e.g., mutual aid group) into a single node to see how that domain or type of actor relates to the other domains of caring practices in the network.

Influence of Exposure to E-cigarette and Cannabis Posts on TikTok on Adolescent Tie Formation: A Longitudinal Social Network Analysis Using RSiena

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Background:

Exposure to e-cigarette-related content on TikTok is associated with e-cigarette and cannabis use among U.S. adolescents. However, its influence on peer tie formation remains unknown. This study examined whether exposure to e-cigarette and cannabis posts on TikTok influences tie formation among adolescents using social network analysis.

Methods:

We analyzed data from a longitudinal semi-annual survey across five waves (2022–2024) of California adolescents (Mage = 15 at baseline; ~50% female, ~50% Hispanic; N ~ 4,000 per wave) who completed in-classroom surveys and nominated up to five friends per wave. We applied RSiena models to analyze the influence of exposure to e-cigarette or cannabis posts on TikTok among egos who were never-users of e-cigarettes or cannabis at prior waves on tie formation with alters depending on their e-cigarette or cannabis use status at subsequent waves. Network, ego-level covariate (TikTok exposure), and homophily effects were assessed.

Results:

Networks were sparse with a significant tendency for reciprocal ties. E-cigarette non-users exposed to e-cigarette posts on TikTok were more likely to form ties with e-cigarette users at one time point but the effect was not consistent across waves. TikTok-exposed non-users of e-cigarettes/cannabis were significantly more likely to form ties with other similarly exposed non-users, indicating a consistent homophily effect.

Conclusions:

Findings suggest that adolescent e-cigarette/cannabis non-users exposed to e-cigarette/cannabis TikTok posts cluster together, but exposure does not consistently promote ties with e-cigarette or cannabis users. Network dynamics should be monitored, especially since TikTok exposure is associated with adolescent substance use.

Integrating latent class and social network analyses to understand co-occurring health behaviours: a methodological investigation

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Substance use behaviours, alcohol consumption and many other health behaviours often occur simultaneously, suggesting some latent variable which affects the manifestation of different patterns of co-occurrence. Latent class analysis and similar mixture modelling techniques allow researchers to identify underlying subgroups with similar patterns of behaviour from a broader population. These have become increasingly popular approaches in studies of poly-substance use, anti-social behaviours, adolescent delinquency, and other potentially harmful patterns of co-occurring health behaviours.

However, is also well understood that patterns of health behaviour are shaped by the social contexts of individuals and subject to processes of social influence. Currently, little is known about potential biases arising from estimating latent classes without accounting for social network dependencies. There also has been a growing interest in exploring how behaviours may spread as 'bundles', with patterns of co-occurring practices diffusing across networks. Integrating latent class analysis into social network modelling offers a promising approach to this area of research, but further research is needed to assess the feasibility of combining these distinct frameworks.

We present findings from ongoing work exploring how latent class analysis and related models can be integrated with social network analysis. Using empirical data on adolescent health behaviours and school friendships as well as simulation-based approaches, we assess the reliability of latent class estimation in the presence of peer network

effects. We also demonstrate methods to account for classification error when incorporating latent classes as nodal attributes in social network models.

Peer-Perceived Substance Use Association with Adolescents' Friendship and Popularity Networks

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This study examines the role of peer-perceived substance use in shaping adolescent friendship and popularity networks, addressing gaps in prior research that rely on self-reported substance use or aggregated peer perceptions. Using longitudinal social network data from the SNARE project, a study of Dutch adolescents, we apply Stochastic Actor-Oriented Models (SAOMs) to analyze how classmates' perceptions of alcohol and tobacco use influence their social ties within classrooms.

Findings indicate that peer-perceived alcohol use significantly predicts friendship nominations, aligning with peer clustering theory, which suggests that shared behaviors reinforce group norms. In contrast, peer-perceived smoking does not consistently influence friendships, highlighting potential differences in how substance use behaviors are socially interpreted. For popularity networks, both alcohol and tobacco use are positively associated with nominations, supporting social identity theory and normative influence theory, which emphasize the social appeal of risk-taking behaviors. These findings suggest that adolescents perceived as substance users may be socially rewarded through increased visibility and status among peers.

By integrating a peer perception approach with a network analysis framework, this study contributes to understanding how substance use is embedded within adolescent social structures. The results underscore the importance of addressing peer perceptions in interventions targeting adolescent substance use, as well as the social mechanisms that sustain these behaviors. Understanding these dynamics can inform policies and prevention programs to reduce substance use appeal and promote healthier peer relationships.

OS-14: Contagion and Diffusion processes through Social Networks Location: Room 202 Session Chair: Aníbal Luciano Olivera Morales Session Chair: Thomas Valente

Friend of a friend because we're birds of a feather: Does homophily cause transitivity in social networks?

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Transitivity is important for diffusion processes on networks because a propensity for transitive closure leads to network clustering. Human social networks are characterized by high levels of transitive triangles relative to random graphs of the same density. However, measuring transitivity is difficult when collecting field data using egocentric designs. Homophily is a ubiquitous social process in human social relations and is easily measured with egocentric sampling. Homophily and transitivity are typically presented as potential confounds—that some particular network behavior may be caused by either homophily or transitivity. There is surprisingly little work describing the relationship between the two.

Here we ask whether a preference for homophilous ties can directly cause transitivity in social networks in the absence of a psychological preference for structural balance. To evaluate this, we used exponential random graph models to simulate an ensemble of group-structured networks with varying probabilities that an edge will connect members of the same group, and test whether transitivity emerges endogenously from only this preference for homophily. We find that indeed homophily can be sufficient to generate substantial transitivity in our simulated graphs. However, we also find that the degree to which homophily causes transitivity depends on network density: homophily is more likely to generate transitivity in higher-density networks, but has little-to-no effect on transitivity in lower-density networks. Thus, the effect of homophily on endogenous transitivity requires sufficient in-group connectivity so that new in-group ties have a relatively high probability of closing triangles.

This work has strong implications for understanding diffusion processes on networks such as the transmission dynamics of infectious disease. We apply these insights to simulating landscape-scale retrovirus transmission using an egocentric network data from western Uganda.

Applicability of the Minimal Dominating Set for Influence Maximisation in Multilayer Networks

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The minimal dominating set (MDS) is a well-established concept in network controllability and has been successfully applied in various domains, including sensor placement, network resilience, and epidemic containment. In this study, we adapt the local-improvement MDS routine and explore its potential for enhancing seed selection for influence maximisation in multilayer networks. We employ the Linear Threshold Model (LTM), which offers an intuitive representation of influence spread or opinion dynamics by accounting for peer influence accumulation. To ensure interpretability, we utilise rank-refining seed selection methods, with the results further filtered with MDS. Our findings reveal that incorporating MDS into the seed selection process improves spread only within a specific range of situations. Notably, the improvement is observed for larger seed set budgets, lower activation thresholds, and when an "AND" strategy is used to aggregate influence across network layers. This scenario reflects situations where an individual does not require the majority of their acquaintances to hold a target opinion, but must be influenced across all social circles.

A preprint of the paper can be found here: https://arxiv.org/abs/2502.15236

Burnout Contagion Across Formal Groups

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This article advances the understanding of burnout contagion by proposing that burnout can spread across formal organizational groups, not just within them. Drawing on Job Demand-Resources and network theories, we argue that burnout propagates via intergroup work interactions, through changes in job demands, resources, and emotional contagion. Using data from 1,881 employees and 8 million e-mail exchanges in a South American university, we examine how burnout originating from intergroup collaborators predicts individual burnout. Our findings reveal that intergroup burnout contagion explains unique variance in individual-level exhaustion and disengagement beyond group-level contagion, with intergroup relationships accounting for up to 19% of variance in disengagement compared to 14% for within groups. Mediation analyses highlight the distinct pathways of job demands and emotional contagion in transmitting burnout across groups, but not job resources. These results underscore the importance of examining burnout as a networked phenomenon that extends beyond formal group boundaries, offering insights into how contemporary workplaces can address burnout in interconnected and cross-functional environments.

Diffusion of Innovations with Individual Preferences: The Role of Social Reinforcement and Homophilic Ties

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This study introduces a computational model integrating the homophic principle both as a structural efect (network clustering by sociodemographic similarity) and as a confirmation bias (preferential influence from socially proximate peers) to explain the bimodal success rates observed in innovation adoption. Building on critiques of structural reductionism in classical diffusion models (Goldberg, 2021), we propose that preference heterogeneity— not just network topology—drives phase transitions between adoption failure and success. Using ecological networks constructed from the American Trends Panel (ATP) dataset, we simulate diffusion dynamics where agents adopt innovations based on:

1. Utility thresholds (q_i), representing individual resistance levels, and

2. Minimum social proximity (h), modulating peer influence validity.

3. Agents adopt if an innovation's intrinsic utility (Gamma) exceeds q_i, or if social reinforcement from peers within distance h surpasses adoption thresholds (tau_i). In this sense, social closeness activates threshold contagion.

Our framework challenges assumptions in prior works (Centola & Macy, 2007; Tur et al., 2024) by replacing synthetic networks with empirically grounded configurations (McPherson & Smith, 2019). Simulations on synthetic networks like Watts-Strogatz, scale-free, and Small-World SDA, show the emergence of phase transitions at critical values of h, demonstrating how homophily amplifies confirmation bias to create non-structural diffusion barriers. For example, at h = 0.2 (moderate social proximity), adoption rates shift abruptly from 18% to 92% as Gamma crosses a critical threshold, mirroring real-world "tipping point" dynamics (Granovetter, 1978).

Methodologically, we advance network science by:

- Estimating homophily parameters (beta_m) from ATP sociodemographics (McPherson & Smith, 2019),

- Creating real-world network topology based on survey data, and imputing preferences based on the individual characteristics of the nodes, and

- Validating through 1,200+ computational experiments on CHPC clusters.

Results of network topology align with empirical observations of cultural differentiation (DellaPosta et al., 2015) and rationalize bimodal market outcomes in technology and public health (Farrell, 1998). Crucially, we show that preference-driven homophily—not preexisting structural segregation—suffices to generate adoption bottlenecks, addressing critiques of earlier models (Goldberg, 2021).

This work bridges micro-level decision-making (rational choice theory) with macro-level diffusion patterns. By incorporating empirical social distances and preference distributions, we provide a paradigm shift from purely structural explanations to ecologically valid models of innovation spread.

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Emergent Directedness in Social Contagion

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Theories of network diffusion often assume that contagions spread symmetrically through undirected ties. However, we show that complex contagions—where adoption requires reinforcement from multiple peers—exhibit emergent directedness, even in undirected networks. Using a novel causal modeling framework, we introduce Causal Tie Importance and Causal Flow Asymmetry to quantify influence propagation. Our analyses reveal that long ties often function as one-way conduits of influence, creating diffusion inequalities. Moreover, as reinforcement thresholds increase, contagion dynamics exhibit a core-periphery inversion, where diffusion is increasingly channeled from the periphery to the core, contradicting conventional assumptions about centrality and influence.

These findings challenge Granovetter's "strength of weak ties" hypothesis and have direct implications for social capital and innovation diffusion. Applying our framework to empirical networks, we show that the influence of weak ties follows an inverse U-shaped pattern, as seen in a recent large-scale LinkedIn study on job diffusion. Rather than the weakest ties being most effective, moderately strong ties play the largest role in spreading job opportunities, while both very weak and very strong ties are less effective. Our results explain this pattern by showing that medium-strength ties optimally balance bridge formation and reinforcement.

Additionally, we analyze endogenous bridge formation in complex networks, showing that asymmetric bridges form naturally, while strategic interventions (e.g., triadic closure) are needed for integrative, bidirectional influence. These findings offer new insights into diffusion dynamics in complex networks, organizational structures, and policy systems.

OS-177: Networks in Agriculture 2 Location: Room 203 Session Chair: Gilad Ravid

Shared cultivation: the structural foundations of seed exchange networks and small-scale farming resilience in the southern Andes

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Social-ecological networks, such as seed exchange networks (SEN), allow examining resilience in farming systems. These networks are relational structures that foster agrobiodiversity within farming systems, thereby enabling farmer communities to cope with broader social-ecological changes. This study contributes to the understanding of SEN and their role in farming resilience by exploring local seed exchange dynamics in a territory recognized for its high agrobiodiversity in the southern Andes of Chile. Using a relational approach including qualitative and quantitative methods, we co-constructed a SEN from a sample of 80 homegardens tended by campesinos and lifestyle migrants who have recently arrived in this territory. We examined a set of network properties that have been implicated with farming resilience, including density, modularity, and centrality. Furthermore, we used eqocentrically exponential random graph models (ego-ERGMs) to examine if (i) seeds were actors configuring the observed exchange interactions, and (ii) whether the origin of people engaged in small-scale farming, along with the diversity of exchanged crop varieties and their functional traits, may contribute to homophilous tendencies in subgroup formation within this network. We observed a decentralized and fragmented SEN connecting 559 campesinos and migrant homegarden tenders. We found that homegarden tenders and seeds are coupled actors shaping seed exchange interactions and subgroup formation in SEN. Despite this result, we did not find any homophilous tendency based on the crops' functional traits. Our results provide evidence that diversity, across both social and ecological scales, is critical to foster seed exchange interactions and farming resilience.

Social Networks and Agricultural Productivity: Evidence from Semi-arid Tropic India

Rahul Kumar Singh, Sarthak Gaurav IIT Bombay, India

In the semi-arid tropics of India, agrarian distress, farmer suicides, livelihood precarity, and entrenched castedriven social stratification persist amidst underdeveloped or inaccessible formal financial systems. Limited nonfarm livelihood options heighten dependence on agriculture, making social networks vital for resilience (Patnaik, 2010). Using household-level data from Kanzara village on social networks, input use, labor patterns, and agricultural output, we explore how these networks mitigate risks and enhance productivity in a climate-vulnerable, resource-constrained context. Social networks foster trust-based cooperation, enabling farmers to pool resources, share timely information on weather and inputs (Pratiwi & Suzuki), and access labor during critical periods, thereby reducing transaction costs and liquidity constraints (Barnett-Howell & Mobarak, 2021). However, caste-based hierarchies stratify network access, often excluding marginalized groups from high-yield knowledge or equipmentsharing arrangements, perpetuating inequities. This study examines how social networks-centered on credit access, agricultural information sharing, farm equipment exchange, and labor collaboration-influence input decisions, labor allocation, and productivity. It also investigates how caste-based hierarchies shape these networks and affect who benefits from resource sharing. This research highlights the role of social networks in mitigating farming risks where formal institutional support, such as credit markets or extension services, is limited. These findings offer valuable insights for policies aimed at strengthening agricultural resilience and sustainability in similar agrarian settings.

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Socioeconomic drivers of smallholders seed sourcing network: a multi-situated assessment across semi-arid areas

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Smallholder farmers critically depend on seed access. It is especially true, in regions experiencing significant interannual precipitation variability, where access to a broad diversity of locally-adapted seed varieties is key for agricultural systems resilience.

However, a general assessment of the drivers of seed access is lacking. This study investigates the processes through which smallholder farmers source seeds in challenging environmental conditions, examining the socioeconomic, cultural, and geographical drivers of seed sourcing patterns. It examines how the structure and composition of seed circulation networks influence farmers' equitable access to seeds, and identifies the key drivers of inequality.

The research is based on a comparative analysis across three geographically and socioculturally distinct study sites in Senegal, Madagascar, and Morocco. These sites were selected due to their diverse agroecological conditions and institutional frameworks, while also sharing similarities in farming systems and crop diversity management. We analyzed data collected through surveys in 2,000 household surveys, documenting crop diversity at both species and varietal levels, agricultural management practices, socioeconomic indicators, and seed sourcing networks.

The study: (1) applies multivariate approaches and cluster analysis to identify households profiles based on their seed sourcing practices; and (2) uses social network analysis to identify key network actors, structural configurations, and relational dynamics that influence seed access opportunities for households.

This assessment across these three countries will allow to identify, if share patterns exist, which will be useful to deliver practical recommendations for improving equity in seed access.

Soil microbial co-occurrence networks do not model functional links

Doina Bucur

University of Twente, Netherlands, The

Ecological networks model species-to-species interactions, and are intended to be predictive models for an ecosystem. When inferring ecological networks from observational data, we assume precision and recall, i.e., that (1) a network link reflects a true pairwise functional relationship between species, and (2) all true relationship are modelled as links. Unfortunately, for opaque ecosystems such as the soil, with numerous and microscopic species, functional information is rare. Instead, co-occurrence networks are inferred by sampling the soil. We ask the question: how accurate are these spatial networks of microorganisms, as inferred with current soil-sampling methods?

An agent-based model with biologically realistic behaviour and parametrisation simulates a plot of land, with true trophic links between species. We observe the spatial co-occurrence that these trophic links naturally produce in space. We also simulate the taking of individual samples from this spatial distribution of species. Finally, we evaluate the accuracy of the co-occurrence network inferred from samples, against the true co-occurrence of the plot.

We find that biological properties other than the interactions, such as the species diversity in the plot, can be estimated with relatively low error by sample pooling. On the other hand, the inference of the co-occurrence network is poor. We see high errors of the pairwise link weights, with large mean errors, and large standard deviations between experiments. The co-occurrence network inferred is thus both inaccurate and unstable (explaining the large differences seen among algorithms for co-occurrence inference), and this is intuitively explainable in spatial terms.

Stronger Together?! A Social Network Perspective on Adapting Collective Agri-Environmental Schemes in Germany

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Leibniz Centre for Agricultural Landscape Research (ZALF), Germany

Germany is exploring collective approaches to agri-environmental and climate schemes (cAECS) to enhance ecological, economic, and social effectiveness. This study examines key actors, their roles and responsibilities, and their interconnections to inform institutional design, particularly concerning 'collective elements' (e.g. participatory design, collective planning, involvement of third-party intermediaries). To do so, we integrate Social Network Analysis (SNA) with the Institutional Analysis and Development (IAD) framework. Using the Net-Map method, we collect data from three early-implementation cAECS cases in Germany that vary in biophysical conditions (farming and ecosystem characteristics), social attributes (farm sizes and social structures), and rules-in-use (funding sources and contract types).

Our results show how these contextual differences influence the structure of collective networks as well as the presence of 'collective elements'. Intermediaries serving as coordinating actors emerge as a central feature of these networks, bearing most of the administrative workload, while others assume supporting roles. Trust-building during the initiation phase is identified as a critical factor for fostering long-term collaboration and further integration of collective elements. Additionally, variations in contract types and farm sizes shape both the design and implementation requirements of collective approaches. Despite these differences, all cases demonstrate the potential for significant benefits from adopting a collective approach to agri-environmental and climate scheme governance. Examples of such benefits include the adoption of measures on a landscape scale, the reduction of transaction costs and the increase in social cohesion.

OS-64: Recent Advances in Statistical Analysis and Mathematical Modeling of Large-Scale Network Data

Location: Room 204 Session Chair: Frederick Kin Hing Phoa

On species uniqueness in ecological networks

<u>Wei-chung Liu</u> Academia Sinica, Taiwan

Species are embedded in an intricate web of interactions known as a food web. A food web is the most fundamental network representation of an ecosystem. It is therefore nature to assess species importance from a network perspective. Past literatures emphasize the use of centrality measurements to quantify species importance. Recent advances of species importance research have proposed the concept of species uniqueness as an complementary measure to species importance. In this presentation, we discuss what uniqueness is and review its recent developments. We start with the concept of species trophic field, which is the set of species a focal species can strongly affect, and how this can be applied to measure species uniqueness. This trophic field-overlap approach can be extend to consider both strong and weak interactors of a focal species, providing a more complete view on species uniqueness. We then show how this extended approach can be simplified by using a matrix that represents the interaction structure of a food web. All the above approaches consider how species can affect all others, but we argue that information such as how a species is affected by all others can also be utilized for species uniqueness measure that considers simultaneously information on effects exerted and received by a species. We analyze 92 food webs to show the relationship between past approaches and our new approach.

A regression framework for studying relationships among attributes under network interference

<u>Michael Schweinberger</u>, Cornelius Fritz, Subhankar Bhadra, David Hunter The Pennsylvania State University, United States of America To understand how the interconnected and interdependent world of the twenty-first century operates and make model-based predictions, joint probability models for networks and interdependent outcomes are needed. We propose a comprehensive regression framework for networks and interdependent outcomes with multiple advantages, including interpretability, scalability, and provable theoretical guarantees. The regression framework can be used for studying relationships among attributes of connected units and captures complex dependencies among connections and attributes, while retaining the virtues of linear regression, logistic regression, and other regression models by being interpretable and widely applicable. On the computational side, we show that the regression framework is amenable to scalable statistical computing based on convex optimization of pseudo-likelihoods using minorization-maximization methods. On the theoretical side, we establish convergence rates for pseudo-likelihood estimators based on a single observation of dependent connections and attributes. We demonstrate the regression framework using simulations and an application to hate speech on the social media platform X in the six months preceding the insurrection at the U.S. Capitol on January 6, 2021.

Analysis of Word Co-occurrence Networks from Paper Abstracts in Semantic Scholar Database

Yoonjin Lee¹, <u>Frederick Kin Hing Phoa</u>², Hohyun Jung¹ ¹Sungshin Women's University, South Korea; ²Academia Sinica, Taiwan

The abstract is a crucial frontmatter element that provides readers with key insights into a manuscript's core ideas and subject categories. Identifying the most important words in abstracts can offer valuable clues about the central themes and evolving trends within a particular subject area. This work introduces a novel analysis method to determine the importance of words within a subject category over time, based on various centrality measures in a word co-occurrence network. The network is constructed from words extracted from the abstracts of manuscripts within a specific scientific subject. We demonstrate the effectiveness of this method using a subset of the Semantic Scholar database, focusing on the field of Statistics from 2019 to 2023.

Extending the Event Subpopulation Model: Estimating Personal Network Size with Inbreeding Bias

<u>Ryuhei Tsuji</u>

Kindai University, Japan

This study estimates the size of personal networks (number of friends and acquaintances) using the event subpopulation model (Bernard, Johnsen, Killworth, and Robinson, 1989), including individuals infected with COVID-19 and those who died in the Great East Japan Earthquake. Initial estimates varied significantly depending on population definitions, such as (a) whole Japan, (b) urban / (c) rural prefectures for COVID-19, and (b) inside / (c) outside tsunami-affected prefectures for GEJE. To improve accuracy, we refined the estimation model by incorporating inbreeding bias within a biased network framework (Fararo, 1981).

The estimation method is based on the proportion of respondents who know an affected individual. The basic formula is:

c = t p / e ...(1)

where e is the number of event participants, p is the proportion of respondents who know a participant, and t is the total population. Adjusting for inbreeding bias:

c = t p / (e (1 - tau)) ...(2)

where 0 <= tau <= 1. Further incorporating binomial variance correction leads to:

c = (t p / (e (1 - tau))) * (1 + (p (1 - p) / e)) ... (3)

which is always larger than the uncorrected estimate.

When we applied these models to Japan, we still observed significant regional variations. Although the refined models improve plausibility, the exact value of tau remains uncertain. Results suggest that estimates from natural disasters, where information spreads widely, may be more reliable than those from infectious disease events, where social stigma limits disclosure.

Model-based edge clustering for weighted networks with a noise component Daniel Sewell¹, Haomin Li²

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Clustering is a fundamental task in network analysis, essential for uncovering hidden structures within complex systems. Edge clustering, which focuses on relationships between nodes rather than the nodes themselves, has gained increased attention in recent years. This provides benefits in terms of (1) understanding the network in terms of the environments or events leading to edge formation, and (2) computational feasibility, as the computational cost of edge clustering is, for sparse networks, linear in the number of network nodes. However, existing edge clustering algorithms often overlook the significance of edge weights, which can represent the strength or capacity of connections, and fail to account for noisy edges—connections that obscure the true structure of the network. To address these challenges, the Weighted Edge Clustering Adjusting for Noise (WECAN) model is introduced. This novel algorithm integrates edge weights into the clustering process and includes a noise component that filters out spurious edges. WECAN offers a data-driven approach to distinguishing between meaningful and noisy edges, avoiding the arbitrary thresholding commonly used in network analysis. Its effectiveness is demonstrated through simulation studies and applications to real-world datasets, showing significant improvements over traditional clustering methods. Additionally, the R package "WECAN" (https://github.com/HaominLi7/WECAN) has been developed to facilitate its practical implementation.

OS-52: Networks, social resources and subjective well-being Location: Room 206 Session Chair: Marina Hennig

"A bunch of degenerates:" An exploration of online discourse about problematic sports betting through social network and text analysis

<u>Cassie McMillan</u>¹, Sara Francisco² ¹Northeastern University; ²Grinnell College

In the past decade, policy changes permitted US states to legalize sports betting and new gambling products were developed that allow people to place bets online. It is unclear whether and how these evolving technopolitics will impact people's experiences with gambling disorder (GD), an addictive condition recognized by the DSM-V. The current project brings new insight to the rapidly changing sporting betting landscape by evaluating how people discuss topics related to GD on two recreational sports betting forums from the social media website Reddit. We scraped an original sample of over 7500 Reddit comments from 194 threads published between 2012 and 2024 that mention key terms related to GD (e.g., "addicted," "problem," "hotline"). For each thread of interest, we reconstructed these data into user-based social networks where actors represent Reddit users and directed edges indicate that one user replied to another's comment. Then, we applied sentiment analyses, exponential random graph models, and meta-analyses to explore whether the network patterns of discussions about GD changed over time. Authors who wrote posts characterized by negative sentiment tended to be more central in the Reddit threads, but this association became weaker over time. Our findings uncover new insight about the ways recreational sports betting forums both normalize risky gambling behaviors and create safety nets that encourage responsible practices.

Blurring Boundaries, Building Support: The Effects of Cross-Domain Multiplex Communication Network

June Shin¹, Jessica Methot^{1,2}

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Organizational research has traditionally emphasized goal-directed workplace communication, yet the blurring of professional and personal boundaries has led employees to engage more in informal, socially-oriented, nonwork-related communication with colleagues (Holmes, 2003; Koch & Denner, 2022). Drawing from literature on cross-domain multiplex relationships—"multifaceted relationships that occupy a blended work–nonwork role space by superimposing work and nonwork interactions, roles, and exchanges" (Methot, Parker, & Hubbard, 2024, p.259)— and "across-the-border" communication (Clark, 2002)—conversations that extend beyond one domain, e.g., sharing family issue with coworkers—we refer to relationships involving blended conversations as cross-domain multiplex communication ties. To understand the effects of engaging in blended communication, we integrate boundary theory and social network perspectives to examine how and why a focal actor's cross-domain multiplex communication networks will experience high network constraint—the extent to which a focal actor's direct ties are interconnected (Burt, 1992)—which may, then, limit creativity by restricting access to unique

information and perspectives due to "over-embeddedness" (Krackhardt, 1999). However, it may also increase others' awareness of the focal actor's nonwork activities (Clark, 2002), creating opportunities for coworker support. We will collect ego network data to test our full mediated model by path analysis. This research advances the work-nonwork interface and organizational communication literature by employing a social network lens to examine how ties involving blended conversations influence individuals' productivity and well-being through their structural network positions.

Developments in wellbeing studies through a prism of the bibliometric network analysis

Irina Pavlova

HSE University, Russian Federation

Wellbeing research is a multifaceted and evolving field that encompasses a wide range of disciplines such as health sciences, social sciences, and economics. In general, there has been quite limited strand of literature providing an insight into understanding of evolution of wellbeing studies of a systemic nature. It is still argued that many attempts to conceptualize wellbeing studies focus not on the definition itself, but primarily at expressing its nature through wellbeing dimensions (research topics and themes).

For the current study, the data are collected from OpenAlex database using the query "wellbeing" OR "well-being" in titles and abstracts to include publications with different form of the word into the dataset (all types of publications are considered). The dataset contains over 619,000 items for 1750-2025.

For older literature items, the historical intervals were selected with the motivation to follow the time slices presented in the theoretical studies. To cope with the challenge of growing number of publications, we adopt an approach by Kullenberg & Nelhans (2015) to divide the material in 15-year intervals for the period 1946-1989 and starting with 1990 to employ 5-year intervals to detect wellbeing studies developments. VOSviewer software as well as R libraries are used to build and analyze keywords co-occurrence, co-authorship, citation, and bibliographic coupling networks for 12 historical intervals to detect thematic evolution, the most influential authors and documents.

Exploring the Relationship Between Social Participation and Subjective Well-Being Improvement with Consideration of Personality Traits

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The relationship between social participation and subjective well-being (SWB) has gained attention in recent years. Social participation is believed to improve SWB through expanding social networks and improving self-efficacy. Furthermore, personality traits have been suggested to influence social participation and SWB, but few studies have considered personality traits. We aim to clarify the mechanisms linking social participation and SWB while accounting for personality traits. Using questionnaire data from an internet survey conducted in Japan (N=11,002), we performed clustering based on personality traits and analyzed the mechanisms by which social participation contributes to SWB. We applied probabilistic latent semantic analysis to cluster participants based on the Japanese version of the Ten-Item Personality Inventory (TIPI). We conducted mediation analysis for each cluster to examine how social participation (independent variable) influenced SWB (dependent variable) through social networks and self-efficacy (mediators). As a result, four personality clusters were identified. In all clusters, social participation had a significant positive total effect on SWB. Additionally, the expansion of social networks and improvement in self-efficacy significantly mediated this relationship. Focusing on the types of social participation, in the "high neuroticism" cluster, participation in "community activities" had a significant positive indirect effect on SWB, but the direct effect was negative. Even when considering personality traits, social participation was linked to SWB, but the mechanisms differed. This study contributes to the literature on social participation and SWB by exploring how social participation affects SWB while considering personality traits.

Loneliness and Perceived Social Isolation: The Role of Personal Networks and Online Interactions Minsu Jang¹, Viviana Amati¹, <u>Raffaele Vacca²</u>

¹University of Milano-Bicocca, Italy; ²University of Milan, Italy

This study explores the determinants of loneliness and perceived social isolation, focusing on the roles of personal networks and social context characteristics. Perceived social isolation is an individual's subjective feeling of disconnection, regardless of actual social interactions. Loneliness arises from a perceived gap between desired and actual social relationships, encompassing both the quantity and quality of connections. We examine the associations between these feelings and specific characteristics of personal networks, including their structure and composition of social roles, support exchange, temporal dynamics, and modes of communication.

First, we focus on personal network characteristics as potential determinants of perceived isolation and loneliness: network size; emotional closeness; geographic distance; network cohesion; diversity of roles and interaction foci; sociodemographic diversity; and network turnout. Second, we investigate the role of online interactions, exploring whether virtual communication mitigates or exacerbates these feelings. While online platforms expand the reach of social networks, their effects on perceived connection and satisfaction with relationships remain mixed. We hypothesize that reliance on online communication weakens social bonds typically fostered through face-to-face interactions, potentially leading to a greater sense of isolation and loneliness. Finally, we consider whether the effects of personal network characteristics on perceived isolation and loneliness vary by gender, race/ethnicity, and migration status.

Using three waves of egocentric network data from the UC Berkeley Social Network Study (UCNets), which provides detailed longitudinal measurements of personal networks and individual-level observations, this study makes both theoretical and empirical contributions. First, it refines and advances theories about social and relational determinants of loneliness. Second, it provides new insights into how modern modes of social interaction, particularly online communication, influence negative feelings associated with social interactions. Ultimately, this study enhances understanding of the complex interplay between social context, individual characteristics, and modes of interaction in shaping experiences of loneliness and social isolation.

OS-100: Tools and Data for Social Network Analysis

Location: Room 105 Session Chair: George G Vega Yon Session Chair: Zachary Neal

A meta-analytic perspective on name generators: Which are used and what do they produce?

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The history of social network research is fundamentally linked to the methodological challenge of assessing people's social relationships. Despite their longstanding use, name generators show considerable variation in their formulation, operationalisation and contextual embedding. The selection and formulation of name generators is typically informed by prior research and guided by consideration of the specific relational context under investigation. To support researchers in navigating these methodological choices and synthesising existing research, this project aims to develop a meta-analytic pipeline that extracts, synthesises and categorises methodological approaches used in previous studies. Using large language models (LLMs), the pipeline will automate the identification and extraction of methodological information from research articles, facilitating the aggregation of methodological choices and their corresponding empirical findings. The project will involve the development, implementation and validation of the pipeline by assessing its performance through manual human coding. The extracted methodological information includes key dimensions of the name generator (e.g. phrasing, relational context), sample characteristics and resulting network structures (e.g., average outdegree, density). By systematically organising and analysing these features, the pipeline will enable researchers to explore how name generators have been used across studies in a structured way. The overall goal is to provide a tool that offers comprehensive meta-analytic insights into methodological practices, allowing researchers to compare study designs, assess methodological trends, and evaluate the impact of specific name generators in different research contexts. This approach will increase methodological transparency, improve comparability across studies, and facilitate more informed decisions about design and implementation.

Clarifying Core-Periphery Detection in Social Networks: Mapping, Comparison, and Implications for Sociological Research

<u>Simone Santoni¹, Xuecong Du², Yinji Zhou¹</u> ¹Bayes Business School; ²University of Edinburgh This study reviews and maps the diverse array of core-periphery detection algorithms employed in sociological and organizational research. Recognizing that these algorithms vary in assumptions, computational demands, and objectives, our work addresses the methodological challenges that scholars face when selecting an appropriate tool for network analysis.

We begin by cataloging the range of techniques that have been applied across disciplines, emphasizing their theoretical foundations and operational criteria. To further clarify the practical implications of these differences, we conduct a comparative analysis using simulated networks that represent both ideal core-periphery structures and networks with varying sizes, densities, and connectivity patterns. Our findings reveal that the performance of a given algorithm is closely tied to the specific characteristics of the network under study, thereby underscoring the need for a tailored methodological approach.

Additionally, we replicate and extend the influential study by Cattani and colleagues (American Sociological Review, 2014), revisiting its core-periphery perspective on cultural fields with updated techniques. This replication not only confirms previous insights but also highlights new dimensions in understanding social legitimacy and power distribution.

Ultimately, we offer practical guidelines for selecting the most plausible core-periphery detection algorithm, aligning methodological choices with research questions and data structure. This contribution aims to enhance the clarity, rigor, and effectiveness of social network analysis within the field of sociology.

Combining Wearable Proximity Sensing and Digital Time Diaries for Longitudinal Network Data Collection

<u>Ivano Bison</u>¹, Michele Tizzoni^{1,2}, Davide Molteni², <u>Tommaso Trulli</u>¹, Amy Lynn Murphy³, Gian Pietro Picco² ¹Dep. of Sociology and Social Research,University of Trento, Italy; ²Dep. of Information Engineering and Computer Science, University of Trento, Italy; ³Bruno Kessler Foundation

Observing how social interactions in nature change over time and space is a major challenge. This study introduces the SocialScope project, which aims to develop an innovative approach to longitudinal data collection on social networks by integrating three technologies.

The first is a novel dual-radio proximity wearable sensor combining Bluetooth and ultra-wideband (UWB) radios, capturing the distance between individuals over time, therefore allowing the reconstruction of proximity networks from these spatial and temporal patterns [1].

The second is a smartphone application called iLog, which combines user self-reported information (e.g., time diary) and data passively collected from smartphone sensors [2]. Digital diaries provide repeated snapshots of participants' daily behaviours, minimizing reliance on retrospective recall and improving ecological validity. Smartphone sensors, e.g., GPS, allow us to track subjects' daily activities and social and spatial interactions. The third is a close-ended questionnaire.

Here we explore some early evidence on how people adjust interpersonal distances in everyday contexts based on gender, nationality, and age attributes. Eighteen college students living on the same dormitory floor wore the proximity sensors for 15 days, and continuously measured distances during real-life encounters every 15 seconds. At the same time, the app installed on the subjects' smartphones gathered time diary information every 30 minutes (Where are you? Who are you with? What are you doing? What is your mood?) and continuous information from the smartphone's sensors. The analysis is based on a total of 431,329 distances detected with the tag, with a total of 6,299 interactions lasting 90 seconds or longer, and 4,681 self-reported time diary information

KOLaid: An R package for selecting key opinion leaders under practical constraints

Zachary Neal¹, Jennifer Watling Neal¹, Elise Cappella², Marcus Dockerty¹ ¹Michigan State University, United States of America; ²New York University, United States of America

When seeking to diffuse new information or encourage the adoption of a new behavior, it is common to recruit the assistance of Key Opinion Leaders (KOLs). Existing software (e.g. keyplayer) focuses on identifying the optimal KOL team of a given size. However, a series of practical challenges can arise in intervention settings that make this "optimal" KOL team infeasible. In this presentation, we review these practical challenges, then introduce and demonstrate the R package KOLpickeR, which facilitates the selection of KOL teams in the presence of common practical challenges.

The KOLpickeR package focuses on solving five practical challenges summarized by ABCDE:

* Availability - In some cases, certain individuals may be unavailable to serve as a KOL (e.g., declined, lack necessary skills), while others' membership on a KOL team may be necessary (e.g., they have already agreed). KOLpickeR allows the user to restrict the scope of potential KOL teams to those that include or exclude certain individuals.

* Breadth - The quality of a KOL team is typically evaluated based on the breadth of the other network members they can reach, but users often do not know which network metric is the most appropriate in a given context. KOLpickeR allows the user specify their goal (diffusion or adoption), then uses the most appropriate network metric(s).

* Cost - Larger KOL teams usually have wider breadth, but there is a cost associated with recruiting and training additional KOLs, so it is not always clear how many KOLs should be recruited. KOLpickeR allows the user to consider potential KOL teams with a range of sizes.

* Diversity - In some cases, it is important to ensure that members of the KOL team are diverse and representative of the larger network's population (e.g., to ensure buy-in). KOLpickeR allows the user to provide a categorical attribute, then computes each potential KOL team's diversity with respect to this attribute.

* Evaluation - When multiple possible KOL teams exist, the choice of a particular team requires balancing cost, breadth, and diversity. KOLpickeR computes and ranks a summary metric that simultaneously integrates these characteristics.

In addition to aiding in the identification and selection of KOL teams given the constraints that arise under practical challenges, KOLpickeR also generates network visualizations of KOL teams and their network coverage. These visualizations aid users in evaluating potential KOL teams, and in communicating the chosen KOL team to both researchers and intervention site partners.

manynet and the stocnet group of packages

James Hollway Geneva Graduate Institute. Switzerland

While there are many computational network analytic tools available in R, most packages concentrate on particular types of networks, particular analyses or models, or particular applications. This fragmentation frustrates learning, teaching, exploration, innovation, and replication. The mission of manynet is to facilitate frictionless analysis of many networks for all. The purpose of this talk is to give an overview of manynet and related stocnet packages, and introduce the many ways they can be used to make and modify, intuitively map (visualize) and mark, identify memberships and motifs in, measure and model many types of networks. Examples are made available in the package through tutorials, complete with glossary entries, and a variety of exemplar data. Special attention in the presentation will be paid to recent developments and connections to recent models and standards.

OS-176: Networks and Culture 2

Location: Room 106 Session Chair: Shan Shi Session Chair: Christian Stegbauer Session Chair: Iris Clemens

The Network of Viennese Coffeehouses and Their Role in Shaping Cultural and Intellectual Innovations

Christian Stegbauer¹, Iris Clemens²

¹Goethe-University Frankfurt, Germany; ²University of Bayreuth, Germany

From the late 19th to the early 20th century, Vienna emerged as one of the world's foremost cultural hubs alongside Paris, London, and Berlin. This period saw the rise of significant literary movements such as Viennese Modernism and Jugendstil, which influenced art, architecture, and literature. Key figures like Arthur Schnitzler, Hugo von Hofmannsthal, and Karl Kraus were central to these developments, often producing their works in the vibrant environment of Viennese coffeehouses.

This presentation posits that these coffeehouses functioned as crucial institutions in fostering intellectual achievements. Serving as meeting points for artists and thinkers, they facilitated exchange and collaboration,

leading to the creation of a microculture where distinct cultural artifacts could emerge. Evidence of this dynamic is found in accounts of regular patronage by notable individuals across different establishments.

In our presentation in Paris, we will use bimodal analyses of texts on the culture of coffee houses and their regular customers to examine how these establishments contributed to artistic, cultural, and scientific progress. At first glance, the subject may not seem to have any particular practical significance, but the cultural heritage cultivated in these spaces has an undeniable intellectual and economic value. This is reflected in the high market prices for works of art from this era and their importance for tourism.

Moreover, similar institutions worldwide—like New York's Hotel Chelsea—demonstrate the potential global applicability of these findings. By understanding the intrinsic value generated through personal interactions at such cultural intersections, we can derive insights beneficial for contemporary cultural promotion initiatives.

Ensemble Interventions: The Duality of Networks and Futures in Public Interest Scenario Work

<u>Ann Mische</u>, <u>Fabian D Maldonado</u>, Zhemin Huang, Quinlen Schachle University of Notre Dame, United States of America

We examine the relational and cultural dynamics of transnational ensembles engaged in collective deliberations about the future through a network and textual analysis of public interest scenario projects since the 1990s. As cultural technologies for exploring multiple plausible futures, scenario methods have been used to facilitate discussions on entrenched public problems, including the future of democracy, armed conflict, urbanization, energy use, migration, food security, and climate change. Scenario projects include diverse stakeholders from multiple sectors and regions, fostering varied perspectives on futures, with certain actors participating in multiple projects. We argue that this generates a dual relation between networks and futures: scenario projects construct futures by means of relations, and relations by means of futures. Drawing from an original database of 238 scenario projects worldwide from 1990-2017, we present a bipartite network mapping of shared organizational participation in scenario projects across three time periods. We trace the historical emergence and global expansion of diverse coalitions of initiators, facilitators, funders, and partners (including consultancies, research organizations, governments, corporations, multilateral organizations, social movements, and civil society groups). We then consider how these coalitions coalesce around problem areas and proposed interventions through a computational text analysis of scenario project reports. We use word embeddings to explore how particular narrative operators (e.g., "participation," "governance," "sustainability" or "growth") are associated with discursive stances toward capitalism and democracy. Finally, we combine the network and computational analyses to determine to what extent scenario projects that share organizations also share discursive stances in their imagined futures. We argue that these global relational dynamics have a "field-building" effect, shaping relationships in an emerging foresight field, while also contributing to the ambivalence about capitalism and democracy embedded in transnational foresight work.

Exploring Side-Directed Behavior in Networks

<u>Brent Hoagland</u>¹, Paul Douglas McLean¹, Eunkyung Song² ¹Rutgers University, United States of America; ²University of Massachusetts--Amherst

Side-directed behavior (a term coined by primatologist Frans De Waal), or SDB, refers to an action undertaken by an actor ostensibly towards one alter, but more significantly directed semiotically towards a third party (McLean and Song 2023). A male chimpanzee ritually embraces all the females in the troop, to challenge the dominance of another male. A student bullies a schoolmate, but more to gain status with the cool kids than to express animosity towards the victim. An email between colleagues includes a cc to the department manager—arguably the alter of primary concern, despite not being explicitly addressed. A patron supplies a favor to another man's client, chiefly as a signal of respect to his peer patron. The world of politics is replete with strategic behavior such as diverse forms of virtue signaling that involve performing for audiences, often with the goal of forming alliances—although the extent to which those audiences cum allies are explicitly designated and/or delineated is variable and often unclear. One important consequence for social network analysis is that transactions within networks need not constitute the most significant relationships being sought. Understanding the network 'of primary concern,' for both participants and analysts alike, becomes an interpretive process. Acknowledging that such subtle behavior is widespread can seriously complicate the coding and interpretation of network data.

Unfortunately, SDB can happen so pervasively, so subtly—for example, the alter may or may not be aware (or be made aware) of 'what is actually going on'—and at such a variety of scales (among individuals, among organizational units, among nations) that measuring it precisely and assessing its importance in network tie

formation can be very difficult. Actors may possess varying amounts of skill in denying that their actions had any ulterior motive. Yet understanding how to practice SDB, as well as how to interpret it, is highly consequential for skilled social actors, especially in 'caged' social settings.

We are designing an online, vignette-based experiment to explore certain important dimensions of SDB within small group/small network settings. Notably, we vary the social distance between actors in a triad, and vary the positive, neutral, or negative valency of the framing of alters or relationships within triads, to see how those variations affect observers' assessments of the salience of the side-directed element of the behavior. We hope to have some preliminary results in time for the conference, but minimally we can discuss the research design and project aspirations. Our overall goal is to examine systematically some of the cultural, and specifically semiotic, processes that underlie network tie formation.

References:

McLean, Paul D. and Eunkyung Song. 2023. "Theorizing Side-directed Behavior." Pp. 96-117 in Interpretive Sociology and the Semiotic Imagination, edited by Andrea Cossu and Jorge Fontdevila. Bristol: Bristol University Press.

Measuring Taste: Testing The Roles Of Class, Genre, And Popularity In Taste Development

Margaret Palmer

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Sociological scholarship on taste in cultural items has largely relied on explanations associated with class or genre distinctions, including work on consumption across those boundaries. However, scholarship on popular culture and taste has found increasing cross-class and cross-genre consumption, suggesting that current conceptualizations of taste are insufficient in light of rapidly growing popular culture milieu, increased connectedness through social media, and the shifting demands on popular culture. Capitalizing on advances in computational sociology, I test core cultural theories about taste, class, and genre, using a network of young adult books connected to each other by cooccurrence on recommendation lists on a popular literary social media site. Using data on books on lists of recommendation on literary social media platform GoodReads.com, I construct a projected unipartite network of over 150,000 books connected by cooccurrence on 3,000 lists. In addition to webscraped metadata for the books, I rely on data from 12 literary awards, user-selected micro-genres and algorithmically clustered macro-genres, and viral popularity. I use exponential random growth models (ERGM) to test the role of class, genre, and viral popularity in predicting connections among books. Leveraging ERGM's ability to use endogenous variables, I then consider that taste is not directly measurable using book characteristics and take a more fully relational approach to testing the formation taste. Using networks allows me to analyze the role of the network structure, as taste may be unaffiliated with class, genre, or popularity and may, instead, be an unmeasurable relational process.

Personal Networks and Cultural Participation in post-pandemic France

Pierre Mercklé

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The aim of this presentation is to describe the disruptions to personal networks caused by the Covid-19 lockdowns (limitation of face-to-face encounters, development of online relationships, lost and degraded ties, interpersonal conflicts...), and their short- and longer-term effects on cultural practices since the early 2020s.

Numerous studies have analyzed the relationship between social networks and cultural participation. On the one hand, social interactions are powerful drivers of cultural choices and participation to leisure activities (Upright, 2004); and on the other, outings and cultural and sporting activities, particularly outside the home, are in turn determinants of sociability (Lizardo, 2006; Benediktsson, 2012). But these studies were carried out in "ordinary" times, and do not allow us to hypothesize on the impact of a major health crisis that affects both personal relationships and the use of free time. Secondly, they are all based on cross-sectional data, which makes it more difficult to analyze causal relationships between networks and cultural practices.

In this presentation, we therefore draw on data from several ongoing French longitudinal surveys (Mama 2022, N = 2,300; Vico 2020-2025, N = 16,224 in wave 1), to determine the extent to which disruptions to personal networks have accelerated a movement towards privatization, individualization and a retreat into the home of free-time uses, without fundamentally changing the social anchoring of cultural practices and preferences, nor reducing social inequalities in access to cultural goods.

OS-183: Political Networks 2

Location: Room 107 Session Chair: Manuel Fischer Session Chair: James Hollway Session Chair: Mario Diani Session Chair: Dimitris CHRISTOPOULOS

Gaining Social Capital? The Impact of Institutional Political Experience on Politicians' Social Trajectories

<u>Alejandro Plaza</u>¹, Joaquin Rozas² ¹Humboldt Universitat zu Berlin, Germany; ²Universidad Pompeu Fabra

This study investigates the causal impact of holding a seat in a representative political body on individuals' social capital, utilizing the unique case of the Chilean Constitutional Convention (2021–2022). Unlike previous processes, this convention adopted an innovative electoral design that lowered entry barriers for independent candidates, many of whom came from social movements and civil society organizations. This institutional shift created a distinctive political setting to analyze how transitioning from activism to institutional politics affects delegates' social networks and political capital.

Using a two-mode bipartite dataset that tracks affiliations with up to six social organizations and political parties before and after the convention, the study evaluates changes in delegates' embeddedness, cohesion, and brokerage. The analysis employs a difference-in-differences (DiD) design, comparing delegates who secured a seat (treatment group) with candidates who narrowly missed election (control group).

The study hypothesizes that institutional participation increases embeddedness and cohesion for all delegates but reduces brokerage for independents due to the loss of their original bridging roles. Conversely, party-affiliated delegates are expected to experience increased brokerage capacity, leveraging their pre-existing partisan networks. Findings from this research contribute to the literature on political socialization, social capital, and network dynamics in emerging institutional contexts.

Governance Resilience & Political Change: Native Forest Deforestation and the Implementation of Argentinean Forest Law

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This manuscript explores resilience in the policy framework designed to govern native forest ecosystems in Argentina, with particular attention to the case of Salta province. Resilience, in this context, refers to the capacity of a policy system to adapt and achieve effective implementation. This would be evidenced in the enforcement of the legal protection of native forest ecosystems. Our analysis encompasses a wide range of legislation including: The latest Forest Law, Law 26160 on Indigenous Land, policies on family farming, and Argentina's international commitments regarding environmental protection and the rights of Indigenous peoples. The case of Salta is particularly significant due to several factors: In this province, there were very high levels of deforestation observed prior to the enactment of the Forest Law, and several efforts to circumvent restrictions, in coordinated actions between the local government and stakeholders interested in achieving the expansion of productive areas. One of the strategies was recategorization, although it was not the only one. They also took advantage of the laxity of controls and the low imposition of penalties, factors which, in combination, would make it possible to circumvent legal restrictions. The contested issue revolves around the definition of the territorial ordinance of native forest (OTBN by its spanish acronym) map. We examine in depth how, in addition to various attempts to expand the area of land that can be deforested (such as through reclassification), there is evidence of systematic responses to counter these efforts, including the intervention of National Forests office (Bosques de Nación), tribunal rulings, and the imposition of fines to penalize violators. We also analysed the debate around the trajectory of redifinition of OTBN along this decade, which has currently a new version looking at major local and national Argentinean newspapers. This paper highlights the role of "oscillating exceptional agents", a diverse group of actors who have contributed to protecting contested areas of forest preservation and economic development (yellow zones), areas

most threatened by deforestation and inhabited by Indigenous and criollos family farmers communities. By a sequential mixed methods research design, combining quantitative and qualitative methods including policy network analysis and content analysis of actors' discourse, we explore the complex system of coalitions between family farmers and indigenous organizations, environmental state and non-state agencies, and their collaboration with federal authorities. This paper highlights the role of "oscillating exceptional agents" a diverse group of actors who have contributed to protecting contested areas of forest preservation and economic development (yellow zones), areas most threatened by deforestation and inhabited by Indigenous communities. By a sequential mixed methods research design, combining quantitative and qualitative methods including policy network analysis and content analysis of actors' discourse, we explore the complex system of coalitions between family farmers and indigenous organizations, environmental state and non-state agencies, and their collaboration with federal authorities.

Our findings indicate that besides external pressures such as change in the political administration and the pandemic, the existing coalition were able to be resilient in governing of native forest ecosystem in the province of Salta.

Identifying Drug Policy Constellations: A Social Network Analysis of U.S. Politicians on Twitter

Nicholas Athey

University of La Verne

Recent research on political communication highlights how digital platforms facilitate policy discourse, yet much of this work focuses on ideological polarization rather than specific issues. This study builds on social network analysis (SNA) research by examining whether Twitter interactions among U.S. politicians provide information about cluster actors who coalesce around shared policy interests (i.e., policy constellations). While prior studies have investigated partisanship and influencer dynamics, less is known about how politicians form networks around specific issues, particularly in drug policy. Using a dataset of several hundred American politicians and over 7,000 cannabis-related tweets, I construct a two-mode network based on retweets, hashtag co-occurrences, and direct mentions ("@") to analyze patterns of interaction and discourse. The first mode comprises ties between politicians and organizations, while the second mode ties politicians to policies and political issues. Preliminary findings suggest that a small subset of politicians disproportionately drives the conversation, acting as key brokers who amplify and shape policy discussions. At the same time, distinct clusters emerge, with politicians and organizations aligning around specific policy stances, regulatory frameworks, and advocacy efforts. This study extends existing work on digital political networks by offering an analytic model to uncover policy constellations through communication ties. These findings contribute to research on political communication, digital advocacy, and the role of social media in shaping contemporary policy debates.

Mapping Elite Conflict in Weimar Germany: The Structure of Parliamentary Interactions

Benjamin Rohr¹, John Levi Martin²

¹University of Mannheim, Germany; ²University of Chicago, USA

This paper examines the changing structure of elite conflict in Weimar Germany by analyzing interactions among political parties in the German Reichstag between 1920 and 1932. We introduce a new database derived from digitized parliamentary proceedings, capturing all speeches, interjections, and reactions to interjections recorded by parliamentary stenographers. Each interaction is assigned a politeness score based on the type of interaction (e.g., applause, agreement, laughter, shouting) and modifying descriptors (e.g., "tumultuous" or "lively"). Using these scores, we first employ network analysis to trace changes in the structure of deference. We then construct a party-party structural equivalence matrix based on shared interaction patterns and arrange parties in a two-dimensional space using multidimensional scaling. Our findings reveal that the resulting party structure closely aligns with one derived from roll-call vote similarity, whereas speech content alone fails to reproduce this pattern. By examining relationships formed through repeated interactions on the floor, this study provides novel insights into elite competition and polarization in the Weimar Republic, contributing to broader debates on institutional instability in democratic systems under stress.

Neural Network Nominate: Mapping Mass Political Ideology via Revealed Preferences Adolfo Fuentes-Jofre^{1,2,3}, Cristian Jara-Figueroa⁴, Cristian Candia^{1,2,3,5} ¹Computational Research in Social Science Laboratory, School of Engineering and Government, Universidad del Desarrollo.; ²Instituto de Data Science, Facultad de Ingeniería, Universidad del Desarrollo, Santiago, Las Condes, Chile.; ³Centro de Investigación en Complejidad Social, Facultad de Gobierno, Universidad del Desarrollo, Santiago, Chile.; ⁴Cash App, Head of Network Science and Human Behavior, San Francisco, United States.; ⁵Northwestern Institute on Complex Systems, Kellogg School of Management, Northwestern University, Evanston, United States.

Understanding political polarization from a social network perspective is critical for diagnosing how policy preferences diffuse, cluster, and shape opinion dynamics. We present a novel method, Neural Network Nominate (NNN), which extends bipartite network analysis to measure ideological positions from user-proposal ties. Building on Thurstone's paired comparisons and the NOMINATE framework, NNN embeds both individuals and policy proposals in a low-dimensional latent space, learned by a neural network classifier that predicts the outcome of each user's preference ties. We examine large-scale datasets from three contexts—Chile, France, and Brazil—collecting over five million user-proposal choices. The resulting bipartite networks are then mapped to ideological spaces where users cluster by political leaning, and proposals align with the left-right dimension.

Our approach consistently attains strong predictive accuracy, including 68–70% for pairwise choice and up to 91% for self-reported left-right classification. We highlight how these embeddings illuminate generational differences in polarization: for instance, younger cohorts in France and Brazil form tighter ideological clusters, whereas young right-wing Chileans align with left-leaning policies. By focusing on revealed preferences, NNN mitigates the social desirability biases often found in surveys and the echo-chamber distortions in social media data. The method offers a scalable, transparent means to identify bridging proposals that might reduce ideological divides. This contribution underscores the value of a network-based approach for analyzing mass political ideology, fostering new directions in understanding—and potentially intervening in—polarized political landscapes. Our findings reveal critical insights, opening pathways for digital democracy interventions.

OS-125: Corporate Networks 2

Location: Room 108 Session Chair: Roy Barnes Session Chair: Mohamed Oubenal Session Chair: Roberto Urbani

Business elite and field of power in Brazil

<u>Ana Paula Hey</u>, <u>Ivy Ribeiro</u> University of Sao Paulo, Brazil

The paper combines the methodology of Multiple Correspondence Analysis (MCA) and Social Network Analysis (SNA) to investigate the Brazilian business elite, focusing on the interlocking directorates and boards formed by 72 publicly traded companies whose shares were traded on B3 (Brazil's main stock exchange) in 2020. To this end, information about the executive boards and boards of directors of these companies was analyzed using R Studio software, with the reference forms annually submitted by the companies to the Securities and Exchange Commission (CVM) as the primary sources. Guided by a notion of elite based on Wright Mills' positional method and Pierre Bourdieu's construct of the field of power, the study aims to demonstrate how individuals' participation in organizations, their shared educational background, and their professional trajectories form a coordinated elite, which constitutes a necessary foundation for the exercise of power. We also mapped the relationship of these agents with national political and cultural spheres, investigating their participation as members of the government, cultural institutions (such as family and private foundations and think tanks), and social clubs. We used SNA to identify groupings or communities (community detection) through clustering algorithms (stochastic block modeling), enabling the creation of an active categorical variable to be included in the MCA. This methodological combination contributes to the sociology of elites by making it possible to objectify social capital and the multipositionality of agents and to assess the influence of these elements on the structure of social space.

Business transaction networks in 2017 Hungarian metal production sector

Esteban Muñoz¹, László Lőrincz^{1,2}

¹Corvinus University of Budapest, Hungary; ²HUN-REN Centre for Economic and Regional Studies, Budapest, Hungary

Firms exchange various valuable resources to accomplish their daily tasks and achieve their goals. However, the process of tie formation in networks of business transactions between firms is still unclear. We follow and combine

previous knowledge from the sociology of organizations, network science, and economic geography to inspire our research hypotheses on how we can potentially describe and infer the substructures that may better represent their network formation processes. We define our networks with firms as nodes and economic transactions between them as edges, which we observe from the 2017 Hungarian VAT declaration records. We construct our networks from transactions between firms of the specific industry-region, their economic transactions with external partners from different industries and regions, and the transactions between these partners. We focus on firms operating in the metal production sector (N=10 networks). Using Bayesian ERGMs, our preliminary results show that structural and actor-relation effects are relevant and significant in identifying the process of tie formation in these networks. Firms in this sector in 2017 relied on existing connections for their exchanges, and typically did not engage in circular trade patterns. Moreover, there was limited preferential attachment in these networks, suggesting that firms imposed capacity and risk constraints. Our contribution extends to the possibility of applying these models to other industries, as well as identifying trends that may be useful for further studies that need to set prior distributions when using Bayesian estimation as a solution for sparse network inference.

Corporate Interlocks and Cybersecurity Governance: A Network Analysis Approach

Srinidhi Vasudevan¹, Anna Piazza¹, Riccardo De Vita², Madeline Carr³

¹University of Greenwich, United Kingdom; ²Manchester Metropolitan University; ³University College London

Corporate interlocks—the sharing of directors across multiple company boards—create influential networks through which cybersecurity knowledge and practices flow between organisations. These connections are remarkably common: in 2018, 78% of the top 50 S&P500 firms shared at least one director. Despite recent trends limiting multiple directorships—59% of S&P500 firms cap directors at three additional positions—these interconnections remain powerful in corporate governance.

These directorate networks serve as channels through which cybersecurity attitudes propagate across organisational boundaries. Beyond individual application of experience, these networks facilitate collective learning as board members exchange insights. Interlocks function as effective external knowledge sources, providing access to insider strategies that would otherwise remain confined.

Our study employs a Linear Network Autocorrelation Model (LNAM) to examine how interlocks influence cybersecurity governance across S&P500 companies. We analyse key variables including Risk and Audit committee structures, presence of CROs and CISOs, board size, women directors, governance quality scores, and ransomware experiences, while controlling for industry effects. This approach reveals how cybersecurity practices diffuse through director networks and identifies which governance characteristics most effectively enhance cyber resilience.

Ethnic Social Capital and Wage Disparities: The Impact of Occupationally Diverse Ties to Malay and Chinese Contacts in Singapore

VINCENT CHUA

National University of Singapore, Singapore

This study examines the impact of ethnic social capital on wages in Singapore, focusing on the contrasting effects of Chinese and Malay social ties. Using data from Wave 2 of a 2023 study of approximately 900 young adults (aged 21-39) from lower to middle-income households, the analysis reveals that in a labour market where education, occupation, and experience are the primary determinants of wages, social capital plays a comparatively minor role. However, a notable asymmetry emerges: while Chinese social capital has minimal or no effect on wages, Malay social capital is linked to a significant wage penalty. Among degree holders and PMETs, having more Malay contacts correlates with lower wages, even when these contacts are high-status. To address the possibility of reverse causality—where the negative link between Malay social capital and wages could stem from more Malays occupying lower-wage jobs—the study controls for workplace ethnic composition. Additionally, by controlling for the respondent's ethnicity, the analysis confirms that the wage penalty is driven by the devaluation of Malay social networks, not the respondent's ethnicity. These findings highlight the devaluation of Malay social capital and point to underlying racial biases and structural inequalities in Singapore's multi-ethnic labour market, even among highly qualified individuals.

Evolution of intra- and inter-city networks of multinational firms in Africa, 2010-2022

<u>Corneille Rogromel</u>, Céline Rozenblat University of lausanne, Switzerland

In the current context of globalization, this research explores the networks of multinational firms in African cities. Historically, the colonial era structured African economic relations, remaining after the countries' independences. For 10 years, African cities have diversified their globalization, supported by the emergence of new partnerships (Martin, 2023; Chaumont, 2024).

We undertook an empirical study of the ownership networks of multinational companies based on the ORBIS-BvD 2010–2022 dataset, a sample of the top 3,000 global groups' networks of firms (all their direct and indirect subsidiaries with ownership above 10%) in 2010, 2013, 2016, 2019, and 2022). We located 98% of the African companies in homogenized Large Urban regions (LURs) (Rogromel & Rozenblat, 2024) building weighted and oriented inter and intra-city networks.

Between 2010 and 2022, the number of firms of the sample in African cities significantly increased from 2,400 to 28,000, with links rising from 3,700 to 28,000 (Orbis-BvD-Citadyne Unil, 2010–2022). This evolution reflects not only a growing integration in globalization but overall, the growth of intra-urban, intranational, and intracontinental urban networks, while the intercontinental networks lost their domination. The African Continental Free Trade Area (AfCFTA) agreements, by simplifying regulations and opening African markets, have significantly accelerated this intra-continental integration (Obida, 2019). Cities such as Port-Louis, Cairo, Lagos, and Johannesburg became regional hubs, concentrating these intra-African interurban networks. While a vertical structure dominates with political or economic capitals, a horizontal structure emerges where specialized cities interact in a complementary fashion with the major hubs.

OS-80: Social Networks and Climate Change

Location: Room 109 Session Chair: David Benjamin Tindall Session Chair: Mark CJ Stoddart Session Chair: Paul Wagner

CENTRALITY AND CARBON PERFORMANCE IN MEXICAN FIRMS

ISAAC HERNANDEZ, ARTURO BRISEÑO, OSVALDO GARCIA, JOEL CUMPEAN UNIVERSIDAD AUTONOMA DE TAMAULIPAS, Mexico

Scientific research on climate change emphasizes carbon performance (CP) as essential to sustainable management. The framework examines business greenhouse gas emissions from environmental restrictions and public expectations. CP has been explored for pollution monitoring and financial incentives like carbon credits, but sociological knowledge of corporate networks as sustainability advocates is lacking.

This study examines CP through the lens of corporate centrality, defined as a company's position based on its connectivity and influence within a network. It analyzes different types of centralities in Mexican corporations, employing social network analysis (SNA) and metrics such as degree, closeness, eigenvector, and betweenness centrality.

The research focuses on networks of shared board members (board interlocks) and the carbon emissions reported by these companies. Using a symmetric undirected matrix to account for board interlock connections, our findings reveal whether companies with higher centrality implement more effective sustainability practices, positioning them as key nodes for disseminating emission reduction strategies.

Furthermore, the study aims to identify the challenges faced by peripheral companies, which, despite having less influence, exhibit greater flexibility to adopt innovative approaches. This research offers theoretical and practical frameworks to improve business sustainability plans and highlights the significance of network dynamics in advancing low-carbon economies.

The findings enhance the domain of business management and sustainability, emphasizing the significance of collaboration and leadership in addressing climate change. The report provides pragmatic ideas for formulating public policies and business initiatives that enhance the role of core enterprises and promote sustainable development.

Climate Networks: How Extreme Weather Events Connect Communities in Mexico Ben Rosche, Filiz Garip

Princeton University

Extreme weather events, such as droughts, floods, and hurricanes, increasingly shape the lives of communities across Mexico. While exposure to similar climate events might suggest shared experiences, the social and economic consequences of these events vary drastically. Some communities recover quickly, while others suffer prolonged economic hardship, displacement, and intensified migration. This study adopts a network perspective on climate change to investigate how extreme weather events connect communities in Mexico and how these connections contribute to unequal social and economic outcomes.

We analyze the evolving structure of climate-induced community networks using a combination of high-resolution NASA weather data and social and economic data from the Mexican Migration Project. We construct a bipartite network linking communities to extreme weather events, where ties represent shared exposure to specific climate shocks. By modeling the evolution of this network from 1980 to the present, we examine how climate events create interdependencies among communities and influence migration patterns, economic resilience, and long-term demographic shifts. Specifically, we assess whether communities with similar climate exposure experience parallel social and economic consequences or whether preexisting inequalities exacerbate divergent outcomes.

Preliminary results suggest that the number of communities affected by the same extreme weather events has increased significantly since the early 1990s, creating dense clusters of climate-linked communities. However, the economic and migration consequences of these shared exposures are highly unequal. Wealthier communities often absorb climate shocks with fewer disruptions due to greater institutional support, financial stability, and diversified economies. In contrast, poorer communities, particularly those reliant on subsistence agriculture or informal labor markets, face greater displacement risks and higher migration rates to the U.S. and urban centers within Mexico.

This research contributes to a growing literature on climate-induced inequality by shifting the focus from isolated community-level effects to the broader relational dynamics that structure climate vulnerability. Our findings highlight the need for policy interventions that recognize not only the increasing frequency of extreme weather events but also the interconnected nature of their consequences. Understanding how climate events bind communities into shared experiences—while simultaneously deepening socioeconomic inequalities—can inform targeted adaptation strategies, such as regional economic safety nets and climate-responsive migration policies.

DROPS OF THE FUTURE

<u>Marina Gorbatiuc</u> Moldova State University, Moldova

Sustainability and sustainable development include questions of climate change, as well as climate-culture, but are broader, involving other environmental concerns (such as local pollution and plastic waste,) as well as questions of social justice and distribution of economic resources in human communities and environmental protection, addressing various forms of pollution, ensuring conservation of wildlife and the maintenance of healthy ecosystems to enhance security by building resilience to the impacts of climate change.

Climate change, due to increased carbon emissions worldwide, is the greatest challenge facing sustainability efforts. It affects economic systems, increases social inequalities and causes severe environmental impacts. Sustainability represents an opportunity to ensure that both present and future generations meet their needs. Climate change is a highly controversial issue, with contestation over its facts, causes, proposed solutions and the values underpinning them (Hoggett, 2011; Marshall, 2014). It is embedded in broader knowledge wars in the contemporary era, with the proliferation of 'fake news', manipulation of the citizenry through social media, and distrust of experts – leading to the notion of the 'post-truth' era.

Investigating relationships between PM_{10} and Climatic Parameters using PCA Model in the three largest urban areas in North Macedonia

Emilija Manevska, Olgica Dimitrovska, Ivan Radevski, Svemir Gorin, Arse Kuzmanoski, Blagoja Markoski Faculty of Natural Sciences and Mathematics, North Macedonia, Republic of

This study applies Principal Component Analysis (PCA) to evaluate how meteorological factors influence PM10 pollution in Skopje, Kumanovo and Bitola from 2012 to 2020. PCA reduces data complexity while identifying key weather variables that impact air pollution levels.

Findings indicate that temperature and wind speed have the strongest negative correlation with PM10 concentrations, meaning lower temperatures and weaker winds are linked to higher pollution levels. These
conditions limit pollutant dispersion, leading to worse air quality. Humidity and precipitation have mixed effects humidity can promote both the removal and formation of pollutants, while precipitation aids in PM10 reduction through wet season, depending on intensity and duration.

The extracted principal components explain a significant portion of pollution variability, highlighting the dominant meteorological influences on air quality trends. By clarifying these relationships, PCA enhances the understanding of air pollution dynamics in the three largest urban areas in North Macedonia.

This analysis provides valuable insights for air quality management in North Macedonia. By identifying the key meteorological drivers of pollution, policymakers can develop more targeted and effective strategies to mitigate PM10 levels and improve public health.

Key Players in Climate Adaptation Across Urban-Rural Contexts: A Case Study in the California Delta

<u>Tara Pozzi</u>, Emily Denio, Mark Lubell UC Davis, United States of America

Climate adaptation governance refers to the structures, processes, and policies that manage climate change impacts. Collaborative partnerships between organizations involved with climate adaptation creates a network that binds the governance structure together. Understanding the key actors in a governance system is critical for understanding how to leverage existing structural components of the network to overcome institutional and social barriers to adaptation, such as network fragmentation or diverging adaptation goals. Utilizing a 2024 survey of climate adaptation practitioners in the Sacramento-San Joaquin Delta, this study answers two questions: 1) Which organizations are most central to the collaborative network? and 2) How does this differ across land-use contexts? We answer these questions by using a core-periphery network test and examining different centrality measures to identify popular, influential, broker, or broadcaster organizations. We expect to see a similar collaborative network structure between practitioners working in rural and mixed land use contexts compared to urban, which we expect to be more decentralized. This study will establish which organizations act as key adaptation players in the Delta and how this varies across the urban-rural spectrum.

OS-88: Spatial and Geographic Social Networks

Location: Room 112 Session Chair: Clio Andris Session Chair: Zachary Neal Session Chair: Paul Schuler Session Chair: Gil Viry

Analysing space usage processes through a dual network lens

Kerstin Sailer University College London, United Kingdom

The embedding of social actors within physical spaces has been increasingly studied in Social Network Analysis. What has received less attention to date is a more dynamic perspective on the different kinds of spaces that actors flow through in their everyday lives, which have become more manifold and shifting, for example through hybrid working and digital technologies.

In this talk I want to explore a new perspective for the relationship between people and space by building on Ron Breiger's seminal approach to the duality of networks, which considered how individuals intersected within groups by virtue of their participation in events. This can be applied to people and spaces. Practically, this means focussing on movement patterns, i.e., how people make their way from A to B, which path they chose, and therefore how often they frequented different spaces along the way.

This approach works across scales, but here two case studies are explored of space usage processes inside buildings: an in-patient ward and the variety of healthcare workers moving through it, and a university building populated by students and staff. Preliminary insights suggest that the particular patterning of the spaces an individual frequents tells us something about the individuality of the actor and their social embeddedness, and vice versa, which people use which spaces may tell us something about the character of those spaces.

This work hopes to widen perspectives on the context of social structures by offering a way of analysing dynamic actor-related behaviours in space.

Bridging Geographic and Conventional Network Visualization Methods: Lessons Learned

Anton Santos¹, Helen Harvie², Carrie Costello³, Sophia Sidi¹, Emma Haight², Symbia Barnaby³, Mary Wilson³, Kristy Wittmeier², Stephanie Glegg¹

¹University of British Columbia, Canada; ²Children's Hospital Research Institute of Manitoba, Canada; ³Family partner

Background and Aims: Connecting for Care is a mixed-method social network analysis case study of Canada's child development and rehabilitation network. It explores social ties and knowledge translation (KT) patterns among healthcare providers, families, researchers, and KT support personnel. This presentation outlines our integration of algorithmic and geographic visualization approaches to facilitate analysis and qualitative data gathering.

Methods: A cross-sectional national online survey collected respondents' KT connections across Canada's 10 provinces and 3 territories. Using UCINet and NetDraw, we created egocentric maps showing inter/intraprovincial/territorial knowledge exchange patterns. Nodes were positioned manually by province/territory and region using WindowTop software to optimize clarity. These visualizations were presented during interviews to further our understanding of network structure and factors influencing tie development.

Results: We identified 596 connections among 622 individuals (234 respondents; 388 non-respondents). Analysis revealed 452 intra- and 144 inter-provincial/territorial ties, with connections concentrated in densely populated regions. We generated 13 provincial/territorial maps and 3 regional visualizations for interpretation. Average geodesic distance of 3.6 suggests relatively efficient knowledge exchange despite Canada's vast geography. Knowledge brokers (betweenness centrality range: 0-1003, median: 0) were primarily concentrated in central Canada. Interview participants valued intra-provincial connections for exchanging context-specific information within Canada's decentralized health system.

Conclusion: The predominance of intra-provincial ties reflects the importance of region-specific expertise and the opportunity to support the implementation of evidence-based practices across Canada. Qualitative inquiry enhanced our understanding of network structure. Software development that improves the integration of geographic and network data would facilitate this approach.

Climate Change and Migration Networks: Spatial Dynamics of Climate-Induced Mobility

Jisoo Kim¹, Hyungsoo Woo²

¹Korea Advanced Institute of Science and Technology, Republic of Korea; ²Institute of Philosophy and Sociology of the Polish Academy of Sciences, Poland

While migration patterns have traditionally been analyzed primarily through economic, security, and migrant community network frameworks, the growing impact of climate change necessitates a shift in focus to understand the role of climate factors in shaping these movements. This study explores the intersection of climate change and global migration patterns over the past two decades, focusing on South-to-North migration. Utilizing international migration data and satellite imagery, we employ valued Exponential Random Graph Models and spatial analyses to identify emerging migration hotspots linked to regions experiencing severe climate impacts. These geocoded migration networks highlight how climate stressors, such as floods, sea level rise (elevation change), and extreme temperatures, influence the magnitude and direction of migration flows. Our findings reveal significant shifts from traditional migration patterns, emphasizing how climate-induced stressors reshape the relational dynamics and migration pathways of these networks. By focusing on the spatial dimensions of climate-induced mobility, this study underscores the importance of geographic and climatic context in understanding migration networks. This study contributes to a more nuanced understanding of how environmental stressors shape network structures and offers valuable insights for understanding human mobility and fostering social cohesion across borders in a climate-impacted world.

Coinventing Climate Change Mitigation Technologies: Where and When

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Heriot-Watt University, United Kingdom

The rapid deployment of green innovation is critical to achieving global carbon targets. Climate change mitigation technologies (CCMTs) produce a global public good, yet their R&D costs, risks, and benefits remain strikingly uneven. Over the past two decades, CCMT co-invention networks have evolved from core-periphery structures— dominated by the U.S., China, and Germany, into more polycentric systems where emerging economies like India

play an increasing role (Ma et al., 2022). However, little is known about how these co-invention networks and their dynamics influence patent filing strategies and jurisdiction selection, and so their diffusion across the global market. This study leverages global patent data from PATSTAT, USPTO, and Lens.org, applying a relational event model to analyse the structural drivers of CCMT patenting decisions. We examine how inventor nationality, cross-country collaborations, and network topology (e.g., hub-spoke vs. distributed structures) shape patent jurisdiction choices. By unpacking the interplay between global co-invention networks and patenting decisions, this research offers insights into the strategic dimensions of green technology diffusion, market selection, and innovation drivers.

Community-level networks on a societal scale

Rense Corten

Utrecht University, Netherlands, The

The emergence of online social networks like Facebook in the early 2000's promised a breakthrough in social networks research social network research by enabling analysis of societal-scale interactions due to abundant data. However, despite many groundbreaking studies, progress has been limited by a lack of freely available data. In rare cases where such data have been made available by platforms to researchers, individual-level data can typically not be shared with the wider research community. However, data that are aggregated to higher social entities, such as municipalities, can be shared more easily. This paper presents one such data set based on the (now defunct) Dutch social network platform Hyves. From an underlying individual-level network covering a significant fraction of the population, we create a data set of consisting of topological features of within-municipality networks, covering all municipalities in the Netherlands. This provides a unique insight into features of social connectivity within municipalities that is not readily available from other resources. We present descriptives of topological features of municipality networks, explore associations with other properties of municipalities, and demonstrate the usefulness of municipality-level network measures for social research.

OS-18: Current trends in socio-semantic network analysis

Location: Room 114 Session Chair: Iina Hellsten Session Chair: Camille Roth Session Chair: Nikita Basov

Relationship frames, ambiguity, and the duality of dyad and content

Oscar Stuhler

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Network analysis aspires to be "anticategorical," yet its basic units, — relationships — are usually readily categorized entities with labels like "friendship," "love," or "patronage." In this way, a nontrivial cultural typification underlies the very building blocks of most network analyses. Despite work showing that a specific "type of tie" often stands in for quite heterogeneous empirical phenomena, this typification is seldom challenged in research practice. This article expands on recent efforts to more adequately theorize ties by further developing and arguing for the concept of relationship frames — cultural models that stabilize relational expectations. I suggest that such frames are rooted in regularities in the duality of dyad and content. I then demonstrate the fruitfulness of these arguments by uncovering such regularities content of 1.2 million relationships between characters in fiction writing. Subsequently, I show how this operationalization of relationship frames allows us to conceptualize and measure tie ambiguity. The paper concludes with an exploration of which factors enhance or reduce such ambiguity.

Matching social and linguistic scales in socio-epistemic systems

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Both social and linguistic systems often exhibit nested structures and hierarchies, which can be recovered empirically through a variety of well established hierarchical clustering techniques. However, attempts to match social and linguistic levels in socio-epistemic systems remain scarce. In this paper, we propose an information-theoretic approach to cross-correlate levels in the community and linguistic structures of a research area, which we apply to a corpus of theoretical physics publications (D=228,748 abstracts). We cluster the corpus into K=611

topics using Sentence Transformers and HDBSCAN. This linguistic partition is then organized into a dendrogram using agglomerative clustering. Additionally, we locate communities in the co-authorship network using hierarchical stochastic block modelling. Since both the linguistic and community partitions possess hierarchical structures, we may observe epistemic and social structures at arbitrary scales, from highly coarse-grained to very fine-grained social or linguistic partitions. However, at that stage, scales in these social and linguistic hierarchies are unrelated. To match communities and linguistic clusters across scales, we start by determining each scientist's "specialty" (the most frequent topic among their publications). These specialties can be leveraged to assess the probability that scientists belong to a certain community. Using a minimum-description length criterion, specialties are then coarse-grained adaptively by merging topics recursively (following the dendrogram structure) such as to eliminate linguistic details that add too little information about the network structure at a given scale. We validate our approach using a supervised text-classifier trained with manual annotations from an expert of the field.

A sociosemantic mutualist approach for understanding the development and resilience of a scientific field. The case of ecosystem approaches to health

<u>Pierre Mongeau</u>, <u>Johanne Saint-Charles</u>, Louis Renaud-Desjardins UQAM, Canada

Investigating the applicability of the ecological mutualism model, we consider topics and researcher communities in scientific publication networks on health as species in a mutually beneficial relationship. Analysis of 6,430 Scopus articles on ecosystem approaches to health (Ecohealth, OneHealth, Planetary Health) reveals the coevolution of key features of mutualistic interactions, modularity and nestedness. We compare the evolution of each approach over time, considering disruptive events and productivity. Our results show that mutualism accounts for the field's development and resilience.

Climate activism: Socio-semantic networks of support and opposition

<u>lina Hellsten</u>

LUT University, Finland

Climate change has attracted new forms of activism, such as Extinction Rebellion that organizes global and local demonstrations and actions with wide-scale public attention. The focus is on how the public attention is constructed in the social networks of activist groups and their semantic networks of communication. In particular, the paper scrutinizes strategic uses of the online communications by two climate activist groups to call-for-action, spreading information, and fostering interaction around climate actions.

The analysis focuses on three types of networks; 1) social networks of participants addressing each other in online settings; 2) the semantic content of the communication between the participants, and 3) the socio-semantic networks in the activist groups' social media posts. The paper builds upon earlier automated methods for the analysis of socio-semantic networks in social media, which use the available meta-data in social media to detect topical networks of hashtags and the words in the social media posts as well as the social networks of those authoring the posts, and those addressed in the posts.

The results show that the activist groups use their social networks to create semantic networks of support with other activist groups, and networks of opposition towards other social actors, such as individual politicians, or governmental organizations. The main strategies, calls-for-action and information spreading focus on one-way communication instead of creating a space for interaction between the different participants in the debates.

Error correction mechanisms improve the ability of replicators to reach peaks in a fitness landscape

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¹University of South Carolina, United States of America; ²Private Citizen; ³Iron Light

Abstract: The evolution of replicators, including DNA sequences, information embedded in linguistic formats (memes), and the output of genetic algorithms, is understood as stemming from mutation, selection, and retention. However, the overwhelming majority of mutations degrade fitness while mechanisms that inhibit deleterious mutations prevent replicators from reaching new peaks in a fitness landscape. Here we show that error correction mechanisms, in contrast to error reduction, both improve the fidelity of replicators, and accelerate progress towards a fitness peak. As a result, error correction should be strongly selected for and should be widely observable for

social as well as biological phenomena. This has critical implications for the stability of information transmitted via social networks and suggests that network diffusion also represents a type of distributed network computation.

OS-151: Modeling Network Dynamics 3

Location: Room 116 Session Chair: Stepan Zaretckii Session Chair: Tom A.B. Snijders Session Chair: Christian Steglich

Tracking complex dynamics: the adaptation of stablecoin decentralized networks to critical events

<u>Cristina Pozzoli</u>¹, Marco Venturini^{1,2}, Flaminio Squazzoni¹ ¹University of Milan, Italy; ²Sorbonne Université, Paris

The cryptocurrency market has grown exponentially to become a significant part of the global financial system, with a market capitalisation of \$3.05 trillion as of 26 February 2025. Designed to maintain a stable value pegged to a reserve asset, stablecoins have gained momentum among traders and investors as a bridge between traditional fiat currencies and the decentralized world of cryptocurrencies.

Despite the perceived stability provided by built-in decentralised algorithms and their relative autonomy from fundamentals, stablecoin networks are not immune to critical events, with adaptive responses not yet fully understood. This study examines how the transaction networks of two Ethereum-based stablecoins adapt in response to the Terra-Luna crisis, one of the most tragic panic crises in the cryptocurrency world. By using Relational Event Models (REMs), we study the evolution of these stablecoin network structures and the mechanisms driving their post-shock adaptation. In particular, our analysis explores the role of triadic closure as a potential stabilising mechanism and investigates whether the formation of new triadic connections has shaped the overall structure during the crisis period and helped to restore network cohesion after disruptions.

Our REM analysis reveals a shift in network dynamics after the crisis. Under stable conditions, tie formation is mainly driven by reciprocation and transitive closure, while after the shock these mechanisms weaken significantly, suggesting a disruption of established relational patterns. Cyclical closure becomes more prominent, suggesting a shift towards alternative reconfiguration strategies to maintain network cohesion. Using REMs, this study provides one of the first researches on how stablecoin networks adapt in response to critical events and demonstrates the importance of these models for studying network dynamics and formation mechanisms, with potential implications for research on the microstructure of financial markets.

Using simple pedestrian dynamics to generate temporal networks of contacts

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Empirical contact networks remain underexploited in revealing fundamental mechanisms driving social behaviours. We propose an original modeling framework for generating temporal networks, designed to reproduce key observables from empirical data [1]. Our hypothesis is that some of these observed features are intrinsically linked to the spatial constraints of face-to-face interactions. Unlike conventional network-based approaches, our models incorporate the critical role of spatial constraints in shaping interaction patterns. This approach builds on the core idea of Starnini et al. [2], but shifts to a more fundamental framework by considering social homogeneity in agents behaviour.

Starting from a pedestrian model with continuous space and discrete time, a "contact" occurs when two agents face each other within a certain radius. A temporal network is constructed with nodes representing agents and links defined by these contacts. Our simulations explore various dynamics, interaction mechanisms, boundary conditions, and spatial configurations to assess the geometry's impact. The resulted temporal networks are then compared against empirical time-varying networks collected during four conferences [3].

One key result concerns the inter-contact duration distribution, which is power-law distributed with an exponent -3/2 in the

empirical data. We reproduce this result using three different pedestrian models: two-dimensional random walk; active

Brownian particles; and the Vicsek model [1]. This suggests that this property can be recovered by any pedestrian dynamics

as soon as it has a random underlying mechanism.

We believe that this novel approach to network generation offers a framework to link observations on temporal networks to sociological interpretations.

OS-114: Alcohol and Substance Use in Social Networks 2

Location: Room 125 Session Chair: Kathryn M Barker Session Chair: Jessica M. Perkins

The peer dimension of young people's substance use behaviour: a mixed methods social network analysis among senior high school students

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Background: Peer influence has been reported as a predominant risk factor of harmful substance use among young people. Given the high prevalence of substance use among young people in Ghana, an understanding of young people's social networks will be central to developing and implementing preventive interventions. This study described the social network features and substance use prevalence of senior high school students in Ghana, and the underlying mechanisms that may influence substance use behaviour within friendship networks.

Methods: Using a mixed methods study design, we conducted a social network analysis among senior high school students in two schools in a Ghanaian municipality. We used a bounded social network approach and implemented a social network survey as the first phase of data collection process. A second phase consisted of in-depth interviews with a sub-sample of the survey participants. Quantitative data were analyzed using descriptive statistics and inferential statistics. We analyzed qualitative data using a thematic framework approach.

Findings: Quantitative findings revealed a relatively high prevalence of any substance use among the participants (63.5%, 44.7%, and 64.1% in networks 1, 2, and 3 respectively). Also, we found a relatively low friendship network density and average level of reciprocated ties. Gender identity was identified as a strong predictor of friendship network formation. The qualitative findings revealed that the substance use values and norms of a friendship network, as well as traditional gender norms influence individuals' substance use behaviour.

Conclusion: The study provides findings on the association between young people's social network features, gender norms, and their substance use behaviour. The findings can be leveraged for the design and implementation of school-based interventions aimed at preventing substance use among young people in Ghana.

Understanding Substance Use in Alaskan Native Youth: A Social Network Perspective

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Previous literature consistently demonstrates that American Indian (AI) youth have earlier initiation and heavier use of substances compared to other racial groups. This study analyzes the social networks of Alaska Native (AN) youth, focusing on the role of school, family, culture, and peer influences on substance use, depression, and suicide. This cross-sectional analysis included 150 seventh to twelfth grade students enrolled in a charter school in Fairbanks, Alaska. In addition to analyzing the role of peer networks, this study incorporates students' relationship to school staff. Students were first provided with a school roster and asked to identify their friends. They were next provided with a roster of faculty and selected whom they would go to for support and ranked how likely they were to seek their support. Reciprocal ties between peers were protective against substance use. Intriguingly, having more staff in a student's network and stronger relationships with those staff were protective against substance use. These novel findings, particularly concerning the influence of staff, provide a new dimension to our current understanding of substance use in AN youth.

This analysis illustrates the complexities of social influence governing substance use while considering other common predictors of substance use among youth, such as depression and suicide. It highlights the need to consider both risk and protective factors within social networks, laying the groundwork for well-informed

interventions. The results support harnessing the positive influence of peer networks and staff relationships to reduce substance use in adolescents, presenting an optimistic perspective for community-based interventions.

Social Network Influences on Substance Use among Adolescents

Thomas Valente¹, Kristina Miljkovic¹, Jessica Barrington-Trimis¹, Sarah Piombo²

¹University of Southern California, United States of America; ²Harvard University, United States of America

Adolescent social networks have been shown to be strongly associate with use of tobacco, marijuana, and alcohol. In this study we replicate those associations and make four additional contributions to the literature. First, we show that both perceived friend use and friend self-report are independently related to associated with individual use. Second, adolescents who named more friends in response to a network question were less likely to report substance use, whereas those who were named as friends were no more or less likely to report use. Third, students who identified as Asian ethnicity were less likely to report any substance use but remained susceptible to peer influence on substance use. Finally, we show that being named as a friend by Asian students was protective against use of all three substances. Data were collected from up to 14 demographically diverse schools in southern California and consist of 23,012 surveys collected bi-annually from 9th to 12th grade.

OS-123: Contagion and Diffusion processes through Social Networks 2

Location: Room 202 Session Chair: Aníbal Luciano Olivera Morales Session Chair: Thomas Valente

Endogenous competition and the under-realized diffusion in social networks

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A central theme in social network analysis is diffusion—the spread of diseases, information, and behaviors through social ties. Originally introduced by demographers and widely applied by epidemiologists, the basic reproduction number (*R*0) and its derivations serve as foundational metrics for diffusion processes. Using infectious disease diffusion as an example, this paper describes a mechanism overlooked in most conventional analyses, in which a disease can endogenously "compete" with itself when multiple infectious individuals race to infect the same susceptible individual, thereby reducing the effective reproductive rate. Utilizing an empirically-calibrated network epidemiological model of wild-type COVID-19 diffusion in its early pandemic, we show that the mechanism would be expected to reduce its reproductive rate by an average of 39%. Simulation experiments further identify several different types of endogenous competition mechanisms and their relative effect sizes. We highlight the incorporation of endogenous competition mechanism as a necessary step in realistically modeling diffusion processes.

Optimal seeding of complex contagions for epidemic control

<u>Giuseppe Maria Ferro</u>, Giulio Burgio, Nicholas Landry, Patience AKATUHWERA Princeton University, United States of America

Understanding optimal strategies for promoting protective behaviors in networked populations is crucial for effective epidemic containment. While diseases spread via simple contagion—where a single contact can transmit infection—protective behaviors like mask-wearing often spread through complex contagion, requiring reinforcement from multiple contacts. This dichotomy presents a strategic trade-off: seeding behavior adoption at nodes with high standard centrality (key in disease spread) may slow the epidemic but hinder the propagation of the protective behavior, whereas seeding at nodes with high complex centrality accelerates behavior adoption but may allow the epidemic to spread unchecked.

In this work, we couple a simple Susceptible-Infected-Susceptible (SIS) epidemic model with a complex contagion model of behavior adoption. We analyze various seeding strategies across single-layer and multiplex network frameworks to assess their effectiveness under different objectives, such as minimizing fatalities or delaying peak infection. Our findings reveal that the optimal seeding strategy is sensitive to the relative time scales of disease and behavior spread and often involves an interpolation between standard and complex centrality measures. These results offer nuanced insights into designing targeted interventions that balance rapid adoption of protective behaviors with effective suppression of epidemic spread.

The spread of an unpopular norm in a social network experiment

Rob Franken, Rense Corten Utrecht University, Netherlands, The

Social norms are often thought to emerge because they benefit those who follow them. Yet, the persistence of "unpopular norms"—behavioral regularities that endure despite being privately rejected by most—challenges this assumption. Examples include foot binding in historical China, child marriage, and entrenched patterns of bribery and corruption. How can we explain the emergence of such norms?

We argue that the structure of social networks plays a crucial role in the emergence of unpopular norms by magnifying the "majority illusion" paradox: Even when a behavior is globally rare, certain network structures can cause individuals to perceive that most of their neighbors conform to it, creating the false impression that it is more widespread than it truly is. This illusion, when coupled with network externalities, can ripple through the network, pushing the population toward widespread compliance with an unpopular norm.

Our agent-based simulations reveal that network structure not only magnifies this illusion but also facilitates its spread under conditions of incomplete information and simplified decision-making heuristics. While most network configurations allow the majority to resist the spread of an unpopular norm pushed by a few fanatics, specific structures—characterized by fat-tailed degree distributions, disassortative mixing, and strong degree-trait correlation—enable these fanatics to sway the majority into compliance.

To empirically validate this mechanism, we will conduct a large-scale incentivized social network experiment involving an asymmetric coordination game on experimentally manipulated networks. During my talk, I will present the simulation results, describe the experimental design, and—if available—discuss the experimental findings.

Building on shifting sands: complex contagion and negative ties hinder malaria outdoor preventive measure adoption in a hard-to-reach population in Meghalaya, India.

Elisa Bellotti¹, Federico Bianchi², Francesco Renzini²

¹University of Manchester, United Kingdom; ²Universita' Statale Milano

Despite a remarkable decline in global incidence over the past two decades, the full eradication of malaria remains a major global health challenge. An estimated 249 million malaria cases still occurred in 85 endemic countries in 2022, according to the World Health Organization, which has set a goal of reducing global incidence by 90% by 2030. Achieving this target requires increased efforts to address persistent local malaria clusters. These are often located in hard-to-reach populations in marginalized areas of the Global South, where conventional large-scale interventions may prove insufficient hence presenting

challenges for public health policies. Effectively fighting malaria in these settings requires context-specific interventions informed by localized knowledge.

Large scale interventions focus on indoor mosquito bites' preventive strategies such as long-lasting insecticidetreated nets (LLINs) and indoor residual spraying (IRS). Residual malaria transmission take place in outdoor contexts, where exposure occurs during occupational activities, outdoor sleeping, or social gatherings. This challenge is particularly concerning given that effective solutions exist. For example, topical insecticides and repellents, available in various forms such as sprays, lotions, and creams, have been proven to provide costeffective protection against outdoor biting, and individuals generally acknowledge the effectiveness of these preventive measures. However, an important gap remains between recognition and implementation – the adoption of these protective measures at the community level consistently falls short of the critical mass necessary to achieve meaningful epidemiological impact.

In this work, we show that social network effects can help explain the low adoption of outdoor biting preventive measures in residual malaria epicenters. While previous research in the social sciences and public health has emphasized how networks facilitate the diffusion of positive health practices, our findings reveal that networks can also amplify resistance to adopt new measures that originates from local health beliefs or perceived costs and risks of changing established routines. Through our investigation of two marginalized village populations totalling 352 individuals in Meghalaya, India — a recognized residual malaria epicenter — we identified a dual mechanism combining high-threshold complex contagion and negative influence that explains the persistently low adoption rates of an insecticidal cream designed for outdoor prevention use. By analyzing fieldwork signed network data on the villagers' health-related peer-to-peer discussions (i.e., villagers with whom one was likely to discuss health issues, as well as villagers with whom one avoided such discussions), we found that overcoming personal

resistance to using the cream required a relatively high prevalence of users among their positive ties, which we were able to empirically estimate. However the positive impact provided by such an unlikely situation is offset by observing just one negative tie using the cream: our results provide strong evidence of a negative marginal effect on one's likelihood of using the cream yielded by the presence of at least one user to whom one reported being negatively tied, so that having a negative tie with a cream user decreased the villagers' probability of using the cream by 5.5%, net of the other modelled factors.

11:2 - 11:4

Epidemic and behavioural contagions: modelling the role of social networks in stay-at-home compliance during the Covid-19 pandemic

Sofiane Mazières

Sorbonne Université, France

This study examines the mechanisms of public compliance with stay-at-home orders introduced in response to the Covid-19 pandemic. Various hypothesis have been proposed by scholars to explain compliance patterns as a result of media coverage, policy enforcement and civic capital. However, they fail to explain why some countries such as France had high levels of compliance but low levels of trust in policymakers and the medias. Our hypothesis is that, through their day-to-day interactions, individuals have contributed significantly to the emergence and reinforcement of compliance with the to stay-at-home orders, as a result of social control and peer influence. In the context of France's 2020 spring lockdown, this article seeks to answer the question of the extent to which social networks and interactions influenced the dynamics of adherence with public health policy.

A data-driven approach was employed to develop agent-based models, with data derived from the Google Community Mobility Reports and social surveys conducted in France. Subsequently, an exploration of compliance mechanisms was conducted through a systematic comparison of model outputs with the actual lockdown compliance curves. Our results reveal significant variation in compliance levels due to social interactions, demonstrating that individual lockdown compliance cannot be accurately understood without considering account social networks and interactions. Our model allows us to better interpret compliance with public health measures as the result of the combined effect of policy, media coverage and social interactions.

OS-209: Networks in Agriculture 3

Location: Room 203 Session Chair: Gilad Ravid

The Networks of Policy Pushback: Politicisation, Protest Discourse, and Elite Resistance in EU Agri-Food Policy Reform

Anna Florentine Gall¹, Melanie Nagel²

¹Wageningen University, Netherlands; ²Eberhard Karls Universität Tübingen, Germany

The EU's agri-food sector both drives and remains vulnerable to environmental risks. Despite increasing calls for greening, EU agri-food policies continue to prioritise the interests of agricultural policy elites, such as farmer associations. However, the strategies these elites employ to resist much-needed reform remain underexplored. While the existence of closed policy networks is well-documented in (post-)exceptionalism scholarship, less is known about how policy elites obstruct or resist reform. Drawing on politicisation literature, we contend that protest-related discourse can amplify politicisation to a level where reform opportunities shrink, effectively blocking change. Using Discourse Network Analysis of Euractiv articles, we examine protest-related discourse on sustainable agriculture during a period of reform momentum (2018-September 2024). Our preliminary findings reveal a steady increase in politicisation, which only subsided after the 2024 European Parliamentary elections. A turning point in 2022-2023 saw agricultural policy elites frame sustainability as a threat to food security, escalating discourse polarisation and right-wing actors infiltrating protests. This marginalised environmental reform efforts and legitimised the rollback, weakening, and withdrawal of greening initiatives. By heightening politicisation, policy elites reinforced exceptionalist legacies and productionist interests, keeping policy networks closed and obstructing sustainability reforms.

OS-186: Recent Advances in Statistical Analysis and Mathematical Modeling of Large-Scale

Network Data 2 Location: Room 204 Session Chair: Frederick Kin Hing Phoa

Reddit Users Unleashed - Understanding User Behaviour and Their Impact on Meme Stocks

Simon Trimborn

University of Amsterdam, Netherlands, The

In this study we investigate the drivers and changes in users' posting probability on social networks via a sparse network model and change point detection framework. With the model, we examine the impact of user behaviour on the Reddit forum Wallstreetbets upon markets. Results show that changes in users' behaviour significantly predicted returns, integrated volatility, and jump volatility, even when controlling for network activity and established metrics measuring influential user impact. Including changes in behaviour of users on Reddit into models to explain the market movements, leads to adj. R^2 of up to 0.45 for return and 0.8 for jump explainability, vastly outperforming the competing models. Studies often focus upon influential users in networks, but we show that changes in behaviour of less important users explain a larger part of returns, integrated variance and jump volatility than important users do.

Understanding Volatility in Infodemic Risk Index: A Twitter-Based Analysis Across Countries

Anna Bertani^{1,2}, Riccardo Gallotti¹

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During highly contentious and polarized events, such as the COVID-19 Pandemic, the vast amount of information circulating online increases the risk of an infodemic. Gallotti et al. (2020) introduced the Infodemic Risk Index (IRI), a novel metric to quantify the impact of this phenomenon which assesses the user's exposure to unreliable content based on their number of followers. However, despite its practicality, the IRI exhibits significant volatility over time, particularly in certain countries where it fluctuates sharply.

In this study, we aim to investigate the causes behind these fluctuations, identifying key factors contributing to IRI instability. We analyzed Twitter data presented in Gallotti et al. (2020) spanning February 2020 - May 2022, and measure the index volatility by calculating the standard deviation over time for a total of 50 countries. Our findings reveal two key contributors to this instability. On one hand, volatility is partially correlated with the unequal distribution of followers, indicating that countries with highly followed users experience greater fluctuations. On the other hand, drawing from the concept of the news media diet (Bertani, 2024), we measured the uncorrelated entropy to assess the diversity of media consumption. We found the tendency of a negative correlation between the average media entropy and the IRI volatility, suggesting that limited media diversity contributes to index instability. This result has been tested by considering each news media source separately, finding that news sources classified as fake or political shows the same behaviour with a higher level of significance. This emphasizes how much news media outlets have an important role in catalyzing public attention during polarized events. Finally, further analyses on the way they attract attention might be insightful in order to contain the spread of misinformation.

OS-179: Networks, social resources and subjective well-being 2

Location: Room 206 Session Chair: Marina Hennig

Multi-Level Marketing Networks: Navigating Between Aspirations for Well-Being and Unpaid Labour

Gwladys HADJIMANOLIS

Clersé, France

Since its emergence in the 1920s, multi-level marketing (MLM) has been based on a dual principle: the direct selling of products and services and the recruitment of new members through co-optation. Marketed as a vehicle for empowerment and flexibility, this business model is now presented as a response to the search for meaning at work, particularly in the digital era. However, very few participants manage to generate substantial earnings. How can the sustained engagement of individuals in MLM networks be explained, given the frequent absence of financial remuneration, while they continue to perceive these networks as a source of personal and professional fulfilment? Drawing on an undercover participant observation conducted in two MLM networks between 2021 and 2024, this

study explores how these structures function as spaces for social resources – material, affective, and cognitive – that shape members' subjective well-being. In the first network, predominantly female and focused on the sale of cosmetics, MLM is perceived as "an activity of one's own" providing an escape from family and wage labor constraints, while enabling individual self-expression through work. In the second network, specializing in financial investment and primarily composed of young men from underprivileged Parisian suburbs, the pursuit of well-being is grounded in adherence to a virilist entrepreneurial model that promotes discipline and self-transcendence. By combining an analysis of social resources and relational dynamics, this contribution examines how these networks influence perceptions of well-being and individual success.

Networked Collective Efficacy and the Evolution of Urban Neighborhoods: Negotiating Resource Allocation Beyond Market Logic

William Hilliard Martin

Carnegie Mellon University, United States of America

This work develops a theoretical and methodological framework for analyzing spatially embedded social networks to better understand how collective efficacy emerges through everyday spatial interactions grounded in local needs. Traditional economic and social exchange models emphasize market-based paradigms of individual rationality and competition, often overlooking the geographic and network structures that facilitate local cooperation, resource access, and subjective well-being. This research examines how spatial mobility and social network structures interact to shape localized perceptions of need satisfaction and collective efficacy in urban neighborhoods.

The study integrates spatial and social network analysis through a novel interactive map-based survey tool that models three interconnected spatial network structures:

1)Street-based mobility networks, representing spatial constraints on movement and access.

2)Resident-point-of-interest affiliation networks, capturing geographic resource access.

3)Community efficacy social networks, revealing social ties weighted by subject collective valuations.

This approach models how geographic space and social resources reciprocally structure each other and activate social capital. By linking spatial constraints, network topology, and subjective experiences, this research contributes new geospatial methods for modeling embedded urban social networks, offering insights into how spatial affordances and social inequalities shape access to collective resources and regenerative capacities.

This work advances spatial network analysis, urban sociology, and participatory design research by proposing an integrated framework for visualizing and measuring social networks in geographic space. By highlighting the role of spatially embedded social ties in fostering collective efficacy in heterogeneous resource environments, it offers new methodological and conceptual tools for strengthening community resilience and well-being through place-based network structures.

Subjective Social Status, Social Networks, and Implied Social Worlds

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In the study of inequality, a common finding is that people do rather poorly at assessing the scale of inequality in their societies. Relatedly, the study of subjective social status emphasises how people's perception of their own relative position may differ from, and may be more salient than, their "objective" position. Here, we explore how people may be formulating their conception of their own social worlds and their position within it, by drawing on rich geospatial, demographic, economic, and social network data from two communities in South Asia (one in India and one in Nepal). Adult residents in these communities were asked not only a series of name generators for multiple types of social support, but also the "MacArthur Ladder", placing themselves on one of ten rungs relative to others in their community. We first describe how residents' reported subjective social status is associated with various attributes (e.g., education, gender, caste, wealth). We then use our geospatial and network data to construct different plausible social worlds that each respondent may be envisioning when considering their relative status: what if they considered only their neighbours? Their immediate social connections? Their friends-of-friends? We further consider if certain relationship types are particularly consequential in aligning people's perceptions to their "true" status and the inequality of their community, and whether network positions facilitate "accuracy" in

perceptions. With these insights, we contribute to the growing body of work aimed at understanding people's perceptions of and preferences regarding inequality.

The Impact of Social Networks on Subjective Wellbeing for Parents During Pandemic School Closures

Shawna Bendeck

Colorado State University, United States of America

Parents of school age children struggled during COVID-19 pandemic school closures. The stress, uncertainty, and role conflict they experienced placed strain on their own wellbeing. Parents reported an increase in stress, loneliness, depression, anxiety, fear, and guilt due to pandemic pressures. One way parents mitigate these effects during a disaster is by activating social capital through networks, however, pandemic-induced quarantine orders created barriers to in-person forms of social support.

Faced with these barriers, how was the wellbeing of parents impacted by the strains of the pandemic? Were parents able to access social networks, and if so, in what ways? How did networks mitigate wellbeing outcomes? This mixed methods study explores these questions using in-depth interviews and social network analysis to understand the resource networks of parents of school-aged children during the pandemic (n=29).

Parents identified members of their support networks and the forms of support that flowed through these networks. To measure the strength of each ego network, a strength indicator was developed using eight network characteristics. Strength scores were analyzed against mental health strain (a composite of stress, wellbeing, and worry scales) to examine how network strength may act as a buffer to strain during the pandemic.

Social network analysis uncovered how parents utilized their traditional social networks and formed new support networks to foster resilience. Parents experiencing greater levels of strain had weaker social networks (i.e. smaller, less diverse, fragmented) than their peers. Results illuminate the ways networks can protect parents' subjective wellbeing.

A Network Analysis of the News Consumption Gap: The Role of Personal Traits and Well-Being

Hojun Joo, Sujin Choi

Kyung Hee University, Korea, Republic of (South Korea)

Despite the prevalence of a high-choice media environment, individuals with lower income, education, and political interests consume less news than those with higher levels. Individuals with lower news consumption are limited in political participation due to insufficient access to information, and it has been considered an important issue regarding equal opportunities for political participation. While prior studies have focused on groups with low news consumption, this study contributes to discussion by exploring the impact of personality traits (e.g., openness, extraversion) and well-being (e.g., lifestyle, mental health, life satisfaction, daily patterns) on gaps in news consumption.

This study forms news consumption gap networks for each year (2021 - 2023) and develops a stochastic actororiented model, using the Korea Media Panel Survey. The networks are formed as an undirected binary network based on differences in respondents' news exposure scores, which are measured by aggregating responses on the primary use of news through platforms such as OTT services, SNS, and TV.

Based on this approach, the study expects that matches in personality and differences in well-being characteristics will widen the gap in news consumption over time. It suggests that negativity in the news leads to less news consumption among individuals with certain personality traits, and it discusses the journalistic news values of negativity. It also proposes that well-being characteristics significantly influence the stratification of news consumption, providing complementary insights not fully explained by income, education, and political interest. Ultimately, this study discusses the implications of well-being for political inequality and the information gaps.

OS-171: Tools and Data for Social Network Analysis 2 Location: Room 105 Session Chair: George G Vega Yon

Multi-Relational Community Detection in Social Platforms using Graph Neural Networks

<u>Nouamane Arhachoui</u>¹, Vincent Gauthier², Anastasios Giovanidis¹, Lionel Tabourier¹ ¹Sorbonne Université, CNRS-LIP6, Paris, France; ²Télécom SudParis, Institut Polytechnique de Paris, Palaiseau, France

We propose a method to detect communities in multi-relational networks, based on a graph neural network pipeline. The method allows to target areas where communities are consensual over the different modes of the network, which are processed as different networks in the pipeline. This is done by combining the outcomes of multiple simple Graph Neural Networks, applied on each of the graphs representing different forms of interactions between users of the social platform. The method is validated on a synthetic benchmark, as a first step for further improvements. In particular, the flexible architecture of the pipeline allows to swap its subparts and create variants of community detection.

Safely publishing your social network data: The network anonymization problem

<u>Frank Takes</u>, Rachel de Jong Leiden University

Social network analysis research is typically done on real-world social network data. Together with a research paper, academics are confronted with the question of whether or not to publish the network data underlying their analyses. Here, a problem is that the structure of the network alone might disclose the identity of the nodes, i.e., the individual people present in the network. For example, if in a social network only one person has three friends of which two also know each other, then the ego network structure of this person reveals the person's identity. Yet, to derive meaningful insights from this person's social network, information about their ego network structure is inherently necessary. At first glance, the need for protecting people's privacy is inherently at odds with ensuring reproducibility of social network analysis research. In this work, we discuss the network anonymization problem, which aims to achieve both objectives.

In the network anonymization problem, the goal is to perturb a given social network dataset in such a way that individuals can no longer be uniquely identified based on their surrounding network structure. We discuss how this problem relates to the more generic problem of statistical disclosure control, and cover a number of trade-offs that one needs to consider to address this problem in a social network scenario.

The first is that of the attacker scenario: what de-anonymizing information should we realistically assume is in the hands of an adversary, in case we are considering the structure of the social network as our main object of study? The second is the anonymity-utility-tradeoff: if we alter the network structure to increase anonymity, how can we still make sure that data utility is guaranteed? Utility can be measured in various ways, including preserving structural network properties and ensuring reliable performance on downstream tasks such as centrality analysis. The third is that of balancing computational complexity: depending on the chosen attacker scenario and corresponding measure of node anonymity, efficiently perturbing the network while retaining sufficient data utility can be a challenging computational problem.

We provide an overview of common network anonymity measures and network anonymization algorithms from the literature, and demonstrate a case study on the population-scale social network of the Netherlands, in which we show how various measures and algorithms perform in terms of attaining privacy and utility of the anonymized social network data. We furthermore demonstrate accompanying software that can anonymize a given social network dataset.

Salton cosine index in network analysis

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For nonzero vectors x and y, the Salton cosine index is defined as

 $S(x,y) = \langle x,y \rangle / (|x|.|y|),$

where $\langle x, y \rangle$ is the inner product and $|x| = \sqrt{\langle x, x \rangle}$. It has the following properties: (1) $S(x,y) \in [-1,1]$, (2) S(x,y) = S(y,x), (3)

S(x,x) = 1, (4) x, $y \ge 0 \Rightarrow S(x,y) \in [0,1]$, (5) a, $b \in R \Rightarrow S(a.x,b.y) = S(x,y)$.

The Salton index measures similarity. It is usually transformed into a dissimilarity by d(x,y) = 1 - S(x,y) or $d(x,y) = arccos(S(x,y))/\pi$. The Salton index is especially useful in analyzing weighted networks because (property 5) it makes comparable nodes of different strengths.

Let W = [w[u,v]] be a matrix representation of a 2-mode network N = ((U, V), L, w); U, V are sets of nodes, L is the set of links, and w : L \rightarrow R is the weight. We can define a dissimilarity between nodes as D(u,v) = d(w[u,.],w[v,.]); w[u,.] is the matrix row of node u. The idea can not be directly applied to ordinary (1-mode, U = V) networks because in D(u,v) we would compare w[u,u] with w[u,v] and w[v,v] with w[v,u], but we must compare w[u,u] with w[v,v] and w[u,v] with w[v,u]. This is resolved by the corrected Salton index S'(u,v) = (<w[u,.],w[v,.]> + (w[u,u]-w[u,v]).(w[v,v]-w[v,u]))/(|w[u,.]|.|w[v,.]|). The properties 1-5 hold also for S'.

The Salton index can also be generalized to multiway networks, opening a way for new methods for their analysis. The details will be given in the presentation.

Examples from analyses of real-life networks will illustrate the proposed approaches. They are supported by an R package ClusNet available at https://github.com/bavla/Rnet/tree/master/R.

The Resilience Network: A Free Tool for SNA and (Health) Intervention Research

Daniel Meier¹, Jürgen Lerner²

¹Swiss Re, Switzerland; ²University of Konstanz, Germany

The Resilience Network (ResNet, see resnet.me) is a free mobile app together with several free web applications (surveys, scheduling polls, quizzes, etc.) designed to improve individual and group resilience by fostering social relationships and personal development. While primarily focused on improving the "7 life categories" of each app user, ResNet also offers many features for SNA and (health) intervention research.

ResNet collects data through an integrated psychological profiling questionnaire including the Big Five personality traits, through longitudinal sentiment tracking of all 7 life categories, and through interacting with others in the app. The collected data allows researchers to study sentiment dynamics, psychological profiles, and social behaviors. Health interventions such as promoting physical activity, improving nutrition, or leveraging positive outcomes from social interactions are within the scope of ResNet. Other types of interventions can be explored.

In this talk, we will demonstrate ResNet's basic capabilities, including its web-based survey tool and its psychological profiling features. Using ResNet in research studies will be beneficial for the further development of the app. We especially welcome suggestions and collaborations for the use of ResNet in SNA and public health research.

Tunable network properties with a Social Proximity Network Generator

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Synthetic networks are an important tool for simulation studies of social phenomenon such as disease spread and behaviour adoption. Algorithms to generate such networks must be able to incorporate important features of real world social networks such as positive degree assortativity, clustering coefficient, and skewed degree distributions.

We have implemented a network generator that uses social proximity to drive edge creation. It adapts the algorithm of Pasta and colleagues (2014) that was designed to reproduce empirical Facebook friendship networks. Our implementation simplifies and generalises their algorithm, taking it beyond those specific networks.

In our paper, we present this implementation and preliminary results about the effects of algorithm parameters on the structural properties of the generated networks. These structural properties include mean and variation of centrality measures, network distances, clustering, and degree assortativity.

OS-208: Networks and Culture 3

Location: Room 106 Session Chair: Shan Shi Session Chair: Christian Stegbauer Session Chair: Iris Clemens

Quantification of Movie Directors' Creative Strategies and Collaborative Tendencies Based on Social Networks

Yinzuo Zhou^{1,2}

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In the highly competitive global film market, directors must adapt more flexibly to the everchanging environment. The creative strategy of film directors, which involves the selection of film styles, scripts and actors, is essential for guiding them towards successful career development. Based on a large-scale dataset collected from IMDb, network science computational tools are used to identify and describe the consistent patterns and individual differences in directors' creations at different stages of their careers. The intrinsic relationship between these individual differences and their success is further explored. The results show that the directors' overall creative strategy tends to prioritize exploration over exploitation, and the permutation test confirms the reliability of the new findings. We also find that highly rated directors are significantly influenced by different regional cultures and must adopt unique creative strategies to achieve high ratings. Besides, highly productive directors and highly rated directors show opposite trends in collaboration patterns, highlighting the differences in collaboration patterns among different types of directors. Overall, this study provides a new understanding of the development of directors' creativity and their behaviors in the pursuit of success.

The cultural fabric of social ties among Uzbek students

Nigora Umarova, <u>Deniza Alieva</u> Webster University Tashkent, Uzbekistan

The study explores how culture and cultural values shape social network structures. The data was collected online from 276 Uzbek students. Using social network analysis, correlational analysis and cross-tabulations, we identified patterns linking cultural orientations to network size, interaction frequency, and social influence.

The findings reveal that peers, education, and media significantly shape students' social circles. Peer-driven networks encourage establishment of broader, more interactive connections, while those shaped by education or media often lead to more selective, close-knit ties. 31.2% of students influenced by peers formed networks of "10 or more people," whereas those shaped by education (36.5%) or media (34.1%) reported having no significant network. Students who resonate with cultural norms usually engage more consistently within their networks, confirming the importance of shared values in building cohesive connections.

The study also highlights how culture and networks influence each other. Cultural norms not only determine how relationships form and evolve but they are also transmitted and reinforced through social interactions. This dynamic exchange between cultural identity and social ties shows how networks are built, maintained, and reshaped over time.

Ultimately, social networks are expressions of cultural identity. By showing how shared values and norms shape social ties, this study highlights the importance of incorporating cultural perspectives into social network analysis. Understanding this interplay offers deeper insights into how networks are created, maintained, and evolve within cultural contexts.

From Impact to Legacy: Evaluating Timişoara's ECoC Networks as Feedforward Assets for Resilience and Sustainability

<u>Silvia loana Fierăscu</u>

West University of Timisoara, Romania

This chapter explores Timişoara's evolution as a European Capital of Culture and its ongoing transformation journey. The study examines how governance principles, trust-based networks, diversity, and inclusion facilitate ecosystem resilience and sustainability. In a mixed-methods research design, I use quantitative data from administrative records and Social Network Analysis (SNA) covering the years 2017 to 2024, alongside qualitative insights gathered from interviews and focus groups with more than 40 key stakeholders. The analysis explores the

cultural networks at macro-, meso- and micro-level, highlighting the mechanisms at work that can support further policy, collaboration, and cultural engagement.

Results show that 2023 marked a significant growth in Timişoara's cultural ecosystem, characterized by a notable rise in projects, events, and inter-organisational partnerships that fostered a cohesive and inclusive envrionment. While the number of active organisations decreased in 2024, local participation strengthened, indicating a strategic pivot towards grassroots consolidation and regional resources. The transition from a centralised to a decentralised network from 2017 to 2024—strengthened by trust transfer and inclusive governance—proved vital for nurturing social cohesion and cultural innovation.

This research illustrates how decentralised, trust-based collaborations are essential for fostering resilient and sustainable cultural ecosystems. Although the analysis of the legacy is limited to data collected up to 2024, pinpointing mechanisms at work allows for the co-design of interventions that maximise the long-term impact of Timisoara ECoC. The analytical framework is relevant beyond the case of Timisoara and the policy domain of culture. It can be scaled and adapted to other urban settings and policy domains such as education, health or youth ecosystems.

Keywords: Timișoara, European Capital of Culture, Cultural Networks, Impact Evaluation, Feedforward Assets, Social Network Analysis, Mixed-Methods Research, Resilience, Sustainability

OS-184: Political Networks 3

Location: Room 107 Session Chair: Manuel Fischer Session Chair: James Hollway Session Chair: Mario Diani Session Chair: Dimitris CHRISTOPOULOS

The Network Ecology of Political Capital

<u>Jeffrey C Johnson¹</u>, Stephen P Borgatti² ¹University of Florida, United States of America; ²University of Kentucky, United States of America

This paper advocates thinking of political capital within a social network ecological framework and suggests that although network position forms the structural basis for individual levels of political capital, the political environment within a given political ecosystem determines how and when social ties are put into action. The political network changes little in the short run, but the costs and benefits of political action will influence perceived tie strength and political obligation depending on the political environment (e.g., the political environment created by 9/11). In viewing political capital in such a manner, we engage in an empirical examination of these ideas through the study of a policy network in North Carolina over a 6-year period, examining individual variation in reputed political influence as it relates to various kinds of network centrality, structural holes, cognitive knowledge of the network, and political status at three points in time. At a macro level we examine individual variation in reputed political influence as it relates to various kinds of network centrality, structural holes, cognitive knowledge of the network, and political status at three points in time. Included are legislators, lobbyists, state government officials, and activists involved in passing a piece of environmental legislation. At the micro level, we examine the political capital over time for two political antagonists (lobbyists representing opposing industries), examining how the development of and change in such capital is related to political outcomes.

Transition Networks in Discrete Political State Spaces: A New Field of Relational Policy Analysis

Volker Schneider

University of Konstanz, Germany

This paper introduces a novel field for applying network analysis to political phenomena by conceptualizing transitions in discrete political state spaces as transition networks. By examining transitions in key areas—political regimes, institutional governance structures, and policy regimes—this approach aims to categorize transition paths and identify structural similarities, thereby enhancing our understanding of political development patterns. Larger datasets allow for analysis using relational event models.

First, the paper explores regime transitions in ancient Greece, tracing shifts between democracies, autocracies, and hybrid regimes. By constructing a network of regime types and their transitions, it identifies patterns of political change, including factors that facilitate or hinder transitions. This framework provides insights into regime stability

and temporal dynamics of regime evolution, with implications for contemporary democratization and autocratization processes.

Second, the paper examines transitions in institutional governance structures, focusing on infrastructure systems. It analyzes shifts between private markets, state hierarchies, and hybrid systems, highlighting mechanisms driving governance adaptation, convergence, and persistence. Institutional path dependencies and external shocks play a key role in shaping these transformations.

Third, policy regime transitions are analyzed through climate policy, tracing changes in policy instrument configurations over time. By mapping policy trajectories, this approach identifies critical junctures and dominant pathways, offering insights into how policy repertoires adapt to political and economic shifts.

By applying network analysis to political state spaces, this paper advances a relational perspective on political change and transformation, contributing to a deeper understanding of political development dynamics.

States' Responses to Sanctions: Assessing Coercion, Resolve, and Diplomatic Leverage

Charlie Alexander Carter

London School of Economics, United Kingdom

States use sanctions as a means to penalize or influence behavior in their counterparts. Sanctioned states may respond to these material penalties in different ways. On one hand, they might signal conciliatory attitudes to reduce the impact of sanctions. On the other hand, they might demonstrate resolve and willingness to absorb costs to resist external pressure. This paper uses relational event models and language measures to analyze how sanctioned states communicate their responses after being subjected to sanctions, and the network dynamics that govern sanction allocation and response.

Social-Ecological Networks and Dynamic Ecological Networks Due to Climate Change: a Challenge to Actors?

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The study of social-ecological systems and social-ecological networks allows for the joint analysis of both social and ecological systems. Managing and governing – and even more so achieving social-ecologial fit in – social-ecological systems has been claimed to be complex, because of actors' lack of knowledge about the complex ecological interdependencies, but also because of the dynamic nature of ecological interdependencies. This paper addresses the question of how actors in a social-ecological system address potentially changing ecological systems and related interdependencies. More specifically, we study a river basin in Switzerland and rely on survey data on actors involved in managing the river basin. We further rely on ecological data about connectedness of river patches, and how this connectedness might change depending on a) climate-change induced future scenarios, and b) the addition or removal of man-made barriers and the improvement or deterioration of water quality. This allows us to work with different scenarios of ecological interdependencies, and assess to what degree actors are able to consider these scenario-based interdependencies into their network structure, and where there might be gaps in the collaborative actor network to address future scenarios. We rely on ERGM analyses of the social-ecological network.

Population of X/Twitter users and web domains embedded in a multidimensional political opinion space

Pedro Ramaciotti^{1,2,3}, <u>Antoine Vendeville</u>^{2,1,3}, Jimena Royo-Letelier², Duncan Cassells^{6,2,3}, Jean-Philippe Cointet², Maxime Crépel², Tim Faverjon^{2,3}, Théophile Lenoir², Béatrice Mazoyer², Benjamin Ooghe-Tabanou², Armin Pournaki⁵, Hiroki Yamashita^{2,3,4}

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The undertaking of several studies of political phenomena in social media mandates the operationalization of the notion of political stance of users and contents involved. Relevant examples include the study of segregation and

polarization online, or the study of political diversity in content diets in social media. While many research designs rely on operationalizations best suited for the US setting, few allow addressing more general design, in which users and content might take stances on multiple ideology and issue dimensions, going beyond traditional Liberal-Conservative or Left-Right scales. To advance the study of more general online ecosystems, we present a dataset of X/Twitter population of users in the French political Twittersphere and web domains embedded in a political space spanned by dimensions measuring attitudes towards immigration, the EU, liberal values, elites and institutions, nationalism and the environment. Positions are derived using a method for ideal point estimation on a bipartite network between members of parliament and their followers. We provide several benchmarks validating the positions of these entities (based on both, LLM and human annotations), as well as a discussion of the case studies in which they can be used, including, e.g., Al explainability, political polarization and segregation, and media diets.

OS-126: Corporate Networks 3

Location: Room 108 Session Chair: Roy Barnes Session Chair: Mohamed Oubenal Session Chair: Roberto Urbani

Fracturing of what? The Evolution of Inner Circle Networks in a Small Open Economy

<u>Majsa Stina Grosen</u>

Copenhagen Business School, Denmark

Drawing on insights from the political economy literature, I argue that the decline of the inner circles cannot be understood without taking economic power of the companies in relation to the economic power of states into consideration. Research that has sought to explain the decline of the corporate inner circles across nations have explained this decline by investigating structural network characteristics, such as the decline of big linkers, and to some extent changes in the political economy by first showing how the financialization led banks to withdraw from the inner circles and secondly how the globalization of the economy led big international companies to withdraw from. Yet other potential drivers such as changes in the national business structure and historical changes in for example firm size, mergers and acquisitions, or ownership structures remain understudied. By empirically investigating the development of the corporate interlock network among the hundred largest Danish companies from 1973 to 2022, I confirm previous findings, by showing a decline of the inner circle from the 1990s onwards that can be explained by a decline in big linkers in the network. The significant decline in the size of the inner circle is however not reflected in the evolution of the accumulated firm size of the inner circle. I therefore argue that the economic power of the inner circle does not fracture but remain stable over time.

Going Beyond the Rival: Examining Competitor Identification through a Interorganizational Networks Lens

Josh Alexander Simmons

University of Kentucky, United States of America

The field of competitive dynamics has greatly improved existing understanding of how firms engage in competitive behavior with one another to improve their competitive position. Additionally, competitive dynamics researchers have long studied how organizations engage in dyadic inter-firm rivalry with one another through targeted competitive actions and responses. However, the outcomes of interfirm rivalry affects not only the firms' direct competitors but also evoke reactions from managers of firms beyond the dyad, leading to evolution in the competitive network. Research has long discussed the need to address how the structure of firms' interorganizational competitive network beyond dyads affects their competitive behavior, along with how firms' competitive networks lead them to form, maintain, or dissolve competitive ties. Adopting the manager-oriented perspective of competitor identification, this study proposes that numerous factors may impact firms' perceptions of direct, indirect, and potential competitors, such as the structure of the interorganizational network, the competitive behavior of the firm, and other firm-level attributes. Additionally, this study proposes the usage of statistical models capable of examining change in firms' competitive network structure, along with methods for examining potential co-evolution mechanisms between the interorganizational competitive network and firms' competitive behavior. This study contributes to existing research in competitive dynamics by exploring structural, behavioral, and attribute antecedents of firms' competitive tie formation, leading to an enhanced understanding of how firms identify competitors in their industry.

Inter-firm Network Community Permeability and Firm Innovation Performance —The Contingent Effects of Firm Within-Community Cohesion and Knowledge Heterogeneity

<u>Yi-Jin Sam Chen¹</u>, Andrew Parker², Stefano Tasselli^{1,3}

¹University of Exeter, United Kingdom; ²Durham University; ³Erasmus University Rotterdam

This study examines how being part of a tightly interconnected cluster of firms - a network community - that has a permeable boundary with bridging ties to firms outside the community influences individual firm innovation performance. Network communities characterized by high permeability-where members maintain bridging ties to external firms-enable the selective importation of diverse knowledge, thereby fostering valuable recombination and innovation. Furthermore, we theorize that the benefits of community permeability are contingent upon the extent to which a firm maintains within-community cohesion and firm-level knowledge heterogeneity. We tested our hypotheses using longitudinal data on alliances and patents from 2002 to 2023. Our findings reveal that firms embedded in network communities with high permeability exhibit enhanced innovation performance. In addition, the benefits of community permeability are amplified when firms are deeply embedded within cohesive community structures and possess highly heterogeneous internal knowledge portfolios. These results highlight that it is not just interfirm network ties that matter for innovation, but the community of network ties a firm is embedded in and the extent to which the community has bridging ties to firms outside the community relationship. This underscores the dual importance of maintaining robust internal community ties for effective knowledge integration while engaging in external linkages that provide access to diverse insights. This research advances the theoretical understanding of the benefits of open and closed networks, reconciling the debate by considering structures between and within network communities.

Modeling co-inventor networks in MNE: a Markov ERGM approach to knowledge transfer

Yu Ju Lo, Yen-Chen Ho

National Chung Hsing University, Taiwan

In a multinational enterprise (MNE), inventor collaborations are essential for the multilateral transfer of technological knowledge, leveraging dispersed expertise, fostering innovation, and maintaining competitive advantage. Previous studies on MNE intra-firm knowledge transfer and innovation applied regression-based statistical analyses to network data, which nevertheless suffers from the violation of independence assumption because of the interdependent nature of organizational members and their interactions. In this study, we adopt the Markov Exponential Random Graph Model (ERGM) approach to examine the co-inventor network within a multinational enterprise (MNE), using data from ARM plc, a semiconductor design MNE, during the 2010–2012 period. The ERGM approach explicitly addresses the interdependencies inherent in network data and accommodates the testing of node- and dyad-level variables. We test the impacts of technological similarity and geographic proximity in the tie formation process while controlling for network structural statistics. Model estimation is performed using Markov Chain Monte Carlo, and simulation results validate the model fit. The findings indicate that co-inventor collaborations are significantly affected by both technological similarity and geographic closeness. This work provides valuable insights into knowledge transfer processes and collaborative innovation, offering a robust and practical framework for analyzing complex network dynamics in MNE.

2:20pm - 2:40pm

Multiple actors in multiple places – financial products as interorganizational networks

Daniel Tischer¹, Martin Everett², Adam Leaver¹

¹University of Sheffield; ²University of Manchester

In this paper we perform a longitudinal ego network analysis of organisational networks containing multiple types of functional actors operating through various jurisdictions. Our data – various corporate debt products issued in Hong Kong – features a range of functionally-specific actors that combine into product ego-networks with rich attribute data. We are interested in how these networks' structures may differ in terms of selection of partnering actors, across product types and jurisdictions, over time. We present a protocol on how to interrogate such data using both existing and novel approaches for analysing ego-networks.

OS-218: Social Networks & Inequality 3

Location: Room 108 Session Chair: Gianluca Manzo

The coevolution of exchange networks and cooperation

Jun Zhao, Mohona Mandal

University of South Carolina, United States of America

People seek wealthy partners for upward mobility, while the wealthy benefit from the cooperation of those around them, reinforcing resource advantages. This research examines how exchange networks and cooperation coevolve, focusing on when network partners influence cooperation and whether people choose partners based on wealth or cooperation homophily.

We collected data from 1,080 participants via Prolific, assigning them to 40 randomly generated networks of ~28 players. Participants engaged in repeated interactions where they decided how much to cooperate with network alters. Networks varied by (1) whether players started with equal endowments and (2) whether cooperation from wealthier partners had a productive effect. A stochastic actor-based model estimated both network formation and changes in cooperation levels.

Cooperation increases faster in networks with resource inequality and wealth productivity, suggesting inequality promotes cooperation. Regarding network formation, we find a wealth heterophily tendency—poorer players prefer ties with wealthier players over other poorer individuals, regardless of endowment equality. Further, in unequal endowment conditions, players move in the opposite direction of their alters' cooperation levels. They are less likely to cooperate when many alters have high cooperation rates, suggesting resistance against defection.

Networks amplify inequality, as individual disadvantages and network effects accumulate. While cooperation is generally valued, this study highlights its potential downsides in stratified resource environments, where prosocial behaviors benefit actors unequally.

OS-193: Social Networks and Climate Change 2

Location: Room 109 Session Chair: David Benjamin Tindall Session Chair: Mark CJ Stoddart Session Chair: Paul Wagner

Mapping Environmental Governance in Iran: A Network Analysis of Institutional Dynamics and Digital Discourse

<u>Hila Houmand</u> University of Hamburg, Germany

Environmental governance in non-Western contexts remains underexplored, particularly in resource-rich and politically complex settings like Iran. Drawing on theories of distributed governance, this study examines how diverse stakeholders-including governmental institutions, NGOs, academic and research institutions, media outlets, religious and cultural organizations, private sector, and international entities-engage in environmental governance through digital platforms. Using a mixed-methods approach, we combine social network analysis (SNA) (e.g., centrality measures, community detection), discourse analysis, and Causal Layered Analysis (CLA) to map Iran's environmental governance network. CLA examines discourse at multiple levels, from surface narratives to deeper systemic and worldview perspectives, using textual, visual, and audio data. SNA focuses on structural patterns derived from hyperlinks, partnerships, and collaborations, visualized through node size, clusters, and bridging roles. Together, these methods reveal how actors employ selective coupling to align their connections and discourse with institutional logics. In network analysis, selective coupling is evident in how actors form ties based on shared policies, interests, or discursive alignment, while avoiding connections with others. In discourse analysis, it appears in how actors emphasize certain topics (e.g., religious framing of stewardship) while ignoring others, shaped by their institutional logic, interests, or relationships. Preliminary findings highlight the central role of government-linked actors and the bridging function of media platforms, with institutional logics-state bureaucratic (e.g., top-down enforcement)-shaping actors' strategies. By integrating network, institutional, and discourse analyses, this research advances theories of distributed governance and institutional logics, offering a framework for addressing environmental actors and challenges in politically constrained regions.

Our planet, our health: The untapped power of social networks in governance for climate resilient healthcare systems.

Sophie Robinson¹, Michele Barnes², Kathryn Bowen¹, Glenn Hoetker³ ¹University of Melbourne, Melbourne Climate Futures; ²University of Sydney; ³Melbourne Business School

Climate change and its' impact on both human and environmental health presents a pressing and complex challenge, with healthcare sustainability playing a critical role in both adaptation and mitigation efforts. Not only is healthcare infrastructure under pressure from rising demand due to climate related disasters, illness, and morbidities; it also has a significant environmental footprint. For instance, initial estimates demonstrate that healthcare operations contribute up to 8% of total annual greenhouse gas emissions in countries like the United States and Australia.

Despite this, little is known about how healthcare systems are currently making decisions regarding climate resilience. Similarly, little is known about how climate-related policies and initiatives are then playing out on the ground. This study is the first of its kind globally, applying social network analysis to explore the governance of climate resilient development in healthcare systems. It sheds light on how specific governance traits either enable or hinder sustainable transformations, offering insights into which governance characteristics should be scaled up.

Focusing on the Australian healthcare system, this research has major global relevance, presenting numerous practical implications for other healthcare contexts. Ultimately, this research builds a foundational understanding of the social determinants of both adaptive and possibly transformative responses to tackling climate change within healthcare systems.

The dual network approach to decarbonization: the case of the fossil to fossil power plants conversion in Civitavecchia, Italy

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This work assumes that the fossil fuel industry and its enablers act as a 'fossil network' to protect their vested interests though the support and continuity of the generalized use of fossil fuels.

At the same time, it posits that an antagonist 'decarbonization network' largely motivated by the counterhegemonic' anti-fossil fuel and planetary health beliefs and values of its components confronts the fossil network to attempt to the progressive phasing out of fossil fuels from socio-economic systems.

Building on these assumptions, we propose addressing the fossil-supportive and change-resisting behaviors of the fossil network and the decarbonization network's multipronged efforts to terminate a fossil infrastructure through a concurrent analysis of both networks to spatially and temporally investigate their structures and the practices of support and of deactivation they respectively carry out.

The proposed approach – we call it 'dual network approach' – conceptualizes decarbonization processes as a continuous conflict between two multi-layered networks, both resorting to different agents and sequences of practices. It is applied to the fossil network emerged to support the conversion to gas of a group of coal-fired power plants in Civitavecchia, a long-standing fossil energy hub near Rome, Italy and to the antagonist decarbonization network that aimed to block such conversion.

The goal of this work is to disentangle and analyze patterns and causal relationships of the complex web of agents and practices emerging from the confrontation between the fossil and the decarbonization network pursuing simultaneously their respective goals in the case study considered.

Tracing Policy Changes in the Indian Climate Justice Discourse: Comparing Policy Beliefs and Advocacy Coalition during Copenhagen, Paris, and Glasgow Climate Conferences

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Indian climate policy has evolved as a multi-stakeholder process with dominant underpinnings of justice and equity. The existing literature documents the importance of civil society, academic and governmental actors, and their networks in driving different justice related agendas within the policy subsystem but inadequately explains how the climate justice policy discourse has evolved over time. The current study aims to uncover changes in the dominant elements of the climate justice discourse in India. It employs print media data from three English dailies in the Indian climate policy corresponding to major international climate conferences of parties (COP): 2009, 2015, and 2021. It draws theoretical insights from the Advocacy Coalition Framework (ACF). The analysis has revealed two coalitions in 2009 and three coalitions in each of the 2015 and 2021 periods with actors promoting different agendas related to international and domestic climate justice. As the singular demand for international climate justice transforms to moderate acceptance of domestic climate action, the domestic climate justice movement in India gains strength and diversifies. The study provides useful insight into the trajectories related to climate justice and foregrounds the need to engage with domestic climate justice concerns for effective climate action in the coming years.

Unravelling coal supply chains: A network approach to balancing energy security and climate change mitigation in India

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India's coal transition requires an in-depth understanding of structural dependencies among mining companies, power plants, and states. While coal phase-outs are often planned based on efficiency of power plants, this study employs Social Network Analysis (SNA) to assess influence using supply chain positioning, emissions intensity, and network centrality metrics. The analysis of India's coal network highlights structural dependencies, state-level vulnerabilities, and mining company dominance in the supply chain. SECL, MCL, and CCL emerge as the most critical mining companies, supplying high-capacity, high-emission power plants such as Vindhyanchal STPS and Rihand STPS, reinforcing their centrality in the energy system. In contrast, WCL and NECL have limited structural influence, meaning their coal phase-out would cause minimal disruptions. At the mine level, Korba, Talcher, and Singrauli emerge as key supply hubs, yet Singrauli ranks lower in out-degree, indicating it supplies fewer but higher-capacity plants. Contradictions arise where Jharia and Paschim Bardhaman rank high in emissions but lower in supply volume, indicating that coal quality and plant efficiency drive pollution more than raw supply capacity. Chhattisgarh, Uttar Pradesh, and Maharashtra are the most coal-dependent states, while Tamil Nadu ranks high in network influence, suggesting renewable investments here could stabilize the broader grid. These findings emphasize that coal transition planning must integrate network-based insights, balancing decarbonization with energy security and economic resilience. By adopting SNA-driven policy frameworks, India can align its coal phaseout strategies with climate change mitigation, while ensuring a just transition that strengthens energy networks and economic stability

OS-204: Spatial and Geographic Social Networks 2

Location: Room 112 Session Chair: Clio Andris Session Chair: Zachary Neal Session Chair: Paul Schuler Session Chair: Gil Viry

Rescaling Migration Networks for Better Interpretability: The Case of Canadian Internal Migration

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Migration as a network, while not a novel idea, has recently gained significant attention for analyzing both international and internal migration patterns (Danchev & Porter, 2021; Pitoski et al., 2021a). However, despite its potential, network analysis has often been applied to migration with insufficient attention to interpretability(Pitoski et al., 2021a), focusing on estimating network metrics and tools, such as community detection algorithms, even when they are conceptually inadequate. Furthermore, the lack of comprehensive migration flow data has impeded effective network analysis. When flow data is available, assigning weights to ties remains a challenge, with proposed solutions often inadequate—for instance, simply taking the number of migrants moving from one place to the other (Abramski et al., 2020; Chen et al., 2021; Fagiolo & Mastrorillo, 2013; Pitoski et al., 2021c, 2021b; Zhang et al., 2020), or binarizing flows based on arbitrary thresholds (Carvalho & Charles-Edwards, 2020; Peres et al., 2016). Rarely has weight attribution accounted for origin and destination population sizes, and never for overall migration levels or all three factors simultaneously.

Adequately measuring and interpreting migration as a network is crucial, as the conceptual framework of migration networks offers exciting opportunities for advancing migration research. By merging classical migration theories

with long-theorized systemic approaches (Mabogunje, 1970), deeper insights into migration phenomena can emerge, particularly in the context of internal migration, where the structure of the migration system is less shaped by political factors. The relatively better availability of flow data for internal migration also paves the way for robust longitudinal analysis of migration networks. In recent years, systemic analyses exploring changes in the structure and interconnectivity of internal migration have gained traction (DeWaard et al., 2020; Huang & Butts, 2023), particularly in response to declining migration intensity in some Western countries—trends that have proven difficult to explain, especially with bilateral-level analyses. Moreover, major societal shifts (e.g., the COVID-19 pandemic and the rise of remote work) may have long-term implications for the (re)configuration of migration systems. However, realizing these analytical promises depends on adequately measuring and transposing migration systems into networks.

This paper proposes a novel method for rescaling migration networks that neutralizes the effects of population size and yearly migration fluctuations while ensuring that edge weights accurately reflect the attractiveness between geographical areas. This approach enhances the overall interpretability of the network and enables the use of network tools that are otherwise difficult to apply when edges are improperly weighted. Notably, it facilitates the identification of repulsive ties, which are critical for a more comprehensive understanding of migration systems and improves the validity of community detection. It also enables the calculation of network metrics that were previously inapplicable to migration systems (e.g., density) or had limited informative value (e.g., certain centrality measures), providing more direct, intuitive, and meaningful interpretations. As an example, we will apply this method to Canadian migration data to demonstrate its potential for network-based migration analysis.

Spatial patterns of personal networks and social capital among young people living in Switzerland

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Urban studies have shown that youth living in disadvantaged and remote areas are less likely to have relationships to people from different social backgrounds and milieus, sometimes called bridging social capital. This so-called neighbourhood effect may restrict their life opportunities. However, existing evidence is largely based on the area where young people (the 'egos') live and often ignores the personal (egocentric) network context and where the individuals connected to the young people (their 'alters') live, possibly leading to misattribution errors. This paper aims to bridge this gap by examining how the spatial patterns of young adults' personal networks relate to social capital. The data come from the 2020-23 Swiss Federal Survey of Adolescents (www.chx.ch) on personal networks of young adults. It includes the almost complete national cohort of young Swiss men (N approx. = 60,000) aged between 18 and 21 years, and a sample of about 15,000 Swiss women aged 19. Based on data from this large-scale representative national youth survey, we first develop a typology of four distinct spatial patterns based on how alters are clustered in and scattered across places defined as Swiss (or transnational) employment areas and foreign locations. We then analyse how these patterns are related to area deprivation where young people reside and social capital, measured in terms of the size, composition (homophily) and structure of emotional support and conflict ties between young people and the members of their personal networks.

The Cost of Everyday Mobility: Emotional Responses of Black Youth to Advantaged Neighborhood Settings

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Spatial isolation approaches to racial disparities have long assumed that lack of access to well-resourced communities is a critical mechanism through which racial segregation limits the wellbeing and life chances of Black youth. Recent research indicates that Black youth spend a substantial amount of time outside of segregated Black spaces due both to residence and everyday routines. Although Black youth may benefit from access to organizational and amenity resources in advantaged neighborhoods, they may also experience elevated exposure to the risk of scrutiny, microaggression, and discrimination. To date, few quantitative studies have addressed the emotional experience of Black youth as they navigate socioeconomically advantaged urban areas, particularly youth in groups that include Black males – potentially drawing greater negative scrutiny from the local environment.

We draw on data from the 2014-16 Adolescent Health and Development in Context study to examine the in situ emotional responses of Black youth to spending time in advantaged neighborhoods. The AHDC uses a network name generator to collect up to 10 non-household friends or other people with which the youth spends the most time during a typical week. Youth participants report on age, race, sex, education, behaviors, risk behaviors, and relationship attributes for each named partner. After an initial in-home survey, youth participants are given a

smartphone to complete a 7-day geographically-explicit ecological momentary assessment (EMA) that collects continuous GPS data along with smartphone-based brief surveys. The EMA module administers five daily, randomly-timed prompts to complete a mini-survey that collects current information on the presence of household and network partners, affect, activities, risk behaviors, and perceptions of the social climate of the current location at the time of the prompt. By asking which specific household and network partners are present in the moment, EMA responses can be linked to characteristics of the network partners present as well as aspects of the spatial environment.

Our dependent variables are youths' EMA ratings of negative and positive affect. Youth report agreement at the time of the prompt on a scale from 1 to 5 with 1 being "not at all" and 5 being "extremely" to these 7 items: daring, happy, confident, relaxed, excited, cheerful, and energetic (Cronbach's alpha = .86). Negative affect includes 9 items: angry, sad, stressed, bored, lonely, afraid, rejected, nervous, and irritable (Cronbach's alpha = .80). The presence of Black friends that are male is a count of named network partners reported as present at the time of the EMA prompt, constructed as categories of 0 (reference), 1, 2, and 3 or more Black male friends present.

OLS regression models of emotional outcomes with youth-level fixed effects (N=1727 EMAs nested within 406 Black youth) offer evidence that the affluence level of the immediate neighborhood environment is negatively associated with positive mood for Black youth when accompanied by multiple Black male youth. We discuss the implications of everyday routine location effects on mood for understanding racial disparities in mental health and wellbeing as well as the broader benefits of incorporating network data into EMA data collection approaches.

The impact of participative organization on consumers' interaction networks in alternative food shops

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Over the last few decades, the number of shops offering an alternative to the traditional supermarket model has grown in France. One of this shop's aims is to create social links between these consumers. The way the shop operates (participative or not), its clientele (homogeneous or heterogeneous), its place in the neighborhood, or the layout of the premises can be favorable or unfavorable to interaction between consumers.

What is the influence of the type of shop on the consumers' interaction network structures and dynamics?

A non-participant observation protocol with an observation grid and a field notebook was set up on 3 sites: an organic franchise shop, a solidarity grocery shop and a cooperative supermarket. The grid is used to systematically record consumers' attributes and their interactions in the shops to build a network per observation (25 sessions so far).

The first results show that the cashiers are at the center of the 3 networks, which is consistent with the way a shop operates. The organic store network has the biggest number of nodes (677) but the lowest density (1,6%) and 70% of interactions are between employees and customers. Only 4 edges (1,7%) are between customers who did not enter the shop together. In contrast, the solidarity grocery shop has a denser network (29%). Finally, the cooperative supermarket network has more interaction with cashiers than with other customers, but their exchanges are richer (edge weight of 2,43 out of 3) because the customer and the cashier are both members of the cooperative.

The spatial dimension of organizational cover-up

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Over the past several years, sexual abuse scandals have erupted across organizations ranging from universities to workplaces to places of worship. Despite arrests and monetary payouts to victims, abuse often continued undetected, and covered-up, for decades. In this presentation, I argue that organizations systematically conceal misconduct by strategically moving workers accused of abuse to locations that are geographically distant and socially marginalized. I investigate this phenomenon by quantitatively examining the relocation of Catholic priests credibly accused of child sexual abuse within the Archdiocese of Boston. In the broader Catholic Church, movement of priests - the "geographic solution" - is a well-documented response to abuse allegations (Reynolds 2023; Wall 2019). Recent work suggests that dumping grounds for accused priests did not have to be geographically remote as long as they were socially marginalized (Reynolds 2023). It is less well understood how these forms of the "geographic solution" combined to create movement patterns of accused priests and how these patterns differed from those of non-accused priests. I investigate how the geographic and social location of parishes, in

combination with the structure of organizational mobility networks, relate to abusive priest relocation. Using novel data collected from the Official Catholic Directory and BishopAccountability.org, I recreate the movement patterns of both non-accused and accused priests in Boston from 1930-1990 and convert them into networks in which the nodes are geocoded parishes and the edges are priest movements among them. I examine whether the movement of accused priests creates distinct network patterns reflective of strategic relocation, and I compare these movements to those of non-accused priests. I test whether the relocations of abusive priests were skewed towards socially and geographically distant parishes and influenced by the mobility network structure.

OS-132: Current trends in socio-semantic network analysis 2

Location: Room 114 Session Chair: lina Hellsten Session Chair: Camille Roth Session Chair: Nikita Basov

Identifying Trends in Environmental, Social and Governance (ESG) issues of Corporate Management in Korea Using Socio-semantic Network Analysis

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Environmental, Social, and Governance(ESG) initiative is a framework used to assess the environmental and social impact of a company and sustainability, adding the reporting of non-financial information to corporate disclosure. It helps investors make informed decisions that align with their values and long-term goals and also encourages corporations to make strategies for enhancing trust and transparency coping with related risks and even using them as opportunities for business breakthrough. This study aims to identify trends in Environmental, Social and Governance(ESG) issues in Korea and suggest future directions of academic research, corporate management strategies and support policies for ESG. This study explores social connections and meaning structures using a mixed methods of socio-semantic network analysis. The data was collected from news articles covering ESG issues and sustainability reports issued by corporations in Korea over the period from 2004 to 2024. The words in natural language were collected to identify semantic structure and interaction ties between actors were used to figure out social structure by period. Additionally, this study used Latent Dirichlet Allocation (LDA) topic modeling to extract latent themes by period and figure out the changes in the trend of ESG issues. These empirical findings suggest that the ESG issues are predominantly structured around carbon emission in environmental dimensions, human capital and safety issues in social dimensions and transparency in governance dimensions. This study Integrated both social network analysis and semantic network analysis to understand how social connections among actors and knowledge structures influence each other.

Meaning of Things. Modelling Social Construction of Reality

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This work aims at putting to a joint empirical test the claims of such major social theories as social constructivism and symbolic interactionism. Namely, that shared meaning is established in professional and in everyday interaction, facilitated by material objects in a common physical space.

Data include collaboration and friendship ties, ethnographic descriptions of objects (artworks, materials, tools, and everyday items) filling shared spaces, and fixed individual attributes (e.g., gender and age) for three collectives of artists across three time points.

Not all objects are meaningful to every artist. Hence, any single object usually has no values on what it means to some of the artists. Furthermore, descriptions are usually short, which results in rare overlaps in semantic associations between pairs of descriptions, hindering their direct pairwise comparisons. To address this, based on descriptions of objects provided by both artists in a dyad, we used Correlated Topic Models to evaluate total dyadic similarity in meanings in dyads of artists per group/wave.

Analysing these networks is a modelling challenge due to small size, high clustering, and the nature of similarity relations derived from text and thus systematically constrained. Our pooled MRQAP models across the three groups predict total dyadic similarity from prior similarity, collaboration and friendship ties from the previous wave, and similarity in gender and age. Preliminary results suggest that social ties—particularly collaboration—predict

greater similarity of meanings over time. Additionally, social closure (shared contacts) fosters similarity, while attribute similarity also plays a role, though with less consistency.

OS-87: Social networks in the older population

Location: Room 116 Session Chair: Lea Ellwardt Session Chair: Paula Steinhoff

Individual, social network, geographic area, and place attributes associated with older adults' place visitation

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The health of older adults is a key public health issue, with outcomes not only influenced by individual characteristics but also by social and spatial context. Public spaces, communities, and geographic areas offer varied opportunities for healthy, active, and socially connected living. However, inequalities in access to health-promoting places require further investigation to inform interventions. This study aims to explore how individual, social network, geographic area, and specific place factors are associated with older adults' visitation to places for social or physical activity. Participants aged 55-75 from South Lanarkshire and Renfrewshire, Scotland, completed an egocentric social network survey, which included information on the places they visit. Survey data were linked to government records, providing a comprehensive view of area and place attributes. Cross-classified multilevel models will be used to identify predictors of the likelihood of visiting places. Findings will examine whether visitation is associated with: 1) proximity factors (e.g., availability of places within walking distance and actual distance travelled); 2) place factors (e.g., type of place, such as green space or public infrastructure); 3) social network and community factors (e.g., network composition and community belonging); and 4) individual factors (e.g., deprivation and health). This research will identify barriers and facilitators to place visitation, helping to inform the development of interventions that promote the use of places for social connection and physical activity.

Older people's networks: A study of a community centre with SAOMs

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The literature about the ageing population has mainly focused on how different aspects influence individuals' behaviour in the network (e.g., well-being, isolation, and loneliness). However, we do not know enough about the relationships between older people and their caregivers, especially over time and within a community centre. This article tries to fill this gap.

This research was conducted in a community centre in Chile in 2023, with older people and professional caregivers as participants. Three waves were collected at different times of the same year. It asked about social support networks, including various dimensions like advice, positive interactions, friendship, and caregiving networks. Some descriptive and visual analyses are presented, as well as an SAOMs model. In this presentation, the first results of the study will be presented, focusing on how the relationships between the older people in the community centre and their professional caregivers change over time. In addition, it is crucial to understand what may influence seeking advice among all participants.

Food Insecurity and Social Networks in Aging Populations: A Scoping Review

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Food insecurity (FI) is a growing concern among aging populations, yet its relationship with social networks (SN) remains underexplored. This scoping review synthesizes existing evidence on the interplay between FI and SN among older adults, assessing how these concepts are measured and conceptualized. Following the framework by Colguhoun et al. and the recently published PRISMA-ScR checklist, we conducted a comprehensive search covering studies published between 2000-2025. A total of 63 studies met the inclusion criteria, with the majority (67%) conducted in high-income countries and adopting a quantitative approach; only 36% exclusively focused on aging populations. Notably, most studies were published within the past five years, reflecting the increasing recognition of FI and SN as critical aging-related issues. FI was most commonly assessed using standardized tools such as the Household Food Insecurity Access Scale (HFIAS) and the Food Insecurity Experience Scale (FIES), whereas SN was broadly conceptualized in quantitative dimensions and in terms of social support, social capital, and social cohesion, with few standardized measurement frameworks. Existing studies predominantly examine SN as a determinant of FI, while research exploring FI's impact on SN remains scarce. Given that both concepts are highly dynamic, particularly in aging populations, there is an urgent need for longitudinal and intervention-based studies to better understand the nature and directionality of these relationships. This review highlights the need for standardized SN measures, greater integration of qualitative approaches, and a network-centered perspective in aging research to inform policy and interventions aimed at strengthening food security among older adults.

Network and Gene shape Emotional Distress to Social Exclusion

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Social exclusion triggers 'social pain' similar to physical pain, shown by physiological responses including cortisol reactivity and neural activation. Both genetic predispositions and environmental factors shape these response variations. The oxytocin receptor gene(OXTR) rs53576 polymorphism, particularly in G allele carriers, influences socio-emotional sensitivity. Additionally, proactively forming social ties(out-degree centrality) influences sensitivity to social cues and expectations. While genetic and social factors can function independently, the understudied gene-environment(G×E) interaction is crucial in determining responses to social situations. Therefore, this study investigates how rs53576 and out-degree centrality jointly impact emotional and neural responses to social exclusion. 52 older adults from a rural Korean village completed a modified Cyberball task during fMRI, which simulated social exclusion through a virtual ball-tossing game with co-participants within the village, whose names and photos were displayed. Post-scan questionnaires assessed emotional distress during exclusion. Participants were categorized by rs53576 G allele presence, with out-degree centrality measured as discussion partners within the village over the past year. Neural responses were analyzed using contrast analysis across three ROIs: social pain(dACC, AI), negative affect(amygdala, ACC), and mentalizing(mPFC, TPJ, precuneus, STS). G carriers exhibited significantly increased emotional distress during social exclusion(β=0.782, p=0.002), particularly when combined with higher out-degree centrality(β=0.862, p=0.001). Emotional distress correlated with activation across these $ROIs(\beta=0.356-0.382, p<0.012)$. Importantly, neither rs53576 nor out-degree centrality directly affected neural responses, mediated entirely through emotional distress. This mediation was stronger in individuals with higher out-degree centrality(β =0.585-0.628, p<0.028), suggesting complex interactions between biological and social factors influencing neural responses to exclusion through emotional pathways.

Services provided by older adults to family members: a configurational perspective

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According to active ageing theories, older adults who provide services within their families tend to be in better health. It allows them to maintain an important role in the family, which boosts their self-efficacy. It also tends to strengthen the links between providers and recipients. Much of the literature has focused on the profiles of providers and recipients and the quality of their relationship. However, research has paid little attention to the family dynamics into which older adults are integrated. Yet we hypothesise that family dynamics and the propensity of older adults to provide services within their families are closely linked. This study therefore aims to go beyond dyadic 'provider-recipient' relationships by considering all the relationships that make up family networks. To do this, we adopt the configuration approach, which sees families as networks of significant family members who are

related to each other through interdependant ties. The data we used come from the VLV study, an interdisciplinary study carried out in 2011-2012 on the living and health conditions of people aged 65 and over living in Switzerland (n=3032). The results show that different types of services provided by older adults are significantly related to the density of practical help and conflict within their family network, as well as to the central role they play in it. Our findings underline the importance of considering the whole family network in which older adults are involved in order to understand their propensity to be service providers within their family.

OS-191: Social Capital themed session 2

Location: Room 125 Session Chair: Heather McGregor

The Impact of Resident Interaction, Residential Context, and Contact Assets on Place Attachment

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Research on place attachment is important as it is known to help foster social capital and civic participation. It is influenced by living arrangements, the residential context, and resident interaction. Additionally, contact assets, such as children or pets, affect resident interaction and the use of community spaces. However, previous studies have primarily examined the effects of residential context and resident interaction, while the role of contact assets has received limited attention. Their impact across diverse environments is still unclear, necessitating further research. This study examines how the relationship between resident interaction and place attachment varies by residential context and contact assets.

We used questionnaire data from an online survey in Japan (N = 11,002). We applied probabilistic latent semantic analysis to cluster residential contexts, then divided each cluster by the presence or absence of contact assets. Finally, Bayesian network analysis examined how resident interaction and place attachment relate within each divided group.

The results identified four residential contexts, showing that areas with abundant community resources had more residents with place attachment. Across all contexts, greeting others, recognizing faces and names, and having reliable acquaintances consistently correlated with place attachment. For individuals with contact assets, even light social interactions such as greetings contributed to attachment, whereas for those without, recognizing acquaintances by both face and name was crucial. Among those without contact assets, fewer acquaintances were needed in areas with abundant community resources. This study highlights how effective social connections for place attachment vary by community resources and contact assets.

The Ontology of 'Bridging Social Capital': Connecting Communities for Social Inclusion

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We describe a framework on bridging social capital in humanitarian contexts for inclusive resilience. Bridging social capital denotes social interactions and associations that connect communities, groups, or organisations with socio-spatial inequalities and polarizations. It enables the participants to build trust and maintain channels of communication, potentially influencing several broader dimensions of social cohesion and civic engagement. However, bridging social capital can re-perpetuate inequality and tensions too in humanitarian contexts. If benefits are not shared fairly, certain groups may be compelled to move, and powerful community interests may exert dysfunctional control. Challenges with the availability, accessibility, and activability of resources through social support can push bridging social capital into crisis.

Current concepts highlight what bridging is; they fail to address the various hindrances to, drivers of, and norms for such social processes, thus prolonging resilience building. The concept needs a paradigm shift to what bridging does through extrinsic connectedness, involving the mobilisation of resources for inclusion and empowerment in community interactions and daily experiences.

This article presents an ontological framework encapsulating the logic of bridging social capital. The framework systemically deconstructs the combinatorial complexity of the problem around the dimensions of social and capital

and explicates the pathways of social inclusion. The ontology highlights all three drivers of the bridging process barriers, facilitators, and norms—and is applicable in any heterogeneous society and across diverse humanitarian contexts. It is useful for systematically analysing bridging's critical linkages for social inclusion, involving participants' predispositions and aspirations, as well as barriers, norms, and facilitators in their collaborations for resources to develop strategies of inclusive resilience. The framework thus adopts a dynamic concept of a more interactive understanding of social action and inclusion.

The relationship between social capital and corporate operational efficiency: The moderating effect of diversity

Gladie LUI

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Principal Topic

While social capital has multiple definitions (see, e.g., Bourdieu, 1985; Coleman, 1988; Putnam, 1995, etc.), it has two common elements: a set of informal values that generates trust and enhances cooperation among members of a group, and a set of networks that facilitates group actions. From a macroeconomic perspective, economists have long recognized that social capital is essential to societal economic success and it promotes economic growth through information sharing and cooperation. Another mechanism through which social capital creates an impact on the economy is that strong social capital benefits corporations at the firm level. With a firm-level focus, this study aims to investigate mainly two research questions. First, what is the impact of social capital on a firm's operational efficiency? To address the controversial debate on gender diversity in the corporate governance domain, our second research question is: how does the Chief Executive Officer (CEO) gender affect the operational link between social capital and corporate performance?

Methods and Results

We obtain social capital data from the 2018 report, The Geography of Social Capital in America by the Joint Economic committee Republicans. Using a sample of U.S. listed firms (65,481 firm-year observations) over the period from 1996 to 2021, we employ the Data Envelopment Analysis (DEA) to construct the operational efficiency score for all sample firms.

We use the following baseline model to test our research question 1:

"EFFICIENCYt = β 0 + β 1 SKt + $\sum \beta$ i Firm_Level_Controls+ $\sum \beta$ j State_Level_Controls "

"+ $\sum \beta k$ State + $\sum \beta l$ Industry+ $\sum \beta m$ YEARt + et"

where the dependent variable is the DEA score of firms, and the variable of interest is social capital. Firm-level control variables (equity market value, market share, free cash flow, firm age, Herfindahl index, foreign business, efficiency lag), state-level control variables (religious adherence, industry effect, per capita GDP, percentage of population growth and population density) and year effect are also included in our model.

Consistent with our expectation, the results indicate that firms in high social capital regions have higher operational efficiency. We further our sensitivity test using an instrumental variable (IV) approach (a state-level measure of racial fragmentation as IV) and find consistent results.

To test for the moderating effect of CEO gender (research question 2), we conduct a cross-sectional analysis including as explanatory variables the interaction terms: SK*FEMALE for all three of the social capital measures in our baseline model. The results suggest that the positive relation between social capital and operational efficiency is more pronounced for firms with female CEOs.

As robustness tests, we use the length of the operating cycle as an alternative proxy for operational efficiency. We find that companies with female CEOs report shorter operation cycles, suggesting higher operational efficiency which is consistent with our baseline results. We further our test by employing county-level social capital data to validate our baseline results, which we computed using state-level measures and find consistent results.

Trust measurement and the impact of inequality on interpersonal trust.

<u>Jacob Spanke</u> University of Siegen, Germany The level of interpersonal trust is declining in most Western societies. This severely damages the coherence of society and hampers the ability of the political system to make and implement transformative change.

The hypothesis that inequality reduces interpersonal trust has been around for a long time. It is clearly visible in cross-sectional data. However, the thesis has never been confirmed in longitudinal designs. The paper attempts to find new approaches to the missing link between the longitudinal null findings and the robust evidence that exists cross-sectionally, in psychology, and is often debated in the policy arena. It does so by ruling out artifacts of insufficiently detailed trust questions.

The hypothesis that the lack of longitudinal evidence of inequality on trust is due to the fact that the change is too small to be statistically detectable as long as it is only tested with yes/no questions seems likely given that there is also a relationship between interpersonal and political trust that has long been undetected due to artifacts. Indeed, many of the most cited papers on inequality and trust use only the reduced index. The problem posed by the lack of differentiation is also easy to understand theoretically: On average, we remember negative memories much better than positive ones. In addition, the only yes/no option makes the question sound even sharper, so a yes can only be expected with very high scores.

Trust Without Connection? How Social Class Segregation Affects Social Trust

Till Hovestadt

Nuffield College, University of Oxford, United Kingdom

Modern societies are complex social structures, characterised by various dimensions of social stratification. As members cannot possibly form connections to all other members, cooperation, and social cohesion rely on generalised social trust, and the absence of prejudice between social groups. One major determinant of trust and prejudice is connectedness: Trust develops in predictable, long-term interactions. Furthermore, the contact hypothesis and social capital theories imply that positive intergroup contact is essential to reducing prejudices, accepting diversity, and generalising trust to the whole population. While this relationship of intergroup contact and trust has mainly been tested with ethnic diversity and ethnic neighbourhood segregation, two important gaps in the literature remain: Much previous literature does not investigate actual interactions in social networks, but only contact possibilities in neighbourhoods, and a major dimension of social stratification-social class-has been largely neglected. At the same time, evidence implies that neighbourhoods, workplace, and friendship networks are segregated with respect to social class. If only few social relationships exist across social class boundaries, less intergroup contact is possible, which could strongly affect generalised social trust. I utilise data from the German National Educational Panel Study and drawing on position generators, I can approximate how many people in occupations from different social classes actors know. I then estimate whether having interclass contacts affects generalised trust and intergroup prejudices. Our findings shed light on the impact of social class segregation on social cohesion and how fostering interclass social networks can mitigate these consequences.

OS-124: Contagion and Diffusion processes through Social Networks 3

Location: Room 202 Session Chair: Aníbal Luciano Olivera Morales Session Chair: Thomas Valente

Network Interventions to Improve Search and Facilitate Research-Practice Transfer

<u>Jennifer Watling Neal</u>, Zachary P. Neal Michigan State University, United States of America

BACKGROUND

Research-practice transfer involves bidirectional communication between researchers and practitioners, while the research-practice gap refers to breakdowns in this communication. Network interventions are often viewed as a promising way to bridge this gap. However, the focus has primarily been on interventions designed to facilitate researchers' ability to push out (i.e., disseminate) their research.

PURPOSE

In this study, we propose three simple network interventions designed to facilitate practitioners' ability to pull in (i.e., search for) useful research: (1) relying on multiple sources of information to avoid dead ends, (2) relying on well-connected sources of information to avoid echo chambers and (3) relying on sources of information outside their own community to reach brokers.

METHOD & RESULTS

We use a simulation to evaluate the potential utility of the proposed interventions for improving the success and efficiency of research-practice transfer. The simulation suggests that all three interventions improve both the success and efficiency of practitioners' search for researchers in their social networks. Specifically, when a practitioner searching for research relies on multiple sources of information, relies on a well-connected source of information outside their own setting, they are more likely to find a researcher in their network and they do so more quickly.

CONTRIBUTIONS

Taken together, these results suggest that simple practitioner-focused network interventions can improve researchpractice transfer by increasing the success and efficiency of practitioners' searches for research.

NOTE: A preprint of the full paper can be downloaded at: https://osf.io/7u5ne_v1

Collective dynamics of health (mis)information contagion in social networks

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The COVID-19 infodemic has underscored the challenge of health misinformation, significantly influencing public health decisions. Despite efforts to counter it, understanding the social mechanisms driving its spread remains a key research gap. This study integrates survey data with agent-based modeling (ABM) to analyze how misinformation propagates within different social network structures and its implications for public health.

A survey conducted in Spain (January–March 2024) gathered responses from 2,200 individuals, assessing health beliefs using the COVID-19 Misinformation Scale (CMS12). Factor analysis identified four misinformation dimensions (Conspiracy, Hoaxes, Vaccines, Fertility), which were used in a k-means clustering to classify respondents into three groups: Informed (49%), Hesitant (30%), and Misinformed (21%). After characterizing these social profiles via logistic regression, an ABM was developed to simulate misinformation spread in four network structures (Regular, Random, Small-World, Scale-Free) using igraph. The model incorporated network size, learning rates, and resistance to opinion change parameters.

Results indicate that misinformation spreads most effectively in scale-free networks due to the presence of highly connected hubs, while small-world networks tend to confine misinformation within local clusters. Hesitant individuals were found to be the most susceptible to misinformation. Overall, our findings suggest that the combination of a highly interconnected network, low resistance to change, and greater learning capacity facilitates the misinformation spreading among hesitant individuals—those with less defined opinions compared to the more stable and ideologically driven positions of the informed and misinformed groups.

These insights highlight the importance of targeting hesitant individuals in health interventions to mitigate misinformation's impact.

Foraging on Graphs: Adding Agency to Models of Contagion in Networks

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¹University of South Carolina, United States of America; ²University of Hertfordshire, England; ³University of St. Andrews, Scotland

Networks impact how we acquire information and adopt behaviors. This idea has long-standing theoretical roots, but only recently have researchers had the necessary data, computational power, and statistical methods to examine how contagion processes play out over different network structures. Current scholars of diffusion in networks argue that some structures facilitate the spread of some "infection" more than others, depending on whether the nature of object being diffused is "simple" and spread through mere exposure or "complex" and spread through social influence.

While both models highlight the importance of social structures on person- and system-level outcomes, they do so by reducing the actors within them to cultural dupes who are infected by information or behavior given some critical threshold of exposure or quantity of already-infected relations. This may be an artifact of the contagion model's origins in communicable disease transmission, in which passive exposure is a sufficiently comprehensive precondition for becoming infected. But bits of social information and novel behaviors are not diseases. Actors who adopt cultural innovations are not dupes but individuals with agency, and often strategically seek out ideas and practices they might ultimately adopt through their social networks. Deliberate search behaviors – constrained or enabled by their network structure – likely pattern an actor's chances of adoption.

We argue that current network contagion frameworks fail to capture a core aspect of human behavior: individuals often actively seek out and adopt cultural objects that are strategically beneficial or otherwise interesting to them. While human agents are indeed made aware of and influenced to adopt cultural innovations through their immediate social ties as these existing models propose, they also tend to seek out, encounter, and adopt these objects via foraging behaviors that provide additional opportunities for active self-exposure and deliberate social learning.

In our paper, we elaborate a set of speculative models that integrate the contagion literature's insights about the influence of social network structure with the information foraging literature's findings that people deliberately modify their strategies or the structure of their environments in the pursuit of obtaining valuable information or acquiring useful cultural tools. We then run a set of computational experiments that compare hypothetical rates of adoption in Erdős-Rényi graphs and locally clustered Small World graphs – structures that prior contagion research identifies as less and more beneficial to the facilitation of diffusion, respectively – in conditions where active information foraging strategies (i.e., approximations of the ACT-IF model of foraging) are or are not simultaneously parameterized alongside our manipulations to network structure and passive influence dynamics.

Our preliminary results contradict conventional wisdom in the contagion literature: we find that less clustered Erdős-Rényi graphs often facilitate more rapid and complete adoption of complex cultural objects than clustered Small World graphs when agents are incentivized to forage for information beyond their first-order social ties (explore) and strategically resample information when they encounter it (exploit). Our next steps involve using our hybrid foraging-contagion model to predict the adoption of new open-source libraries by developers on GitHub.

How the Context of Intervention Delivery shapes Effectiveness of Peer Led Interventions: Meta Network Analysis of Stochastic Actor Oriented Models in A Stop Smoking in Schools Trial (ASSIST)

Eleni Omiridou, Emily Long, Srebrenka Letina, Mark McCann

University of Glasgow, United Kingdom

Purpose: Evaluate the interactions between the context delivery, mechanisms relating to peer leader influence and reduction in adolescent smoking.

Data: A Stop Smoking in Schools Trial (ASSIST) involved student nominated, peer leaders communicate smokefree messages to peers in their school-year. Data archiving has recently extended availability of data to 53 schools across England/Wales (n=10,387).

Analysis: Stochastic actor oriented models (SAOMs) are estimated using ASSIST, to delineate dyad level influence and intervention effects. Interaction reduced friendship networks are modelled separately to examine interdependencies between multiple types of peer relationships. Using a two-stage analysis on networks, SAOM estimates are nested per period / per social focus. Meta-analysis is repeated for subgroups; setting (Welsh valley/non-valley) and intervention arm (ASSIST/control). The relative contribution of mechanisms to the social patterning of smoking is further examined so that proper attribution can be made.

Implications: SAOMs serve an important tool to build depth to mid-range theory, i.e. for whom and under what circumstances the ASSIST programme works and can be transferred to.

The Diffusion of Expert Opinion and the Risk of Echo Chambers

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Authoritarian regimes are notoriously opaque in their decision-making processes and create challenges for external policymakers to understand and predict future behavior. Because of this lack of clear information, policymakers heavily rely on country experts who track developments on a day-to-day basis. These experts will have a strong potential influence on the policies of foreign actors towards the autocratic regime.

Our data focuses on China. Understanding Chinese politics has become increasingly important for policymakers as China has become a leading cultural, economic, and political global power. Experts in Chinese politics therefore play an important role as a source of information, analysis, and guidance.

While experts may directly observe politics in China, they also inform and are informed by each other. This creates an opportunity for the diffusion of knowledge and information within a network. However, it also creates a risk that sharing and amplifying inaccurate information or biased assessments within the network results in sub-optimal policy outcomes.

We use a snowball sampling process to accumulate information on over 2,000 individual China experts globally. The data contains self-reported assessments of their own expertise on Chinese politics from almost 500 respondents, and occupational background information from public sources on most of the nominated individuals. We also use the nominations to construct a network through which information and influence could potentially flow within this community.

We scrape blog-style publications of experts on salient issues in Chinese politics from online publications and blogs and apply topic modelling to investigate the nature of the information flow through the network. A Stochastic Actor-Oriented Model (SAOM) is used to estimate the level and shape of information diffusion across the network of experts. The findings indicate the presence of the diffusion of writings among networks of experts on Chinese politics, signifying a considerable potential for the existence of echo chambers among these experts.

OS-63: Qualitative Network Research: Understanding network dynamics

Location: Room 203 Session Chair: Laura Behrmann Session Chair: Theresa Manderscheid Session Chair: Benjamin Moles

What Are Venture Investments? Utilitarian Intimacies in New Technologies

<u>Alex Preda</u>, David Xingyi Chen Lingnan University, Hong Kong S.A.R. (China)

In the cutthroat world of VC investment, founders compete in a ruthless game of attention-seeking for a VC partner's time. Yet time is also freely spent on the seemingly frivolous: cocktail receptions, coffee chats, holiday celebrations and even gym sessions, where VC partners and startup founders spend precious time and effort. In a field where half an hour of attention could be worth millions in investment, the question that begs to be asked in the face of this apparent contradiction between temporal scarcity and abundance is, why? Why are social relationships valued to the extent that they are, in the world of venture investing, that its participants deem it a worthwhile venture to commit to?

We investigate ethnographically venture capital's relationships with AI and blockchain startup founders, based on interviews and field observations in Hong Kong, Shenzhen and Singapore, which are major hubs of venture capital. We argue that VC investment relationships occupy a distinct space in the array of economic social relationships. They harbour significant distinctions in context, patterns and expectations when compared with other types of social relationships in the business and personal worlds. They are simultaneously vessels of mutual evaluation and signifiers of social proximity. This double bind of business utility and real-life intimacy—what this paper would dub as "utilitarian intimacy"—sets VC investment relationships apart from other relational norms studied by economic sociology.

Agency and the micro-foundations of network resilience: Insights from "Mafia Capitale" (2012-2015)

Francesca Capo¹, Elisa Operti², Riccardo Maiolini³, Francesco Rullani⁴

¹Università Bicocca; ²ESSEC Business School, France; ³John Cabot; ⁴Ca' Foscari

The study of social networks has traditionally emphasized structural factors in determining network resilience, yet recent research has increasingly recognized the role of individual agency in shaping network responses to disruption. This paper investigates how actors actively reconfigure their ego-networks in response to exogenous shocks, focusing on the strategies they employ to sustain or restore network functionality. We explore these dynamics through a longitudinal case study of the political, economic, and criminal networks embedded in the "Mafia Capitale" scandal in Rome, Italy (2012–2015). The case provides an exceptional setting to examine agentic responses to network disruption, as it involves a business network that blurred the boundaries between legal and illegal practices and faced a major external shock: the election of a new mayor committed to disrupting clientelist ties in public procurement.

Our analysis identifies four distinct strategies actors deployed to restore network effectiveness: turtling, group leverage, direct contact leverage, and broker leverage. These mechanisms reveal how individuals navigate political

and institutional shifts, leveraging their existing and newly formed connections to maintain influence and operational continuity. By combining social network analysis with qualitative historical methods, this study moves beyond structural explanations of resilience, offering a micro-foundational perspective on how actors dynamically manage network churn. Our findings contribute to the emerging literature on network agency and resilience by demonstrating how actors proactively adapt to institutional change and external shocks, with implications for research on organizational networks, governance, and institutional transitions.

Escape from the Sargasso Sea: Networks and Elite Political Action in the Early American Republic

Marissa Combs¹, Benjamin Rohr²

¹Harvard University, USA; ²University of Mannheim, Germany

The study of political conflict often assumes that individuals' social ties determine their political actions. While this structuralist approach has been successful in many contexts, it struggles to account for the actions of political elites, whose power depends on maintaining strategic flexibility. Political divisions among elites are largely endogenous to the political process and cannot be reduced to social position. Building on recent developments in social network theory, this paper advances an "action-in-networks" approach that, rather than using networks to predict sides, focuses on the dynamics of side-taking—how elites make, maintain, and sever ties to navigate the political field. We illustrate this perspective through a case study of John Williams, a key political figure in early New York who switched from the Republican to the Federalist Party in 1795. Using a dataset of over 300 personal letters, we show that Williams' switch was not a predictable outcome of his network position but a strategic move that triggered a reconfiguration of his political and social relationships. Our analysis reveals three key insights: (1) Political elites operate in multiple, intersecting networks. (2) Political action involves not only the making but also the strategic breaking of ties to create new opportunities. (3) Political action is shaped by broader cultural logics embedded in social relations. By the late 1790s, partisanship had displaced older forms of patron-clientelism. Williams, who perhaps did not fully understand this change, found himself trapped in an uneasy alliance—one that ultimately undermined his political prospects.

Mapping Agency Collaboration in the U.S. Animal Agriculture Sector: A Qualitative Social Network Analysis

India Mary Luxton

Syracuse University, United States of America

Regulatory oversight of the U.S. animal agriculture sector is distributed across multiple federal agencies, including United States Department of Agriculture (USDA), Occupational Health and Safety Administration (OSHA), and Center for Disease Control (CDC), each with distinct yet interrelated responsibilities. Collaboration and coordination across these agencies are critical to upholding the food system and ensuring food safety, worker protections, and public health. Yet, differing organizational missions, resource constraints, and institutional barriers can present challenges to coordination and collaboration.

In this research, I use qualitative network research. I draw on interviews conducted with federal agency employees and analysis of ego-network data, collected using Network Canvas, to map inter- and intra- agency collaborative networks. I describe some of the methodological challenges to conducting research with federal agency representatives – challenges that have been intensified in the current U.S. political-economic context.

I identify the barriers and benefits of regulatory collaboration and coordination, as described by research participants. I analyze challenges to collaborative networks through interview and social network data, including information silos, communication barriers, and regulatory fragmentation. I detail positive outcomes of interagency coordination in the realm of the U.S. animal agriculture sector, including crisis responses, enhanced information-sharing mechanisms, and joint enforcement efforts that strengthen regulatory oversight and response to emergent threats, including disease outbreaks.

In identifying key barriers and facilitators of collaboration—such as trust, shared goals, and institutional support this research provides a roadmap for strengthening interagency networks and food system resiliency.

Relational Dynamics and Transformation of Multi-Level Marketing Networks: Co-optation, Supervision, and Socialization <u>Gwladys HADJIMANOLIS</u>

Clersé, France

Multi-Level Marketing (MLM) networks operate on a business model that combines the direct sale of products and services with the continuous recruitment of new sellers, who are integrated into a hierarchical structure based on sponsorship. Far from being static entities, these networks evolve according to individual trajectories and group dynamics, shaped by mechanisms of co-optation, social control, and collective learning. This presentation is based on a qualitative study conducted within a network of female sellers affiliated with a company specializing in cosmetics and dietary supplements, referred to as Vital Nature. Using a multi-method approach that combines interviews, digital and in-person ethnography, and network modelling, this study examines the processes of tie formation, stabilization, and transformation within the network. Special attention is given to the mechanisms through which highly influential members at upper hierarchical levels shape and regulate activity within the network, ensuring its continuity while reproducing interdependent relationships and labor dynamics characteristic of MLM structures. Digital platforms – particularly social media – play a crucial role in these processes: it facilitates co-optation and the deployment of remote supervision strategies, notably by enabling social control through the monitoring of members' online content. Finally, by analysing the upward mobility trajectories and profiles of the most committed sellers, this study questions the conditions of success in an industry where the majority ultimately fails.

OS-31: Intergroup Relations in Social Networks

Location: Room 204 Session Chair: Tobias Stark

Do dual identifiers perceive the structure of interethnic friendship networks more accurately than mono identifiers?

Lexin Chen, Tobias Stark, Eva Jaspers, Tom Nijs Utrecht University, Netherlands, The

As popular destinations of immigration, European societies have become ethnically and culturally more and more diverse, leading to a substantial group of dual identifiers, who self-identify with both the national majority group and the ethnic minority group of their (grand)parents. As individuals with ties to multiple groups, dual identifiers may play pivotal roles in bridging divides in increasingly diverse communities, thus fostering ethnic integration. However, this advantage hinges on dual identifiers' ability to correctly assess their surrounding social structure. On the one hand, dual identifiers may be better at perceiving the structure of interethnic social networks because they are more likely to have ties to multiple groups. On the other hand, low-status minority members may have more accurate perceptions of social networks than dual identifiers because their lower social status makes them more dependent on correctly identifying key players in the network.

We test these competing hypotheses with cross-sectional network data, collected among more than 1,400 adolescents in Dutch schools. Participants were asked to name their direct friends and report their perception of the network structure in their school class (cognitive social structure). Statistical analyses of agreement between self-reports and perceptions were used to test if ethnic identity predicts accuracy.

Peer Networks in Inclusive Settings: Unveiling Friendship and Antipathy Ties Among Adolescents With and Without Special Educational Needs Using Exponential Random Graph Models

<u>Imelda Caleon</u>¹, James Elicano¹, Kenneth Poon¹, <u>Siow Chin Ng</u>², Ilham Nur Qamarina¹, Melvin Chan¹ ¹National Institute of Education, Nanyang Technological University, Singapore; ²Ministry of Education, Singapore

Global efforts to establish more inclusive education systems for students with special educational needs (SEN) have been steadily escalating. In such education systems, students with and without SEN learn together while being provided with the necessary support within their learning environments. Drawing on social contact theory, social exchange theory and the principles of homophily, this presentation aimed to explore and understand the social processes associated with the friendship and antipathy networks of adolescents with and without SEN in inclusive setting. The study involved 429 students attending two schools with high percentage of students with SEN. We applied exponential random graph models (ERGMs) to examine tie formation between students with and without SEN. The results indicate that students with SEN were as likely as students without SEN to send and receive friendship nominations. There were also indications of the stronger homophilic tendencies of students with SEN, students with SEN tend to receive more antipathy nominations from students without SEN. Moreover, the analysis revealed significant sex and race homophily effects across schools. The students were significantly more likely to

form friendship ties with others of the same sex than with those of a different sex, but SES did not have significant effect on friendship formation. Concerning the students' antipathy network, significant sex homophily was found but SES and race did not have a significant effect on the formation of antipathy ties. Additional analyses also indicate that friendship and antipathy ties differ in their influence on students' sense of belonging, particularly for students with SEN. These findings underscore the need to focus on the different facets of students' peer networks and enhance students' positive attitudes toward diversity and inclusion to help students with SEN to feel integrated but also included in schools.

Are high-performing ethnic Roma students excluded from their minority peer group? Friendship relations, ethnic identification, and labeling

Dorottya Kisfalusi^{2,1}, Márta Radó^{1,3}, Károly Takács^{1,2}

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It is a puzzle whether and how social exclusion mechanisms hinder the academic performance of disadvantaged minority groups. Using unique social network panel data from elementary school students in Hungary, we test different predictions of the cultural-ecological theory among the Roma, one of the largest ethnic minority groups in Europe. First, we investigate whether high-achieving Roma students are excluded from the minority peer group (acting white hypothesis). Second, we examine whether high-achieving Roma students aim at passing for white by disidentifying with their ethnic minority group (disidentification hypothesis). Third, we test whether peers and teachers perceive high-achieving Roma students as belonging to the non-Roma group (labeling hypothesis). The findings contradict the acting white and the disidentification hypotheses. On the one hand, high-achieving Roma students are not associated with changes in ethnic self-identification, suggesting that high-achieving Roma students do not aim to disidentify with their ethnic group. In line with the labeling hypothesis, however, higher academic achievement is associated with a lower likelihood of being perceived as Roma. This indicates that with high achievement, Roma students lose their ethnic membership as perceived by others.

Change and Stability of Homophily in Adolescence

David Kretschmer Nuffield College, United Kingdom

As adolescents grow, peer relationships become increasingly central to their social development. Understanding how friendships develop throughout adolescence is crucial, as these relationships can have long-term implications for intergroup attitudes and social cohesion in adulthood. A key factor in this process is homophily, the tendency to form relationships with similar people. However, it remains unclear whether adolescents become more or less open to friendships across different social boundaries as they grow older.

This study examines how homophily evolves throughout adolescence. I first analyze whether adolescents' preferences for similarity in sociodemographic characteristics—such as gender, ethnic background, and religion— change over time and whether trends differ between these attributes. Beyond demographic traits, I also investigate homophily in shared leisure activities and musical preferences to determine whether adolescents' openness to diversity varies by trait type. This provides a broader understanding of whether homophily follows a general developmental pattern or is specific to certain traits. Additionally, I explore the relationship between stated preferences for similarity and actual friendship-making, identifying conditions under which they align or diverge. Lastly, I differentiate between different positive and negative relationships to assess how homophily operates across the various types of ties adolescents have.

To address these questions, I apply random-effects growth curve models and stochastic actor-oriented models for network evolution to six waves of social network data for N = 2,701 students aged 11-17 from the German Friendship and Identity in School study.

Citizen outsiders? Ethnic boundary-making in personal networks in response to othering

Nuria Targarona Rifa

Autonomous University of Barcelona, Spain

In superdiverse societies, many legal citizens with a migration background or ethnic minority status are often othered, leading to feelings of being 'citizen outsiders' (Beaman, 2017). This affects their sense of belonging and
well-being, making it crucial to understand the process better. While we know that it takes place in both intimate and superficial relationships, it is typically explored at an individual level. Taking a relational approach, I study this othering process in dyadic ties using a qualitative perspective to examine how people with diverse ethnic backgrounds negotiate categorical boundaries and respond to being excluded.

The paper presents findings from a social network analysis study (PATCHWORK project) that collected data from a heterogeneous sample of 48 individuals in Barcelona (Spain) in 2023. Participants were interviewed twice. The first interview used a questionnaire to collect personal network data. The quantitative data informed the specific questions asked during the second, qualitative interview, which included two interactive exercises with visual tools designed to explore processes of categorisation and boundary-making within the participants' networks.

Without using pre-fixed ethnic categories, the inductive analysis uncovered the emergence of the category 'citizen outsider', which in the context of Barcelona includes members of ethnic minorities long established in Spain (e.g., Roma), children of migrants, and (descendants of) Spaniards from other Spanish regions. The category is cocreated through the narratives of 'insiders' interacting with 'citizen outsiders' and 'citizen outsiders' experiencing marginalisation. The findings also reveal the range of ethnic boundary-making strategies used in response to othering in everyday interactions.

Is Homophily Enough? Exploring Friendship Choices by SES among School Students

Anastasiia Kuznetsova^{1,2}

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With economic inequality rising in most countries, studying the mechanisms of its reproduction is a pressing matter. Research shows that friendships among children of different socio-economic backgrounds affect their future education achievement and income, inter-SES (socio-economic status) friendships especially improving the outcomes of children from lower-SES families.

Few studies explored the mechanisms of friendship preferences and choices of school children so far; the results of the studies that did are conflicting. The main mechanism assumed to guide friendship choices is homophily, and it is not found consistently in the data. I will test it once again with one of the cutting-edge tools of network analysis, Stochastic Actor-Oriented Modeling (SAOM). I will also test a different mechanism of friendship choice that has never been tested before - friendship hypergamy: children of higher SES are more desirable as friends. This mechanism might account for the cases in existing research where homophily wasn't found.

Existing research suggests that homophily, or assortativity, is not the only mechanism behind friendship selection: research shows that higher-SES students overall have more friends, while lower-SES children have less friends and are more likely to be isolated. Moreover, since SES is clearly hierarchical, homophily does not make sense as the only mechanism of friendship selection with regards to SES. Thus, exploring homophily and potential alternative mechanisms of friendship selection will broaden our understanding of friendship choice by SES as a mechanism of inequality reproduction, potentially outlining a need for more rigorous theory building on the topic.

OS-79: Social network factors for the elaboration and diffusion of inappropriate information Location: Room 206

Session Chair: Yasmine Houri

Information Syndemic as a metaphor to better understand online inequality.

Jaigris Hodson

Royal Roads University, Canada

Digital information and communication platforms like social media are implicated in the spread of digital polarization, mis-and dis-information and other types of anti-social online behavior that together increase inequality. These problems stem from a complex interplay of networks, content and social structures; however, current interdisciplinary work - for example work on virality and infodemics do not fully account for the nuances of these issues. This presentation will show how medical metaphors like infodemic get close, but do not capture, the full picture of how inequalities are enforced through networked affordances. Then, using an epidemiological and social determinants of health model, it shows how a related concept from the public health literature: syndemic, better accounts for the complexity. Finally this presentation shows how problems furthering inequality (like polarization, misinformation or online abuse) can be best understood using the metaphor of Information Syndemic. The Information Syndemic framework thus provides a transdisciplinary and fruitful way to understand how technologies, structures, individual behaviors and social networks deepen inequality.

Enhancing Global Fact-Checking Through Strategic Approach and Network Science

<u>Kaveh Kadkhoda</u>¹, Anna Bertani^{1,2}, Valeria Mazzeo¹, Aleksy Szymkiewicz^{3,4}, Yannis Delimaris⁵, Pablo Hernández Escayola⁶, Riccardo Gallotti¹

¹Fondazione Bruno Kessler, Italy; ²University of Trento, Italy; ³Demagog Association, Poland; ⁴Adam Mickiewicz University, Poland; ⁵Ellinika Hoaxes, Greece; ⁶Fundación Maldita.es, Spain

Misinformation spreads rapidly on social media, reemerging even after debunking. Fact-checkers face major challenges when old claims surface in new forms or different languages. To address this, our research integrates two complementary strategies for detecting and managing repeated misinformation.

First, a brute force approach compares every new claim against an archive of debunked claims, converting statements into numerical vectors using Sentence-BERT. A high similarity threshold (for example, 0.9) ensures fact-checkers focus on the most critical matches, reducing unnecessary workload.

Second, a network-based approach creates a weighted network of debunked claims, with edges reflecting similarity scores. By applying community detection and identifying the most central claims, this method significantly limits the number of comparisons needed.

We evaluate both strategies using a large multilingual dataset of global fact-checking records and social media data from Spain, Poland, and Greece. Our findings reveal that spikes in misinformation coincide with major global events, underscoring the need for robust, adaptive systems. The brute force approach provides full coverage but can be resource-intensive, whereas the network-based method prioritizes efficiency by clustering claims and focusing on the most influential nodes.

Together, these approaches help fact-checkers, researchers, and policymakers more quickly identify repeated false information, preserving the integrity of public discourse. By leveraging past debunked claims and applying network science, this framework offers a scalable solution to the persistent challenges posed by misinformation on social media.

Decoding the News Media Diet of Disinformation Spreaders

Anna Bertani^{1,2}, Valeria Mazzeo¹, Riccardo Gallotti¹

¹Fondazione Bruno Kessler, Italy; ²University of Trento

In the digital era, information consumption is predominantly channeled through online news media and disseminated on social media platforms. Understanding the complex dynamics of

the news media environment and users' habits within the digital ecosystem is a challenging task that requires, at the same time, large databases and accurate methodological approaches. This study contributes to this expanding research landscape by employing network science method-

ologies and entropic measures to analyze the behavioral patterns of social media users sharing news pieces and dig into the diverse news consumption habits within different online social me-

dia user groups. Our analyses reveal that users are more inclined to share news classified as fake when they have previously posted conspiracy or junk science content and vice versa, creating

a series of "misinformation hot streaks". To better understand these dynamics, we used three different measures of entropy to gain insights into the news media habits of each user, find-

ing that the patterns of news consumption significantly differ among users when focusing on disinformation spreaders as opposed to accounts sharing reliable or low-risk content. Thanks

to these entropic measures, we quantify the variety and the regularity of the news media diet, finding that those disseminating unreliable content exhibit a more varied and, at the same time, a more regular choice of web-domains. This quantitative insight into the nuances of news con-

sumption behaviors exhibited by disinformation spreaders holds the potential to significantly inform the strategic formulation of more robust and adaptive social media moderation policies.

Quantifying the impact of persuasiveness, cautiousness and prior beliefs in (mis)information sharing on online social networks using Drift Diffusion Models

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Misleading newsletters can shape individuals' perceptions and pose a threat to societies; as we witnessed, for instance, by lowering the severity of follow-up stay-at-home orders burdening a significant challenge to the fight against COVID-19. In this research, we study (mis)information diffusion by reanalyzing behavioral data on online sharing (from Pennycook and Rand, 2019) and analyzing decision-making mechanisms using the Drift-Diffusion Model (DDM). We use a hierarchical Bayesian parameter estimation to obtain the DDM-free parameters that characterize each dynamic, disaggregating the data by age range and veracity, and obtaining a solid accuracy (in the response times probability functions) between the model and the data. We find that subjects display an increased instinctive inclination towards sharing misleading news, but rational thinking significantly curbs this reaction, especially for more cautious and older individuals. On top of network structures with similar characteristics as Twitter (now X), Mastodon, and Facebook, we use an agent-based model based on the well-known Susceptible-Infected-Recover (SIR) epidemic model to diffuse this individual knowledge to a large scale where individuals are exposed to (mis)information through friends and share (or not) content with probabilities driven by DDM. We found that the natural shape of these social online networks provides a fertile ground for any news to become viral rapidly. Yet we have found that, for the case of Twitter (X), limiting the number of followers of the most connected users proves to be an appropriate and feasible containment strategy.

OS-222: Tools and Data for Social Network Analysis 3

Location: Room 105 Session Chair: George G Vega Yon Session Chair: Zachary Neal

Introducing SICCEN: using an engaging and ethically responsible interface to collect complete network data on smartphones

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Collecting social network data, particularly complete networks and cognitive social structures, can be challenging. One challenge is that network surveys can be repetitive and tedious for respondents. While interfaces have been developed to make this process more engaging, they are typically limited to larger screens (e.g., laptops or tablets), whereas smartphones are more widely accessible. Another challenge is that complete network data regularly rely on the collection of names before obtaining informed consent, raising ethical concerns.

We introduce SICCEN (Smartphone Interface for Collecting Complete and Ego Networks), which was designed to collect quantitative social network data, including cognitive social structures, in an intuitive, engaging, and ethically responsible manner using smartphones. A key design feature of SICCEN is that connections are visualized by proximity rather than lines, ensuring clarity and scalability on small screens, even when capturing complex cognitive social structures. Another key feature is that when network members participate simultaneously, they can enter their names at the start of the questionnaire, which are then dynamically integrated into other participants' surveys in real time. This method eliminates the need to collect personal data in advance and automatically excludes non-participants' names, addressing ethical concerns.

We will discuss the background of SICCEN, its benefits for social network research, how it was developed, its novel features, how we used it for a large-scale school study (N = 1491), and directions for its future development.

OS-20: Cross-sectoral interorganizational networks and complex challenges

Location: Room 106 Session Chair: Robin Lemaire Session Chair: Remco Stefan Mannak

Hidden Patterns or Interwoven Connections?: An analysis of service domains and substructures in purpose-oriented networks

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Purpose-oriented networks (PONs) are interorganizational networks working collectively to address complex challenges. PONs are often comprised of organizations from different sectors and service domains. Research to date has examined the structure of such networks, but determining effective structures for PONs is complicated as these networks vary in context, purpose, size, etc. In addition, the study of these network structures tends to focus on the whole network structure, assuming a uniform structure despite the diversity of service domains represented in the network. This study is an analysis of the structural subgroups present in PONs guided by the question of whether service domain explains any subgroup clustering. We analyze five different PONs that vary in purpose and stage of network development, but all aiming to connect organizations from different service domains. We employ the Markov clustering function to identify any clustering of subgroups. The algorithm deduces the number of clusters based on the structure of the network by partitioning it into non-overlapping clusters. Unlike more recently developed community detection methods, the Markov clustering method is well suited to small datasets and thus an appropriate method for analyzing PONs. It detects indirect ties or communities that may not be detected through clique-detection algorithms. We analyze the results of the clustering analysis to examine whether we find patterns of subnetwork clustering related to service domain across different networks. We discuss the implications of our findings for advancing research on PON structure and the challenges of connecting multiple service domains.

Benchmarking large inter-organizational networks for public value creation

<u>Remco Stefan Mannak</u>, Jörg Raab, Maksim Sitnikov Tilburg University, Netherlands, The

The present paper examines how large cross-sectoral inter-organizational networks that create public value can be benchmarked from a structural perspective. To this end, we study two publicly funded innovation programs aimed at stimulating collaboration between universities, research institutes, and industry partners. Both programs funded 1800-1900 projects in multiple industries over periods of 6 and 24 years, with projects averaging 4-5 participating organizations. Through overlapping participation in other projects, organizations often form very large system-oriented networks in areas such as Agri & Food, Energy Transition, or Delta Technology. In these networks, information exchange between projects and information flows between organizations take place, which are usually considered to be beneficial for the overall outcome of such policy schemes, especially if network structural features resemble a small-world network structure. Questions that interest us in this context are what their structural characteristics are, and how such networks differ across sectors, over time, and in particular, between the two innovation programs. Would both programs be equally successful in stimulating small-world networks (ERGM.multi), along with additional approaches (simulation/coefficient comparison), we distinguish generic network patterns from industry/year-specific network characteristics.

Between social and medical care: Collaborations in an interorganizational network of social workers and medical professionals in Groningen, The Netherlands

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Effective collaboration between health care and social service organizations is essential for addressing complex challenges, particularly in cases involving vulnerable populations. While interprofessional collaboration between organizations offers significant advantages, professionals tend to collaborate primarily within their own disciplinary boundaries, leading to segmented organizational network structures. This study examines the collaborative network structure of organizations involved in providing comprehensive multidisciplinary care for individuals with mild intellectual disabilities facing planned or unplanned parenthood in Groningen, the Netherlands.

We collected data on 785 collaborative ties of 142 professionals working in 109 health care and social service organizations participating in a local interorganizational network initiative aimed at enhancing cross-organizational collaboration. Data were gathered at both the professional and organizational levels, allowing for a detailed analysis

of the network's multilevel structure. Our study seeks to understand professionals' satisfaction with their collaborations on this issue and to model how collaborative reachability, frequency, and satisfaction shape the interorganizational network.

At the organizational level, we employ Exponential Random Graph Models to investigate the micro-processes driving the interorganizational network's structure. At the professional level, we collected additional data on satisfaction, reachability, and collaboration frequency. Preliminary findings indicate that medical and social care professionals exhibit distinct collaboration preferences, with reachability playing a more significant role in shaping collaborative satisfaction among social care professionals than among medical professionals. The analysis of the interorganizational network structure is ongoing and will be presented at the session.

Mutual aid, localisation, and crisis leadership in Sudan: a network analysis

Max Kelly, Pheobe Downing

Centre for Humanitarian Leadership, Deakin University, Australia

This paper presents preliminary results from a social network analysis of international and local partnerships in the Sudan humanitarian response, as part of a broader mixed methods research project examining Sudanese crisis leadership and mutual aid.

Using Gephi for network analysis and visualisation, the study maps relationships between key international and local actors in delivering humanitarian response in the current humanitarian crisis in Sudan. Analysis focuses on funding and resource flows, decision-making and autonomy (e.g. degree of control over how resources are used), and gatekeeping functions (who are the key brokers within the network). A key preliminary finding is that that informal and grassroots actors, including emergency response rooms, which are driving the frontline provision of urgent humanitarian aid, are over-reliant on larger 'gatekeeping' organisations which receive the bulk of international funding. In foregrounding Sudanese expertise and crisis leadership, the study highlights failures of the international humanitarian system to shift power and resources to 'local' actors, a key aim of international humanitarian policy, since 2016.

The study offers a more nuanced understanding of Sudan's mutual aid and civil society response. By amplifying Sudanese voices and knowledge, this research enhances global discussions on humanitarian leadership and partnerships, advocating for more effective and locally driven crisis response. The paper highlights the unique perspective SNA analysis can bring in complex humanitarian settings, as well as some challenges and experiences of SNA in this context.

OS-40: Network Approaches to Political Dynamics

Location: Room 107 Session Chair: Tod Stewart Van Gunten Session Chair: Guillermo Romero Moreno

Political Learning and Misleading Information: An Agent-Based Model Approach to Political Information Dynamics

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The political information ecosystem has evolved significantly, with the internet and social media fundamentally transforming how political content is consumed and how beliefs are formed. Social media platforms have become central to political engagement, reshaping access to information and patterns of interaction. While these platforms democratize access, they also present challenges. Algorithmic filtering and personalized content creation contribute to echo chambers and belief polarization. Although only a small subset of individuals consumes highly distorted information, social media amplifies bias and misinformation, reinforcing users' preexisting beliefs through content curation and recommendation algorithms. This study examines how these dynamics contribute to political polarization and the spread of misinformation within social media environments.

This research investigates how cognitive biases influence evaluations of information credibility and how social networks shape belief polarization and resilience against misleading information. It also explores whether social networks mitigate the risks posed by misleading information. The study employs agent-based modeling (ABM) to simulate and analyze individual behaviors, social networks, and information dissemination, emphasizing that political learning is nonlinear and shaped by complex interactions.

ABM effectively models the recursive nature of political learning, capturing emergent patterns from micro-level interactions among agents (e.g., citizens, media, and opinion leaders). This approach allows for an in-depth analysis of how cognitive biases and network structures influence political information processing. The study also examines how social networks may counter misinformation, demonstrating that strong networks with active communication can foster consensus, even in the presence of adversarial actors spreading disinformation.

The study begins by modeling individual-level political learning, incorporating the effects of cognitive biases on source credibility evaluation. It also examines how citizens navigate the 'exploration' versus 'exploitation' dilemma in the learning process. By placing agents within different social network structures, from elite-dominated information markets to homophilous citizen networks, the study explores conditions under which misleading information can be curtailed. Additionally, it introduces a novel type of disinformation provider, whose goal is to disrupt citizens' understanding of political reality and hinder consensus-building.

Simulation results indicate that second-hand learning within social networks can mitigate belief polarization, particularly in homophilous networks, where individuals share similar political beliefs. When disruptive agents attempt to manipulate information, citizens within well-connected, resilient networks demonstrate greater resistance to disinformation. However, in fragmented networks, individuals are more vulnerable to misleading content. These findings underscore the importance of social structures in shaping belief systems and public opinion.

In conclusion, this study contributes to political communication and computational social science by demonstrating how agent-based simulations provide insights into the complex interactions of individual behaviors and macro-level network effects. It also highlights practical implications for designing interventions to counter misinformation and strengthen public discourse in the digital age. The research emphasizes the need to integrate psychological and social dimensions to foster a well-informed public capable of navigating the modern political information ecosystem.

All Roads Lead to the DRC? Measuring Geopolitical Importance Via Materials Supply Chains

Margaret Jenkins Foster, Philip Potter

University of Virginia, United States of America

That the international economic and political systems are interdependent, multilayered, dynamic networks is well understood—theoretically. However, the complexity of assembling such networks means that the research landscape remains fragmented, with focus on modeling the contributions of specific elements of the system, such as the geopolitical implications of the supply chain network for final goods (e.g., fabricated microprocessors) or of single classes of actors (e.g., firms local to countries or regions, states entering into alliances). These limitations are understandable: expanding the scope requires identifying, extracting, and modeling data that is historically outside the purview of social sciences. However, in a world of globe-spanning interconnected supply chains, the effort allows scholars to understand the emergent topology of the network of flows and dependencies.

We push the frontier of existing work by extracting multiple levels in the global supply chain of 15 materials central to a geopolitically important supply chain (advanced microelectronics). We build a multiplex data network by tracing these materials from extraction through multiple processing steps to trade of the final products. We use this data to produce a dynamic network model that captures the evolution of political leverage within the global microelectronics supply chain—a critical domain for international relations. In doing so, we identify how states exploit strategic positions within these networks over time in response to external political pressures and opportunities.

Our approach extends beyond the domain of supply chain mapping to model the relational processes through which geopolitical power is exercised and contested. By comparing our dynamic network measures against traditional models of interdependence, we demonstrate how advances in data accessibility and network methodology allow scholars to produce deeper insights into evolving patterns of political leverage. We can extend our methodological framework to other contexts in which complex political dynamics emerge from multiple interconnected networks.

An Interpretable Measure of Group Polarization

Yunkyu Sohn Seoul National University, Korea, Republic of (South Korea) I propose an interpretable measure of multi-group polarization for binary choice profiles from a first principle and minimum assumptions. The proposed measure is explicitly defined as the average probability that a single vote helps infer the voter's group label. This is in a stark contrast with current practices of using group polarization measures that are computed from estimates obtained by complicated estimation procedures with strong assumptions on data generating processes, relying on each researcher's discretion to determine an estimation model, the number of dimensions, and the scale of the measure. As a result, a direct interpretation of the level of polarization and comparison between data sets have been difficult. Thanks to its tractability, I derive the proposed measure's characteristics and examine its performance over axiomatic features of group polarization. The proposed measure uncovers aggregate patterns of party polarization in the United States House of Representatives during the modern and contemporary Congress.

China Watchers vs. China Government on Social Media

<u>Franziska Barbara Keller</u>

University of Bern, Switzerland

Social media platforms like Twitter (now X) have provided an interesting arena for debates about topics like China, because producers of knowledge (political experts) and their subjects (politicians and governments) interact with each other on a relatively equal footing, limited and enabled by the same platform affordances. There has been an upsurge of research on Chinese government activity on social media lately, but no similar interest in the activity of China Watchers.

But the activity of China experts on Twitter may grant insights into how expert interactions and debates contribute to the knowledge production about authoritarian regimes and how political experts interact and compete with other actors who try to shape that discourse. This paper thus presents a description of the Twitter conversation of almost 1000 China experts worldwide since 2008, analyzing over 5 million posts. It reports on their online interaction with each other, with the general audience, but also with roughly 1000 accounts controlled or associated with government of the PRC. The China Watchers were selected through a snowballing nomination process, in which China experts were asked to nominate peers. The government accounts were included if 10 Chinese government accounts already in the list followed the given account.

A monthly sentiment analysis shows that sentiment towards China has steadily soured among China experts over time, with a predictable drop during the early months of the Covid-19 pandemic. The same measure among PRC government accounts, once very similar back in 2010, has soared. A diffusion analysis indicates that this sentiment towards China among China Watchers is contagious along the nomination ties.

Interactions between China Watchers and their government subjects on Twitter are surprisingly frequent. While it is more common for China Watchers to reply or mention Chinese government accounts around 16'000 times in this dataset, the latter do reciprocate. However, they appear to mention and reply to them mainly to express criticism with the China Watcher community: the sentiment expressed in these tweets is significantly more negative than those in their other tweets.

China Watchers that interact with the Chinese government are a specific group of China experts: they tend to be journalists, public intellectuals writing Op-Eds or individuals who have also held positions in the government or served as advisers. There is in general only a weak correlation between standing within the China Watcher community (i.e. the number of nominations received) and being mentioned or replied to by the Chinese government.

The paper also examines the role of accounts that appear to be ordinary Chinese or foreign citizens, but for some reason are being followed by at least 10 official accounts. They are retweeted frequently by official Chinese government accounts, who may try to pushed them as alternative China experts.

Finally, it examines changes since Elon Musk has taken over Twitter: have China Watchers remained on the platform or move on to other platforms? Do they post differently and interact with different individuals, and has their interaction in particular with the PRC accounts changed in any way?

Cross-Talk in Political Networks: Dynamics of Online Engagement and Amplification

Ahana Biswas, Yu-Ru Lin

University of Pittsburgh, United States of America

Political communication on social media is shaped by networked interactions between elites and the public. While cross-partisan discussions have the potential to foster dialogue, they also risk reinforcing polarization through

incivility and selective amplification. We leverage a large-scale longitudinal dataset of over 1.1 million interactions between U.S. legislators and their audiences on Twitter/X from 2020 to 2021 to examine the networked dynamics of cross-party engagement. By analyzing retweets, replies, and mentions as evolving relational structures, we reveal asymmetries in how political actors and audiences engage across party lines. Our findings indicate that Republican legislators experience increased engagement when amplifying Democratic content, while Democrats see a decline in visibility for similar actions, highlighting party-specific audience dynamics. We further analyze the posting styles associated with the visibility of cross-talks. For instance, incivility in cross-party replies increases visibility for Republicans by 12%. Furthermore, we reveal how engagement on cross-party interactions influences the likelihood of future bipartisan discourse, suggesting that political elites may adjust their strategies based on audience responses. Our study offers one of the first longitudinal examinations of cross-party interactions, providing new insights into the self-reinforcing nature of political networks. By integrating temporal analysis, engagement dynamics, and discourse quality, we contribute to the understanding of how political polarization manifests through networked interactions and identify key mechanisms that shape the long-term trajectory of bipartisan communication. Our findings have critical implications for platform governance, media strategies, and efforts to foster more constructive political discourse in online spaces.

OS-127: Corporate Networks 4

Location: Room 108 Session Chair: Roy Barnes Session Chair: Mohamed Oubenal Session Chair: Roberto Urbani

Network Centrality and Economic Shocks: The Impact of COVID-19 on Japanese Firms

<u>Hideki Fujiyama</u> Dokkyo University, Japan

Our study examines the impact of COVID-19 on the Japanese economy through a multi-faceted corporate network analysis, including director interlock networks, director dispatch networks, and shareholding networks. Our previous research demonstrated that corporate profitability exhibited both positive and negative correlations with centralities, and that the relationship varied depending on different centralities. Motivated by these findings, we investigate how the shocks caused by COVID-19 vary depending on a firm's network position, as measured by various centralities. To conduct this analysis, we utilize data from listed companies in Japan, covering approximately 3,800 firms per year for six years (2014, 2016, 2018, 2020, 2022, and 2024). For empirical analysis, we identify structural changes using dummy variables. Firms are divided into two groups based on centrality—the top 25% and the rest—to examine differences in the impact of the economic shock. We employ an approach similar to the Difference-in-Differences (DiD) method: Before the pandemic, firms with high and low centrality had a profitability gap; after the pandemic, a gap also existed. We compare these differences before and after the shock. Our results reveal that firms in the top 25% of Bonacich power centrality in the director dispatch network experienced a significant decline in profit levels. These findings suggest that while corporate networks support firms either positively or negatively under normal conditions, they also serve as channels that amplify economic shocks during crises, as seen in the director dispatch network.

Networked Varieties of Capitalism: Inferential network analysis of regulatory impacts on FIRE-to-Industrial corporate networks

Rashid Carlos Jamil Marcano Rivera

Universidad de Puerto Rico, Puerto Rico

This paper analyses how post-2008 financial regulatory measures potentially influence the shareholder networks linking Finance, Insurance, and Real Estate (FIRE) sectors to industrial sectors across distinct Varieties of Capitalism (Liberal, Coordinated, Mixed, State, and Hierarchical Market Economies). Using inferential network models on data covering the period from 2007 to 2019 (and in some cases to 2022), I explore whether regulatory tightening shapes the formation and dissolution of financial-to-industrial shareholder ties. Initial findings (Marcano Rivera, 2023) timidly suggested the presence of differentiated regulatory effects on network structures, but computational capacity limited conclusive results. By incorporating modelling changes and narrowing down the analysis to key sectors of the economy in lieu of the prior all-encompassing approach, the paper proposes to reveal cross-national variation that policymakers must consider in designing sector-specific regulatory strategies.

Ownership Structure as Succession Strategy: Isomorphic Differentiation of the Korean Chaebol Min Woo JO

Seoul National University, Korea, Republic of (South Korea)

The primary objective of this research is to empirically verify whether corporate ownership structure can serve as an instrument for family succession, based on data from Korean chaebols. Chaebols are big business groups in Korea, characterized by a hierarchical-pyramidal ownership structure with numerous affiliated firms. A well-known feature of this structure is that family members of the group's founder (or president) typically occupy the highest positions of the pyramid. The primary rationale behind adopting this hierarchical-pyramidal structure is believed to be its effectiveness in amplifying the controlling family's influence over the entire affiliations.

Existing studies on chaebol ownership structures have predominantly focused on their isomorphic characteristics. However, these studies have overlooked the possibility of variation and differentiation within these ownership structures. Since chaebols are family-controlled business groups, there can be considerable diversity in the principle of family and the logic of successions. For instance, in some chaebols, multiple candidates may compete for succession, whereas in others, a successor may have been designated at an early stage. If all family-controlled business groups are treated as a single homogeneous category, such nuanced dynamics may be overlooked.

Thus, unlike previous studies that have treated the family as a single node in ownership structure network analyses, this study categorizes families into several subgroup categories to examine the structure in greater detail. The analysis employs stochastic block modeling (SBM), which allows for consideration of interchangeability or substitutability among family members. The findings suggest that chaebol ownership structures exhibit "isomorphic differentiation." Specifically, while ownership structures are fundamentally isomorphic, 'Owner-centered hierarchy', they can be classified into five distinct types. These five types appear to be closely related to different succession strategies.

This study contributes to research on family business and corporate sociology by empirically demonstrating that ownership structure and succession strategies can be interconnected. Moreover, it offers valuable insights for comparative studies on corporate structures across different national contexts.

Profit above us: Mapping networks of the 'New Space' economy

<u>Diliara Valeeva</u>

University of Amsterdam

The outer space industry is rapidly evolving into a trillion-dollar sector, driven by significant investments from major tech enterpreneurs and companies. This transformation marks the beginning of the so-called 'New Space' era, characterized by the emergence of profit-oriented space activities such as tourism and travel, communications and surveillance, and asteroid mining. Despite its rapid growth, the key players shaping this burgeoning industry remain underexplored. This paper identifies and analyzes these key actors, focusing on the networks of lobbying and interest groups, as well as the constellation of tech and business elites that surround them. Furthermore, the study examines the discourse promoted by these actors concerning space commercialization and its connection to pressing global issues, including space colonization, the increasing dominance of technology in society, and the intertwined challenges of climate change and diminishing terrestrial resources.

Social Class, Marriage Network and Corporate Elite Mobility: Analysis of Corporate Chairperson's Tenure and Turnover in Taiwan

Zong-Rong Lee

Academia Sinica, Taiwan

Sociological research on corporate elite mobility has often highlighted business families' social networks especially marital ties with other controlling families—as key strategies for maintaining dominance and corporate control, as well as their collective interest as a upper class primary group. However, few studies have examined how these marital networks help sustain their organizational influence in contemporary market capitalism over time, largely due to the challenge of systematically collecting kinship data. This study analyzes data from over 800 publicly listed Taiwanese companies over four decades of observations (1981–2020, N=21,089) and maps the kinship and marital networks of controlling families. Using statistical analyses of chairperson tenure and turnover, it tests core arguments of social class perspective. Taiwan, with its market continuously dominated by family businesses and its rapid post-war economic development, serves as a suitable empirical case for testing these theoretical propositions. The analysis focuses on the effects of intermarriage among business families and whether elite status and corporate profitability moderate these effects. By illuminating the role of informal networks such as marriage in affecting elite mobility, this study advances contemporary research on corporate elites.

OS-194: Social Networks and Climate Change 3

Location: Room 109 Session Chair: David Benjamin Tindall Session Chair: Mark CJ Stoddart Session Chair: Paul Wagner

A Longitudinal Analysis of Climate Change Discourse Coalitions over 28 years of United Nations COP Meetings

Mark Shakespear

University of British Columbia, Canada

This paper examines how discourse coalitions and conflicts of nation-states at UN COP conferences have changed over time, and consider how this relates to changes in global political economy. My dataset consists of over 2,300 speeches by nation-state representatives from COP1 in 1995 to COP28 in 2023, compiled from United Nations archives and national government websites. In these speeches, representatives highlight important issues they see as relevant to climate change, their recent and planned climate-related actions, and the COP process and their participation in it. I use topic modelling to identify distinct climate-related topics, and groups of nation-states adhering to these topics at different times. I analyze points of convergence and conflict throughout nearly three decades of the UNFCCC process, and consider how these relate to changes within countries and across the global political economy, with particular focus on comparing how the discourses of developed, developing, and BRICs countries change over time.

How Sources and Framing Strategies Shape Network Dynamics in Climate Skepticism Discourse: An Exponential Random Graph Model Approach

<u>Sejung Park</u>

Pukyong National University, Korea, Republic of (South Korea)

Misinformation, disinformation, and fake news about climate change are widespread on social media. Climate skepticism can be contagious as climate change is not just an environmental issue but also intertwined with social, political, and economic concerns. Alerting messages from climate change deniers, labeling it a "climate scam," have fueled conversations on social media. However, the mechanisms driving social connectivity and information dissemination in climate skepticism discourse remain understudied. This study addresses this gap by examining how source characteristics and message framing strategies shape user interactions in the climate skepticism network, employing a mixed-method approach that integrates an Exponential Random Graph Model (ERGM) and content analysis. The model includes source attributes, distinguishing between individual and organizational accounts and classifying individuals as celebrities or non-celebrities. Dominant framing strategies in skeptical conversations are included as edge attributes. The homophily effect is tested to assess the likelihood of conversational tie formation between similar sources, while clustering effects are analyzed to determine whether specific sources and framing strategies drive network cohesion. X network data on "climate scam" from January 1 to March 1, 2024, was collected and analyzed. The unit of analysis consists of 19.872 unique users and 53,103 conversational ties, forming a directed network. Preliminary findings indicate that the network exhibits a smallworld structure with high clustering. The dominant framing strategies are conspiratorial, political, and scientific. This study enhances understanding of the generative processes behind opinion formation and echo chamber effects in climate skepticism, shedding light on their potential role in climate policy opposition.

Interpretable Early Warnings using Machine Learning in an Online Game-experiment

Guillaume M. Falmagne

Princeton University

The solutions to environmental crises are known, but social dilemmas illustrate what stands in the way of implementing them : actors free-ride on ecosystem health benefits, even those who deteriorate these ecosystems.

Mechanisms to reduce defection in social dilemmas have been proposed, but are often limited to small groups whereas socio-environmental crises require global systemic cooperation. I propose the CORESO/COOLNET project to discover, using video games, what structures of social interactions at all scales can foster such cooperation. To this end, we will build a common formalism for the driving mechanisms of cooperation already proposed, as well as for new ones that we will explore. Large-scale processes are difficult to study in a traditional laboratory, or insitu without experimental control. We will develop an massively multiplayer online game as an experimental platform for large-scale cooperation. This will allow to test, in particular, the effect of emergent phenomena such as positive social tipping points and of multi-layer network structures on global cooperation. Depending on our results, we could transfer these results to public policy recommendations, in the form of cheap top-down interventions favoring bottom-up emergence. We will also adapt the game into a local governance workshop to guide collective decision-making.

OS-205: Spatial and Geographic Social Networks 3

Location: Room 112 Session Chair: Clio Andris Session Chair: Zachary Neal Session Chair: Paul Schuler Session Chair: Gil Viry

Urban highways are barriers to social ties

Luca Maria Aiello¹, Anastassia Vybornova¹, Sandor Juhasz^{2,3}, Michael Szell¹, Eszter Bokanyi^{4,5}

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Urban highways are common, especially in the US, making cities more car-centric. They promise the annihilation of distance but obstruct pedestrian mobility, thus playing a key role in limiting social interactions locally. Although this limiting role is widely acknowledged in urban studies, the quantitative relationship between urban highways and social ties is barely tested. Here we define a Barrier Score that relates massive, geolocated online social network data to highways in the 50 largest US cities and which captures the connectivity difference between the actual network and a randomized null model. As such, at the unprecedented granularity of individual social ties, we show that urban highways are associated with decreased social connectivity. This barrier effect iis especially strong for short distances and consistent with historical cases of highways that were built to purposefully disrupt or isolate Black neighborhoods. Using multivariate regression models at the census tract level, we confirm that decreased social connectivity related to the presence of highways holds even when accounting for confounding factors such as socio-demographic backgrounds, or other types of barriers. By combining spatial infrastructure with social tie data, our method adds a new dimension to demographic studies of social segregation. Our work can inform reparative planning for an evidence-based reduction of spatial inequality, and more generally, support a better integration of the social fabric in urban planning.

"Neighbors" and "more-than-neighbors" in personal networks: Analyzing local relational dynamics through activity contexts

Lydie Launay

University of Toulouse, France

Although neighborhood relations are omnipresent in debates on the intensification of urban segregation in cities, few studies compare them to other types of social relationships and circles (family, friends, professional, associative, etc.), whether they are locally based and/or extend to other areas. However, as Barry Wellman pointed out as early as 1979, taking social networks as a starting point allows us to connect relationships shaped by residential contexts to the overall structure of personal networks analyze their role in network formation, and assess their impact on access to various resources.

The research underlying this presentation studies the spatial dimension of social segregation, using the conceptual and methodological approaches of social network analysis. More specifically, it compares relational contexts with local activity contexts to examine the place and role of neighbourhood relationships in networks to see whether and to what extent these relationships participate in the formation of "entre-soi" (understood as a sociability that is both homogeneous and cohesive), which primarily takes place within shared activities (education, work, etc.). The aim is to expand on the results of a previous questionnaire survey in which we were able to distinguish between

two types of local relationships: relationships created with "neighbours" and those formed with what we call "morethan-neighbours", and those beyond the local space. It has also highlighted the importance of activity contexts, beyond mere geographical proximity (work, friend groups, associations, etc.) - in reinforcing the homogeneity and cohesion of personal networks. However, quantitative data did not allow us to study precisely each of these local relational contexts and how they interact. It also did not distinguish between formal and informal sociability, nor between individual and collective relations.

Based on an ongoing qualitative study conducted in a neighborhood in Toulouse (France), this presentation proposes a more detailed and dynamic analysis of the plurality of activity contexts in which local relationships are embedded, as well as their interconnections. The goal is to understand how these relationships are formed, maintained, and evolve over time, and to what extent they contribute to either social homogeneity or openness. Interviews with residents and discussions based on the visualization of their network have enabled us to draw up sociological portraits revealing different relational dynamics depending on the type of relationship, social circles and also ego characteristics. These first results provide new insights into the interplay between "structural" homogeneity (linked to the neighborhood's social composition) and "elective" homogeneity (driven by affinity-based ties) within personal networks.

BrainSpill: A Network for Inclusive and Fair Academic Collaboration

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The academic research ecosystem has long been shaped by systemic inequities, favoring scholars with access to well-funded institutions, elite networks, and dominant publication platforms. As a result, knowledge production and dissemination remain concentrated among a privileged few, reinforcing epistemic hierarchies and limiting diverse contributions. In an era of geopolitical shifts and the rapid advancement of Generative AI (GenAI), new opportunities emerge to rethink how academic collaboration is structured.

This study suggests to employ a mixed-method approach – combining qualitative insights from interviews with a quantitative social network analysis to identify key structural barriers faced by researchers from underfunded institutions. By mapping these obstacles, we aim to understand how digital inequalities, funding constraints, and Al-driven changes affect academic participation. Based on these findings, we propose BrainSpill, a prototype social network platform designed to foster inclusive, decentralized knowledge exchange. This tool seeks to mitigate existing disparities by leveraging Al-driven matchmaking, open-access collaboration tools, and reputation mechanisms that promote fair participation.

Our work contributes to the discourse on equity in academia by offering actionable solutions to bridge the gap between privileged and underrepresented researchers, ultimately advocating for a more inclusive and globally connected research landscape.

The Geopolitics of Knowledge in Connection: Cross-country Collaboration Networks in Anglophone Sociology Journals (1966-2018)

<u>Xuewen Yan</u>

University of Texas at Austin, United States of America

Recent scholarship has increasingly examined global disparities in academic production between central and peripheral regions. Empirical studies highlight inequalities in research impact, Anglophone publishing bias, linguistic barriers, and North-South divides in the generalizability of knowledge claims. On the theoretical and political front, "decolonizing knowledge" has gained traction across disciplines, including sociology, as scholars interrogate the institutional and epistemological underpinnings of these disparities. This study applies insights and tools from social network analysis to examine between-country collaboration networks in sociological publishing. As a first step, I analyze co-authorship patterns in two US-branded but globally prestigious journals—American Sociological Review (ASR) and American Journal of Sociology (AJS) (1966-2018), assessing the geographic distribution of authors and their institutional affiliations. Findings reveal that the U.S. is an absolute star in this network, with nearly all international collaborations involving U.S.-based institutions. Only three countries have ever published independently in ASR/AJS without U.S.-affiliated co-authors, while Austria is the only case of international collaboration without a U.S. tie. Frequent U.S.-linked collaborators include developed countries like Canada, the UK, Germany, and Israel, while Global South countries are largely absent. European nations form the only visible non-U.S. collaboration cluster. As a next step, I will apply Borgatti's core/periphery model to quantify network centrality of each participating country and extend the analysis to British Journal of Sociology (BJS),

Sociology, Journal of Sociology (JoS), Current Sociology (CS), and International Sociology (IS) to assess whether these non-U.S. flagship journals exhibit more globally inclusive patterns.

OS-89: Social Networks, Spatial Context, and Innovation

Location: Room 114 Session Chair: Robert Panitz Session Chair: Johannes Glückler

Close and connected: integrating social networks and geography of innovations to analyse the diffusion of energy technologies

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Innovative energy technologies are key for the energy transition, but a broad uptake in society is still missing. The diffusion of innovations literature claims that network characteristics and geographical proximity support interpersonal communication that diffuses innovations in society. Both social network analysis and the geography of innovation propose that a balance of diversity and closeness is needed for innovation but their approaches have not been fully integrated. While social network studies focus on the characteristics of actors in the network and their degree of connectivity and diversity, the geography of innovations pays attention to the spatial distance between organisations and complementing geographical proximity with other dimensions.

This work integrates these two fields by measuring different proximity dimensions in the networks formed by successful information exchanges leading to the diffusion of energy technologies in Switzerland. By surveying 157 professionals and 3,000 adopters, we analysed the interactions of cognitive, organisational, institutional and social proximity with geographical proximity and theoretically connected the results with diversity and connectivity.

Our findings show that the networks among professionals have low geographical proximity and connected actors are very homogeneous. Networks between professionals and adopters are, on the other hand, more geographically proximate and diverse. Finally, networks among adopters and personal contacts show the highest geographical and social proximity. When aligning the geography of innovation's proximities with the diversity and connectivity concepts of social network analysis, networks progressively rely more on connectivity-based dimensions the further they are in the innovation-diffusion process.

Dynamic multiscale analysis of actor networks involved in the management of protected natural areas. Study of two Unesco world heritage sites of Massif Central (France).

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The aim of this paper is to present a framework for analyzing the effects of actor coordination modalities on the management of protected natural areas that lead to valorize its outstanding values. This framework consists of carrying out social network analyses on the scale of the governance of these areas and on the scale of business networks. We apply this framework to two UNESCO World Heritage sites of Massif Central (France): the Chaîne des Puys - Limagne fault tectonic arena and the Causses and the Cévennes, Mediterranean agro-pastoral Cultural Landscape. Relational data were collected by sociometric interviews (131) with actors involved in the governance arrangements (institutional actors) and in the valorization arrangements of the recognition outstanding value of the goods (private actors, mainly from the tourism sector). These data are longitudinal (3 to 5 periods), multiplex (6 to 11 types of links), and characterized by several variables (frequency, quality, purpose, personal and/or professional). The results highlight the social and organizational innovations along with the geographic and organized proximity dynamics that lead to changes in the centrality of actors and in the overall structure of networks (increased density and reciprocity), that have direct impacts on the management of protected natural areas. Beyond the qualitative explanations of the descriptive results of the global network structure and the positioning of the actors, we aim to improve the explanatory power of the quantitative relational data through stochastic and dynamic networks analyses. Finally, we discuss the interest and limitations of our analytical framework, and then outline research perspectives.

Growing together or staying separated? The case of interlocking directorates in financial and automotive industries

Robert Panitz, Bernd Wurpts

University of Koblenz, Germany

For many years, researchers in organizational studies and management studied interorganizational networks through interlocking directorates. Scholars examined the causes and consequences of such corporate networks including processes such as the diffusion of innovations, the behavior of corporate elites, and strategies for avoiding competition. Researchers have also highlighted the effects of interlocking directorships in various industries on foreign direct investment, international expansion, and relocation decisions. While much of the existing literature looked at the consequences of globalization on corporate behaviors, and the cohesiveness of the business community, there is a gap in research that addresses recent technological changes and how the business community responded to innovative and powerful newcomers. How did the rise of new technology companies impact corporate networks in established industries?

We focus on the automotive industry and financial services and explore how established companies, such as traditional automotive manufacturers and banks, utilize interlocks to connect with new competitors, such as electric vehicle producers and fintech firms, which are developing innovative business models and technological solutions. In this paper we mainly focus on financial service firms and use the automotive industry as a reference point. We examine how the network positions of these companies evolve over time and investigate their connectivity. By utilizing a global database of interlocking directorates, we monitor these developments across international borders and over time. Methodologically, we apply various measures of centrality and segregation.

We contribute to the ongoing discussion regarding interorganizational interlocking directorates as tools for strategic positioning in dynamic markets and environments. Ultimately, we seek to provide insights into whether interorganizational interlocking directorates are systematically utilized to evaluate potential new competitors and their technological innovations.

4:00pm - 4:20pm

Regional Difference in Socioeconomic Assortativity of Acquaintanceship Ties

Zhiyi Jin^{1,2}, Michał Bojanowski², Miranda Lubbers², Christian Steglich¹, Marijtje A.J. van Duijn¹ ¹University of Groningen; ²Autonomous University of Barcelona

Over the past decades, economic crises, technological changes, demographic shifts, and migration flows have exacerbated the wealth gap between different social groups in Europe. From a social network perspective, the root of this inequality lies in the segregated network structure, known as assortative mixing, where nodes in networks tend to be connected to other nodes that are similar to them in some way. One type of such is the assortativity observed along the socioeconomic dimension. The causes of this socioeconomic assortativity are debated. It may stem not only from individual preferences but also from the opportunities available to individuals. To this end, this study examines the observed assortativity in acquaintance networks and seeks an answer to the question of to what extent preferences or opportunities drive it.

This study uses Spain – with its decentralized autonomous community system and diverse geographical and economic regions– as a case study. By analyzing aggregated relational data on the composition of acquaintanceship networks and the regional opportunity structures, the findings reveal significant regional variation in socioeconomic assortativity patterns. Moreover, individuals with low socioeconomic status exhibit stronger socioeconomic assortativity in densely populated areas, while individuals with high socioeconomic status maintain ties with peers in similarly prestigious occupations, regardless of their local context. This inequality can also be exacerbated in some regions with better economic conditions. The results disclose the role of SES-based heterogeneity in reinforcing inequality through tie formation, shedding light on how regional contexts can shape broader patterns of social structure.

4:20pm - 4:40pm Socio-spatial contagion for renewable energy technologies Javier Borge-Holthoefer Universitat Oberta de Catalunya, Spain The process of novelty adoption –technologies, medicines, cultural trends, or behaviors– relies on the interplay of individual decision-making and the structural properties of the underlying network. However, innovation adoption and social contagion have seldom been embedded in space, and much less so in cities. Taking solar energy infrastructure adoption as a spatially mediated diffusion process, this contribution proposes to model how individual behaviors –the decision to go solar– aggregate into city-wide patterns. To this end, we develop an adoption model that blends complex social (e.g., threshold-based) and spatial contagion models to mimick the process of rooftop solar panel installation in residential areas. Besides the possible social and spatial drivers, these models account as well for local governments efforts to incentivize rooftop solar panel installation, i.e. tax reductions and rebates, which represent a global (and, in this sense, a "non-spatial") stimulus to the spread of this particular innovation. Finally, the model is confronted with empirical data. This is done collecting public data on solar panel installation, together with cadastral GIS data, and training a computer vision classifier to recognize the presence of solar panels on aerial imagery. Applying this machinery to longitudinal data (2010-2023), we are capable of validating the proposed framework and proceed to answer important questions, such as which are the potential targeted strategies to amplify solar energy adoption, or under which circumstances innovation diffusion is the result of socio-spatial pressures, ore else policy-driven (incentive) process

OS-219: Social networks in the older population 2

Location: Room 116 Session Chair: Lea Ellwardt Session Chair: Paula Steinhoff

Urban-Rural Area, Population Density, and Social Connectedness: Place-Based Differences in Older Adults' Social Networks and Interactions

<u>Maleah Fekete</u>¹, Tianyao Qu¹, Brea Perry¹, Siyun Peng¹, Adam Roth² ¹Indiana University, United States of America; ²Oklahoma State University

While the relationship between urban-rural spaces and social connectedness has long been a focus of sociological inquiry, recent social and technological changes as well as methodological innovations provide new motivation to consider how place influences sociality, especially among older adults. This study uses survey and ecological momentary assessment (EMA) data from 510 adults aged 55 and older in Indiana to investigate how area type and population density affect older adults' core social networks and momentary interactions. We find that population density and urban-rural area type produce parallel effects. Older adults residing in rural counties as well as counties marked by lower population density reported smaller, denser, and stronger personal networks compared to those residing in urban counties and counties marked by higher population density. Similarly, the momentary analysis reveals that individuals in urban areas and higher-density counties are more likely to interact with friends than be alone, whereas rural and lower-density county residents reported fewer interactions with friends. These findings extend prior research by (1) updating understanding of the relationship between place and social connectedness; (2) providing evidence of population density's role in shaping the social opportunity structure; and (3) providing evidence that opportunities to engage with new ties may be a key mechanism through which place shapes both momentary and stable interactions.

OS-213: Social Capital themed session 3

Location: Room 125 Session Chair: Heather McGregor

Walking school buses in the city of Ferrara. A qualitative analysis through social capital theory.

<u>Giuseppe Rocco¹, Susanna Mancinelli²</u>

¹University of Ferrara, Italy; ²University of Ferrara, Italy

Over the past seven decades, the private car has increasingly symbolized connectivity, social inclusion, and status, contributing to higher automobile usage. This trend has led to significant environmental, economic, and societal challenges, including increased greenhouse gas emissions, air and noise pollution, climate change, traffic fatalities, and health issues like obesity and physical inactivity. As a response, active transportation, especially walking, has gained prominence as a promising strategy to mitigate these concerns while providing community-level benefits, fostering social interactions, and building social capital. Europe's focus on sustainable mobility and children's physical health since the late 1990s has led to initiatives like Walking School Buses.

This study explores the barriers to full adoption and the challenges encountered by the Walking School Bus service in Ferrara. Using a qualitative approach, the research utilizes semi-structured interviews to collect data from municipal managers, school managers, and parents. Through thematic analysis, five key themes were identified: "social capital," "service considerations," "environmental sustainability," "service interactions," and "willingness to participate." These themes highlight the influence of parental social structure, parents' perspectives on the service, sustainability practices, factors guiding parental decisions, and reasons for low participation or service discontinuation. The findings provide valuable insights to inform policymakers and enhance the implementation of such services.

OS-73: Social influence

Location: Room 202 Session Chair: Andras Voros Session Chair: Robert W Krause Session Chair: Isabel Jasmin Raabe

Pathways of Peer Influence on Academic Achievement

<u>Tomáš Lintner</u>¹, René Veenstra², Klára Šeďová¹, Tomáš Diviák³, Lenka Kollerová⁴ ¹Masaryk University, Czech Republic; ²University of Groningen, Netherlands; ³University of Manchester, UK; ⁴Institute of Psychology of Czech Academy of Sciences, Czech Republic

Selection and influence processes play a key role in shaping how students group based on achievement. Previous research has documented both mechanisms at play in academic achievement, but most studies rely on self-reported grades rather than valid measures of cognitive ability. We argue that cognitive ability itself is not directly contagious among students. Instead, we hypothesize that the observed achievement clustering is driven by learning-related behaviors, such as classroom participation. To test this, we analyze a nationally representative sample of more than 2,000 Czech 6th graders and track their academic and behavioral changes over the course of a year. We use item response theory (IRT)-based cognitive scores in mathematics and Czech language at two time points, along with measures of classroom participation. We apply stochastic actor-oriented models (SAOMs) to examine both selection and influence processes in student networks. Preliminary results from multi-group SAOMs indicate that students exhibit selection and influence based on IRT-based achievement. However, when classroom participation is included in the model, it emerges as the primary factor driving selection and influence, while direct achievement-based effects diminish. These findings suggest that behavioral engagement in learning rather than cognitive ability determines academic clustering among peers. At the conference, we will extend our analysis using a random-effects SienaBayes model to further disentangle these dynamics and provide deeper insights into the social processes underlying academic success.

Stickiness of Educational Aspirations in the Face of Social Influence

<u>Anna Sokolova¹, Isabel Raabe²</u>

¹University of Mannheim; ²University of Zürich

Educational attainment plays an important role in shaping an individual's future career opportunities and overall life trajectory, and understanding disparities in educational aspirations provides valuable insights into educational inequality.

This study investigates how socioeconomic status (SES) moderates the influence of peers on children's educational aspirations. Past research has shown that adolescents' educational aspirations are largely shaped by their friends' aspirations. We employ the concept of "sticky expectations" — the tendency for high-SES children to maintain high educational aspirations irrespective of objective academic performance. In a novel approach, we integrate this framework with insights on peer influence to explore whether high-SES children are less susceptible to peer effects compared to their low-SES counterparts. Besides direct influence from friendship ties, we explore the role of parental expectations, migration background, and classroom composition in shaping educational aspirations.

We use the CILS4EU longitudinal school network data and apply Multilevel Stochastic Actor-Oriented Models (MSAOM) to study the dynamic interplay between educational aspirations, socioeconomic background, and social influence. MSAOMs allow us to separate selection and influence effects, providing a clear estimation of how peers affect educational aspirations while simultaneously accounting for endogenous network processes, the dynamic nature of the data and its multilevel structure.

Sergey Shvydun TU Delft, Netherlands, The

The concept of centrality is one of the essential tools for analyzing complex networks. However, the notion of importance can be defined in various ways, depending on the network's nature, the characteristics of its components, and the specific processes the researcher is exploring. Over the years, an enormous number of centrality indices have been proposed to account for different aspects of a network. Some of these measures are based on the number of links to other nodes in a network (e.g., degree or spectral centrality). Others assess how closely a node is positioned to other nodes in terms of distance, or how often it appears on the shortest paths connecting pairs of nodes. There are also centrality measures, which are based on ideas from information theory, cooperative game theory, voting theory, Dempster–Shafer evidence theory, multi-criteria decision-making, signal processing, physics, biology, geometry and many other fields. Centrality measures are so vast and diverse that they resemble a zoo, with each model representing a unique species and exhibiting its own distinct characteristics and behaviors. In general, the choice of the most appropriate centrality measure depends on the type of a network and the interpretation of important elements.

Due to the large number of centrality measures available, a significant number of challenges have emerged, particularly in terms of selection, comparison, and validation of these models. First, many centrality measures remain unknown because the most extensive existing reviews are limited to just 50-70 measures. Second, access to many centrality models is limited, with even the most comprehensive libraries containing no more than 40 measures. Next, many models (including some classical centralities) are being reinvented rather than built upon, leading to unnecessary duplication. Fourth, many new measures are assigned the same name (e.g. the neighborhood centrality or the improved 'X' centrality), possibly due to a lack of awareness of existing models. Furthermore, new measures are often insufficiently validated, with comparisons typically limited to only 5-10 existing models, most of which are classical measures. Finally, the number of centrality measures is still growing exponentially, as both researchers and reviewers encounter significant challenges in effectively evaluating or comparing new models with existing ones.

Addressing this research gap, we examine 400 existing centrality measures across both artificial and real networks. First, although many centrality measures offer different interpretations and capture various aspects of network topology, a significant number of them may be highly correlated. Do we need all of these measures and how to choose k most uncorrelated measures? We perform the correlation analysis in order to identify relationships between different models. Our results demonstrate that many centrality measures of different nature are well correlated and that some comprehensive methods agree well with simple models. Next, since most real networks are partially observed, some centrality measures can be misused and lead to wrong interpretation. Therefore, we evaluate the sensitivity of centrality measures to small changes in the graph structure and identify centrality indices that are highly vulnerable to incomplete data.

"I believe this is my position" - football team formations from social influence processes

<u>Ulrik Brandes</u>, Hugo Fabrègues, Gordana Marmulla, Hadi Sotudeh

ETH Zürich, Switzerland

For some broadcasters of association football (soccer) matches it is a routine half-time feature to present average player locations as a proxy for their team's spatial organization. This is commonly referred to as the actual formation, in contrast to the tactical formation presented before the start of the match. Locations averaged separately over the movements of individuals are routinely, but misleadingly, found to suggest arrangements that are more compact than the tactical formations.

We model player movement as a social influence process in which players adjust their distances to tactical reference positions, other players, and the ball. By constructing an influence network from observed proximity relations and viewing average locations as positions in an opinion space attained at equilibrium, we obtain tactical reference positions from an inverse problem of opinion dynamics: instead of determining equilibrium opinions from given beliefs in the Friedkin-Johnsen model, we determine unknown beliefs (tactical assignments) from observed opinions (player locations).

OS-185: Qualitative Network Research: Understanding network dynamics 2

Location: Room 203 Session Chair: Laura Behrmann Session Chair: Theresa Manderscheid Session Chair: Benjamin Moles

Relational dynamics of couples' social networks

Cécile PLESSARD

Université Caen Normandie, France

When two individuals form a couple, they often share their daily lives and experiences; they also share, at least in part, their relational entourages. The literature has shown that the formation of a couple redefines the roles of each individual, leading to significant changes in relationships and networks. We can thus observe a dynamic of extension of one or both spouses' network, as well as a dynamic of withdrawal into the couple's network. Either way, the personal network of each spouse is modified.

Couple's sociability can be observed either through a network of couples interviewed together or separately, or through a personal network of just one of the spouses. If we apply a methodology that takes into account both individuals forming the couple, we obtain a complete picture of the network. In our work, a couple's network has been reconstructed a posteriori from the aggregation of the two personal networks collected. The results presented here are based on the analysis of ten duocentric networks combining the personal networks of the two cohabiting spouses interviewed separately. The study of these relational configurations questions the composition of a couple's network and its structure. They also reveal each spouse's position in the couple's network. Moreover, by observing the level of connection or disconnection of their respective alters, the analysis of these configurations enables us to grasp the extent to which the personal network of each spouse is dependent on the couple's network.

Resilient Networks: Examining Pandemic-Related Disruptions in Nutrition Service Delivery in Indonesia Using a Qualitative Social Network Approach

<u>Fatwa Sari Tetra Dewi</u>¹, Per-Joel Jönsson², Yosephin Anandati Pranoto^{2,3}, Tony Arjuna³, Julia Schröders² ¹Department of Health Behavior, Environment and Social Medicine, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia.; ²Department of Epidemiology and Global Health, Umeå University, Sweden.; ³Department of Nutrition and Health, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia.

The COVID-19 pandemic profoundly disrupted primary healthcare (PHC) systems worldwide, exacerbating preexisting health vulnerabilities. In Indonesia, where child malnutrition remains a persistent challenge, these disruptions have reshaped the structural and functional dynamics of healthcare delivery. This study employs a qualitative social network analysis (SNA) approach to explore how healthcare providers navigated disruptions, adapted service provision, and maintained critical networks in malnutrition care during the pandemic crisis. Using semi-structured interviews with healthcare staff from six PHC centers, so called 'puskesmas', in the Sleman Regency of the Yogyakarta Special Region, we analyzed pandemic-induced shifts in communication, coordination, and resource-sharing networks. Our analysis identifies three core themes: network disruptions (e.g., fragmentation of provider-patient communication, supply chain breakdowns, and weakened inter-facility collaboration), network impacts (e.g., reduced patient access, increased provider workload, and declining trust in healthcare institutions), and network adaptations (e.g., digital solutions for service continuity, community-based monitoring strategies, and strengthened inter-organizational linkages). Findings highlight the critical role of social networks in healthcare resilience during crises. While top-down disruptions initially fragmented service delivery, bottom-up adaptations leveraging informal provider networks and digital innovations - helped mitigate systemic breakdowns. The study underscores the need for network-informed policy interventions to enhance health system preparedness and equity in service access. By integrating SNA into global health crisis response frameworks, we provide a novel lens for understanding the relational mechanisms that shape health system resilience in resource-constrained settings.

Social significance of digital networks in student movements of #DarkIndonesia

Raphaella Dewantari DWIANTO, Rafael Pandu AMARTYA

Universitas Indonesia, Indonesia

This study examines the network structure and the meanings embedded in the connections fostered by digitalization within Indonesia's student movement, specifically the #DarkIndonesia movement in February 2025.

Historically, student movements in Indonesia have played a pivotal role in shaping political change, as seen in the regime transitions of 1966 and 1998. In August 2024, students, alongside the general public, mobilized under the banner of #IndonesiaEmergencyAlert to successfully prevent attempts by political elites to manipulate the legal system. In February 2025, Generation Z students launched the #DarkIndonesia movement to voice their concerns about the governance of the new administration. Digital platforms emerged as crucial mediums for organizing and amplifying the movement. This study builds upon conversation analysis conducted by Drone Emprit, a research unit, to investigate how participants in the movement use language to structure and assign meaning to their digital interactions. Through in-depth interviews with student participants, participant observation, and content analysis, this research explores the dynamics of the movement's digital networks, the social significance of these interactions, and the impact of digital platforms on both the structure of these networks and the meanings attributed to the connections within them.

Understanding network dynamics with Qualitative Network Research

<u>Theresa Manderscheid</u>¹, <u>Laura Behrmann</u>² ¹University of Bremen, Germany; ²University of Wuppertal, Germany

Understanding how networks evolve and change is a key question that many network research projects address through a variety of research topics. Understanding the dynamics of networks is not just a matter of using a particular type of methodical approach, but requires a theoretical and methodological framework to maintain the analytical focus. Qualitative Network Research offers the following premises for approaching questions of network dynamics from a qualitative research perspective: Relationships are not fixed entities, but form and change as they are embedded in a structure of relationships (in interaction with other relationships and contexts) as networks form. As a result, Qualitative Network Research aims at understanding the meanings of relationships and their structural embeddedness, as well as the consequences for social interaction. In short, relationships and networks can be understood as meaning-making interactive interpretations that are perspectival (social and subjective), meaningfully constructed, processual and dynamically negotiated.

In this presentation, we will discuss the premises of Qualitative Network Research and, using examples from our own research projects, show how these premises inform methodological choices focussing on understanding network dynamics.

Networks of insight: the role of personal networks in wisdom acquisition

Emmanuel Kojo Kyeremeh¹, Senanu Kwasi Kutor², Bridget Osei Henewaah Annor³

¹Toronto Metropolitan University, Canada; ²Western University, Canada; ³Western University, Canada

Existing research highlights the multidimensional role of personal networks in shaping various aspects of an individual's life, including the provision of social support and, more recently, exposure to negative influences. However, limited attention has been given to the role of social networks in facilitating wisdom acquisition, particularly in the context of international migration. This study addresses this gap by examining how personal networks contribute to the development of wisdom among Ghanaian immigrants in London, Ontario, Canada. Using a qualitative social network analysis approach and in-depth interviews with 21 participants, we investigate the social mechanisms through which wisdom is acquired in the migration experience. Participants identified up to five individuals who played a significant role in shaping their perspectives and decision-making processes. Our findings reveal that wisdom-related support primarily comes from friends, acquaintances, and colleagues established in Canada, with some participants also identifying transnational ties who have influenced their ways of thinking. Specifically, network members were instrumental in fostering open-mindedness, shaping perceptions of others, and influencing work ethic and time management, particularly in the Canadian socio-cultural context. These findings have important implications for immigrant integration, suggesting that social networks serve as important conduits of cultural and professional learning, ultimately facilitating integration and socio-economic mobility. Understanding these dynamics can inform policies and programs aimed at enhancing immigrant settlement and social cohesion by leveraging network-based wisdom transmission.

OS-143: Intergroup Relations in Social Networks 2 Location: Room 204 Session Chair: Tobias Stark

Fields influencing network advantage

<u>Balazs Fazekas¹, Yuanyuan Gong²</u>

¹Ritsumeikan University, Japan; ²University of Hyogo, Japan

This theoretical paper investigates how fields influence network advantage and proposes a field-network lens that can help better understand network effects. While network theorists conceptualise network advantage as originating in network structure, the paper calls attention to the issue of field forces acting on network nodes. As defined by Fligstein and McAdam (2012), fields have stakes requiring certain kinds of resources and information. Stakes induce forces that act on those who belong to the field. The paper's main claim is that network advantage is influenced by how fields align with each other. Bridging ties might connect to fields irrelevant to the stake of the broker's main field, in which case no brokerage advantage can be realised from the tie that bridges the two fields. Likewise, ties within a tight cluster might go across structurally invisible field boundaries, rendering cohesion benefits ineffectual. In other words, the paper calls attention to the fact that not all structural holes are created equal, that boundaries can be present between two nodes even when a tie exists between them, and that not all bridging and closure ties will be advantageous to the same degree. The paper proposes a field-network framework that helps define where brokerage and closure ties are effectual, ineffectual, or detrimental to network advantage.

How interpersonal communication with immigrant-origin associates shapes views on immigrant representation and support for democratic institutions

Manuel Diaz Garcia

Johan Wolfgang Goehte University Frankfurt am Main, Germany

The representation of citizens of immigrant origin has become increasingly relevant in both societal and academic discussions across European democracies. However, only a limited number of studies focus on the attitudes and support for immigrant representation within the native majority population. This study examines how interpersonal communication with individuals of immigrant origin influences the majority population's views on immigrant representation. It proposes that such interactions help natives recognize the social marginalization experienced by immigrant-origin groups, which leads to three key outcomes: (1) an increasing support for immigrant representation, (2) a decreasing perception that immigrant representation. To investigate these dynamics, a factorial vignette experiment is used to simulate interpersonal communication. It manipulates key factors such as the frequency of discussion, the intimacy of relationships, and the politically relevant content conveyed by others. Survey experimental evidence from Germany provides insights into how interpersonal communication influences natives' views on immigrant representation and explores the potential consequences of growing mismatches between expectations and perceptions of the political system for trust in representative institutions.

Inferential Distributive Networks: Analyzing Socioeconomic Segregation in School Friendships and Its Influence on Students' Perceptions and Explanations of Inequality

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Social inequality, a focal point in sociological inquiry, extends beyond material considerations. Academic focus on understanding how individuals perceive, explain, and respond to disparities has been extensive. Despite the prevailing research on individual and national determinants, recent developments in distributive justice literature emphasize the crucial role of individuals' social relationships in shaping attitudes toward inequality. These approaches illuminate nuanced processes through which individuals extrapolate societal distributive conditions from their particular social contexts, utilizing mechanisms such as social sampling and social inference. Extending these theoretical principles, the prestige and socioeconomic diversity of acquaintances introduce the potential to shape diverse perceptions and beliefs about the same social inequality, being able to modify the action of structural determinants such as the social class of individuals, among others.

This research takes advantage of a rich dataset on classroom friendship networks and students' attitudes to address the following research question: how does socioeconomic segregation of friendship relationships influence students' perceptions and explanations of social inequality? To answer this question, we use data from the MAYBE Project, from more than 400 senior high school students, belonging to 26 classes and 16 schools in the province of Milan, Italy. The analysis of the impact of social networks with this population becomes particularly relevant, considering that it has been seen that attitudes tend to crystallize during late adolescence and early adulthood and that school is one of the most important socializing institutions in shaping them. Despite the

richness of these ideas, empirical validation remains remarkably scarce, with limited attempts using insufficient surveys to model individuals' social networks or research focused solely on students' attitudes toward inequality considering only individual determinants.

Applying network analysis techniques, sociocentric friendship networks are modelled in each class, with nodes representing the total number of students and links depicting unidirectional friendship relationships. Additionally, individual characteristics are assigned to nodes to estimate multilevel regression models and test the following hypotheses: Firstly, that students in classes with greater socioeconomic diversity and less prestige among peers perceive greater inequality in the country (Hypothesis 1a) and explain it more by structuralist factors (Hypothesis 1b). Moreover, that students in friendship groups with greater socioeconomic diversity and less prestige perceive greater inequality in the country (Hypothesis 2a) and provide more structuralist explanations (Hypothesis 2b).

Preliminary results construct a compelling narrative: irrespective of students' social class or other sociodemographic characteristics, socioeconomic segregation in classes and friendships shapes students' conceptions of inequality. Specifically, the models indicate that socioeconomic prestige decreases perception and structuralist explanations of inequality, while socioeconomic diversity increases them. These findings underscore the fundamental role of individuals' diverse social environments and schools, not only in shaping conceptions of inequality but also in unravelling the intricate network of determining factors. In light of the results, the paper discusses the influence of social sampling and social inference mechanisms in the formation of distributive attitudes.

Intergroup networks of informal status: Who perceives whom as popular in European classrooms?

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¹University of Essex, United Kingdom; ²Humboldt University of Berlin, Germany; ³University of Birmingham, United Kingdom

Informal social status is crucial in adolescence. Given general status differences in European societies, we could expect that immigrant students (or those with immigrant parents) may be considered less popular by their school peers. Yes, this has never been directly investigated using informal status measures and proper tools of social network analysis, despite the growing number of network studies on intergroup friendships, dislike, and bullying. In our study, we explore differences in patterns of informal status between students from different immigrant backgrounds in four European countries: England, Germany, the Netherlands, and Sweden. We find mixed evidence for status differences and differential patterns in the four countries.

Intersectional homophily: Accounting for Multiple Dimensions of Homophily

Anthony Paik¹, Chen-Shuo Hong²

¹University of Massachusetts-Amherst, United States of America; ²National Taiwan University

Scholars frequently report the presence of homophily – that network ties are more likely between nodes with one or more shared characteristics – in interpersonal networks. In inferential network modeling, theses homophily findings are generated through an ubiquitous strategy of estimating independent homophily effects for each sociodemographic characteristic under study. More recently, several scholars have proposed strategies for accounting for multiple dimensions of characteristics and their roles in homophily, but theoretical and empirical work on this issue remains limited. In this paper, we develop a theory of intersectional homophily as an alternative to social distance, by-product, and consolidation arguments and estimate exponential random graph models (ERGM) with homophily interactions to examine expectations related to intersectional homophily arguments. We utilize Wave I of the Student Experiences in Law School Study, which surveyed first-year JD students in the fall of 2019 at three law schools. We analyze these data using ERGMs, which include main effects for homophily based on race, gender, status, sexual identity, and political orientation as well as two-way interactions. Results show that distinct patterns of significant main and interaction effects and cannot be fully explained by the consolidation between attributes. The findings support the notion that homophily research should examine how two forms of homophily intersect, above and beyond the main effects of homophily.

OS-29: Guanxi Networks Location: Room 206 Session Chair: Yanjie Bian

Exploring the Dynamics of Multilevel Embeddedness in Cross-Border Insurance Agent Practices in Hong Kong

Shengnan JIANG

HONG KONG BAPTIST UNIVERSITY, Hong Kong S.A.R. (China)

Cross-border economic activities are complex and linked to macro- and meso-social contexts within economic globalization. The success of transnational entrepreneurship underscores the substantial interdependence between formal inter-organizational relationships and informal interpersonal relationships, particularly concerning network structure. However, research often oversimplifies the relational complexities, neglecting the interplay between relational influence and individual agency. This study employs a micro-level analysis to address the identified research gap through a case study of the life insurance sector, which is conceptualized as a networkoriented industry. Qualitative data includes 35 in-depth interviews with Hong Kong insurance agents involved in cross-border life insurance transactions, complemented by three months of observations of their sales practices. Findings indicate that economic and relational rationality guide agents in cross-border entrepreneurship. Relationships are crucial in the early stages, especially when choosing a company to collaborate with. Agents leverage institutional and social resources and online and offline interactions to expand their cross-border insurance business. Networking through existing relationships, especially with intermediary ties, enables agents to reach a wider range of potential clients. Developing network bridges through trusted relationships and enhancing presence and familiarity via digital self-branding are essential strategies for cultivating trust. These sales strategies and practices are meticulously crafted to sustain long-term relationships while optimising economic benefits. Overall, this study deepens our understanding of the complexity of embeddedness by highlighting the importance of relational influences across different contexts.

Key words: Cross-border economic activities, social networks, entrepreneurship, trust-building, multilevel embeddedness.

How guanxi and xi shape Chinese migrant entrepreneurship personal networks

<u>Wang Liao</u>, Hugo Valenzuela Garcia, <u>José Luis Molina Gonzalez</u> Universitat Autònoma de Barcelona, Spain

This study examines the application of guanxi (ξ \Re) and xi (\Re) in the commercial practices of Chinese immigrant communities in Barcelona, focusing on how dynamic social networks shape economic collaboration and cross-group mediation. Drawing on Xiang Biao's conceptualization of xi (Xiang, 2004) as fluid, functionally driven relational clusters, this ethnographic research reveals that immigrant-led business networks are structured through overlapping guanxi cong (ξ \Re Δ , relational complexes), each governed by a "spokesperson" who acts as a pivotal broker. Fieldwork findings demonstrate that these spokespersons—often individuals with heightened social capital derived from kinship, regional ties, or entrepreneurial seniority—leverage their dual roles as insiders and mediators. They navigate structural holes between distinct xi systems, bridging fragmented networks while consolidating intra-cluster authority.

This study highlights how brokerage transcends mere resource allocation by analyzing spokespersons' strategies—such as negotiating bulk purchasing agreements or resolving inter-group disputes. It sustains a "formalized informality" where trust-based guanxi coexists with market rationalization. Crucially, Chinese businessmen within the same xi reconfigure traditional xi dynamics in transnational contexts. While rooted in Chinese relational ethics, their brokerage adapts to Barcelona's regulatory environment and local Catalan business norms. This hybridity challenges static interpretations of guanxi as culturally bounded, instead positioning xi as adaptive infrastructures that enable migrants to circumvent institutional exclusion.

Infinity of Guanxi with Market Rationality: The Case of Relational Costs of Chinese Private Businesses

Yanjie Bian

Xi'an Jiaotong University, China, People's Republic of

Why do Chinese private businesses of all sizes incur relational costs? We revisit and further develop the affinity theme (Bian and Shuai 2020) that Chinese private businesses persistently exercise strategies of guanxi favoritism

to sustain their growth goals under changing degrees of market rationality. To test hypotheses derived from this theme, we have analyzed data from the 2018 China Private Enterprise Survey (CPES) and obtained the following findings. More than 3000 private businesses were randomly sampled throughout the country. While they varied tremendously in terms of employment size (with a range of 1 person to 1.1 million), founding years (1 to 72 years), and other economic and organizational variables, all of them rendered relational costs for social activities with guests of the enterprises with a median of 100,000 Chinese yuan (equivalent to US\$14,000). Ongoing data analysis is designed to explore how the relational costs satisfy the goals of private businesses for survival, expansion, and profit maximization under different stages of development.

PS-01: Poster session Location: Main Hall (Registration)

Migration, Friendship Segregation and Psychological Well-being among Chinese Adolescents LEI JIN1, LIN TAO²

1Chinese University of Hong Kong, Hong Kong S.A.R. (China); 2Peking University, China

China has experienced unprecedented rural-to-urban migration over the past three decades, bringing a large number of rural children into urban environments. Peer networks are crucial for adolescent development, yet little is known about the extent of segregation between local and migrant children in friendship networks or its psychological impact. Existing theories offer conflicting predictions regarding how this segregation might influence migrant children's well-being.

Using nationally representative data from junior high school students nested within classes and schools, this study adapts a racial segregation measure to assess the degree of separation between local and migrant students in peer networks. The findings reveal substantial segregation, particularly among boys. Migrant boys were more likely to befriend other non-local students, whereas migrant girls were similarly likely to make friends with local and non-local students, given the contextual distributions of local and non-local students. Furthermore, segregation from local peers was negatively associated with the psychological well-being of migrant boys.

This study is the first to systematically examine friendship network segregation among migrant children in China. The pronounced exclusion of migrant boys from local peer networks aligns with prior research on gendered barriers in social relationships. By highlighting the persistence of network segregation, this study contributes to a broader understanding of structural constraints in migrant children's peer interactions. It highlights the need for targeted policies to mitigate the negative effects of segregation and promote greater social integration for migrant children.

Interpersonal relationships: An additional source of hardship for workers in nursing homes? A mixed-methods approach

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1Université Toulouse Jean Jaurès, LISST-CERS; 2Institut National Universitaire Champollion, ISIS Castres

The working conditions in nursing homes (EHPAD in French) are shaped by a combination of physical, organisational and psychosocial constraints, which are further exacerbated by the increasing dependency of elderly residents, many of whom suffer from neurodegenerative diseases (Balavoine 2022). A DREES study reveals that nearly 50% of hospital nurses leave their positions or change professions after ten years (Pora 2023), with sick leave being widespread in the healthcare sector, particularly among cleaning and orderly staff (Pollak et Ricroch 2017). Although solidarity mechanisms have made it possible to cope with the workload, the deterioration in working conditions also seems to have reduced opportunities to create bonds and support between colleagues (DREES 2016). The study utilises social network analysis to explore the relationship between interpersonal networks and the distress experienced by healthcare professionals in nursing homes. The investigation encompasses multiplex relationships: professional ties (colleagues, residents and their families) and personal networks, (including family members and friends). The research methodology involves the administration of field surveys, incorporating participant observations, the utilisation of questionnaires, and in-depth interviews with healthcare professionals in the Occitanie region of France. The present study has been designed to facilitate an understanding of how caregivers perceive and define work-related hardship, the role of social networks in either alleviating or intensifying these challenges, and the impact of workplace conditions on relational dynamics. Preliminary findings highlight the importance of solidarity networks, often centred around friendly groups, and reveal the role of residents in assisting caregivers.

OS-72: Social Capital and Social Inequality

Location: Room 105 Session Chair: Rochelle Cote Session Chair: Steve McDonald

Social Capital Index: A Multidimensional and Cross National Analysis

RUCHITA TRIPATHI

Commissionerate of Higher Education, Gujarat, India

This study explores the concept of social capital, emphasizing its three dimensions-bonding, bridging, and linking-and their collective impact on social cohesion and development. Utilizing data from the World Values Survey (2010-2014), a comprehensive Social Capital Index (SCI) is constructed for 43 nations. The methodology involves data normalization, principal component analysis, and aggregation of sub-indicators across social dimensions. Findings reveal significant variations in SCI across countries, influenced by cultural, institutional, and socio-economic factors. Bonding social capital, characterized by trust and solidarity within close-knit groups, is notably strong in countries like Singapore, Georgia, and India, reflecting cultural emphasis on family and intergenerational relationships. These nations exhibit high levels of familial trust, shared values, and reciprocity. However, countries like Peru and Romania rank low, suggesting weaker familial bonds and less cohesive social structures. Bridging social capital, which measures connections between diverse groups, is highest in South Africa, Rwanda, and Nigeria due to strong civic engagement, tolerance, and inclusivity. India performs moderately in this dimension, while nations like China, Tunisia, and Japan lag, reflecting limited trust in diversity and lower organizational participation. Linking social capital, focused on trust in institutions and governance, highlights stark contrasts. Singapore, Malaysia, and the Philippines excel, owing to responsive governments and strong public trust. India also ranks high, reflecting significant confidence in institutions, while Yemen and Tunisia struggle with systemic distrust and political instability. The composite SCI ranks Singapore, Rwanda, and the Philippines as leaders, showcasing balanced performance across all dimensions. India, though ranked in the medium SCI category, demonstrates strong bonding and linking capital but requires improvement in bridging dimensions to enhance overall social cohesion. The findings underscore that while economic development influences social capital, it does not guarantee it. Policies fostering trust, inclusivity, and institutional transparency are vital for strengthening social capital and driving sustainable societal and economic progress.

Social Capital and Mental Health Inequality among Young Adults in Seoul

<u>Joonmo Son</u>

National University of Singapore, Singapore

Individual social capital denotes embedded resources in personal social networks. Resource generators are one of the three representative measurements of individual social capital, along with name and position generators (Van Der Gaag and Snijders 2005). Resource generators probe if one has any social ties that can provide necessary assistance for various needs such as job-search or legal information, provision of helping hands for household chores when sick, lending money, listening ear, or caring about one's well-being. Whether and how resourcegenerator social capital is associated with life satisfaction and depression in young adults is not well documented in the literature. The present study used a two-wave longitudinal data set from the Seoul Young Adults Panel Study (SYPS) surveys administered in 2021 and 2022 on the respondents aged between 18 and 35 at the first wave. The retention rate between the two waves was 72.4%, and the final sample size was 3,762. The study used the fixedeffects regression model to estimate within-person changes over time conservatively. The multivariable regression results found that resource-generator social capital was positively associated with general life satisfaction. Further, resource-generator social capital was significantly related to thirteen domain-specific life satisfaction such as quality of life, health, achievement, safety, prospects for the future, work, or communal environment. On the contrary, resource-generator social capital was negatively associated with the number of depressive symptoms. In conclusion, the presence of social ties that may provide expressive and instrumental resources increases general and specific life satisfaction and decreases depressive symptoms in young adults.

Caste as social capital? An exploratory analysis of the composition of interpersonal networks in rural areas of South India (Tamil Nadu)

Cécile Mouchel

CESSMA et LEDa-DIAL, France

Social capital is one of the most fertile concepts for the last decades. In India, a growing literature seeks to demonstrate the function of caste as social capital. This assertion is based on an extensive definition of social capital as networks and cultural norms that will foster trust and social cohesion. This article takes root in a more restrictive meaning of social capital i.e. interpersonal relationships and the different kinds of resources embedded in these relationships. While taking another definition, this article takes up the same research question. To what extent would caste be a determinant of interpersonal relationships in villages of South India? In a context of rising inequalities all over India, to what extent social capital endowments differ between caste groups? These questions are explored through quantitative data drawn from network modules of the NEEMSIS-1(2016-17) and NEEMSIS-2 (2020-21) surveys collected over 600 households in Tamil Nadu. It includes both name and position generators. Our database includes 11 142 links Alter-Ego in different contexts based on an egocentric approach. The determinants of sociability are analysed through factorial analyses and social networks analysis. Sociability is mainly driven by caste and village relationships with outstanding degrees of homophily and homogeneity. Villages are strongly segregated both spatially and socially. The question of social capital is however hardly solved colliding with challenges of measurements and comparability. Overall, this article is one of the first to use social networks data in India while such data are still lacking for developing countries.

Indigenous social mobility, social and cultural capital: A longitudinal study of the "wealthing out" theory

Rochelle Cote Memorial University, Canada

Research and national census data suggest that Indigenous Peoples in Australia, Canada, U.S., and New Zealand (CANZUS) are socially mobile, with increases in post-secondary attainment and income, entry into middle class professions, and rates of entrepreneurship. A reoccurring and persistent theory centres on the negative impact of social mobility to Indigenous identity – with increases in income, education and professionalization, there are decreases in the cultural legitimacy of Indigenous people – perpetuating the idea of an erosion of Indigenous cultures and social networks at the hands of increasing prosperity. Further, capitalist ideals of success aspired to by Indigenous people are often portrayed as culturally selling out. While these ideas are popularly maintained, longitudinal work does not exist that looks at Indigenous experiences of social mobility, increasing prosperity, and its outcomes. Are Indigenous people, in fact, "wealthing out" of their ties to Indigenous social and cultural capital? Extending work from a multi-year, cross-national study of Indigenous entrepreneurs, this paper will present findings from second-wave interviews, alongside a large survey of Indigenous entrepreneurs and professionals in Queensland, Australia – the first study of its kind that takes a longitudinal look at Indigenous social mobility, and its impact on social and cultural capital. This paper also contributes to the broader literature by integrating Indigenous definitions of wealth, and understandings of forms of capital.

Changes in social capital through the life course: results of a two-decade study

Beate Volker

Utrecht University and NSCR, Netherlands, The

This contribution studies how life course events influence changes in social capital. The central hypothesis is that some events will provide an opportunity to enlarge social capital, while others diminish resources. National representative network panel data that span 19 years (1999-2018) are employed to examine such patterns of social capital changes. Social capital is assessed by the position generator instrument. Findings show that many life course events such as union formation enlarge a person's social capital. This is associated, however, with an increase in social fragmentation and segregation, since social capital in the network is increasing at the cost of social capital range and diversity. In general, life events offer opportunities to increase social capital for people in less fortunate social positions, rather than for those whose position is already at the higher end of the social strata.

OS-13: Contact diary: methodology and practise Location: Room 106 Session Chair: Éva Huszti

Logged contacts. Evolution of the contact diary toolkit

Beáta Dávid^{1,2}, Éva Huszti³

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Contact diary had been used since the 1960s (e.g. Gurevich) and continued with greater vigour from the 1970s (e.g. Pool and Cohen, Freeman and Thompson, Lonkila). Initial attempts mainly aimed to estimate the extent of the personal network surrounding an individual.

Since the mid-2000s, Fu's (2005, 2007, 2008) work has given a new impetus to the use of the contact diary method. In Hungary, the first diary data collection was carried out a few years later, in 2010, on an experimental basis. In terms of duration, different tools had been developed and implemented. In this presentation, we introduce the one-week contact diary and the strength of ties (SoT) index developed on this basis, we discuss the two-days diary tool and the operationalization of the strength of ties based Granovetter's idea. We demonstrate the successful implication of the one-day diary during the pandemic. In the presentation, we will argue for the advantages of the contact diary, highlight its potential as well as discuss the method's weaknesses and challenges.

Unveiling Adolescent Contact Networks: A Mixed-methods Diary Study

ChihChun Huang

National Chengchi University, Taiwan

Over the past two decades, contact diary studies have gained increasing interest, primarily relying on a quantitative perspective that focuses on statistical analysis. We employed a mixed-methods approach to understand how high school students used a smartphone application to record contact diaries. This approach allowed us to capture adolescents' interpersonal interactions, the quality of these interactions, as well as their emotions and perceived benefits following the interactions. A total of 46 participants (egos) were enrolled in the study. All of these students recorded diaries for 30 days, yielding a total of 25,608 contacts with 1,846 individuals (alters). This paper discusses the findings derived from in-depth interviews conducted with these students and reveals the core values of their participation as follows:

1. Keeping diaries reduces stress, reveals emotional changes, and helps students understand relationship patterns and social dynamics.

2. Reflecting on diary content provides deeper insights into social networks, fostering personal growth.

3. Families offer material support and companionship, while peers contribute to leisure and academic knowledge through interactions, enhancing both social and academic learning.

4. By keeping contact diaries, students can better understand how they manage their time, enabling them to plan their schedules more effectively.

Specifically, by recording reflections in contact diaries, high school students can better understand their thoughts and feelings. The contact diary study, as a methodology, effectively captured the realities of adolescents' lives, encouraged them to reflect on their experiences, and enhanced their awareness of interpersonal networks. Finally, we discussed the evaluation criteria for contact diaries.

From stress to support: How mood and biosignals shape social interaction networks over time

Heike Krüger^{1,2}

¹University of Cologne, Germany; ²RWTH Aachen University, Germany,

Mood and stress states dynamically shape social interaction patterns, influencing both the motivation to seek contact and the likelihood of social integration. Positive mood fosters open body language, thereby enhancing perceived social attractiveness, and strengthens relational bonds, whereas negative affect—such as stress and anxiety—can trigger social withdrawal or the seeking of social support as a coping mechanism. However, empirical evidence on how momentary affective states and physiological stress responses impact the formation and dissolution of social ties remains scarce.

This study leverages ecological momentary assessment (EMA) data from the Peer-Smart Network Study, a longitudinal whole-network dataset capturing real-world interactions among 50 university students in Germany. Over seven consecutive days, participants completed three daily contact diaries, reporting social interactions within their predefined cohort network. Emotional and instrumental support exchanges, as well as negative interactions, were systematically recorded. Momentary mood and emotional stress were assessed through short

surveys, while continuous physiological stress markers were collected via Fitbit wearables, capturing heart rate, sleep quality, and physical activity patterns.

Using relational event models, I examine how fluctuations in mood and biosignals for stress influence personal contact ties, as well as the provision and reception of social support. The findings contribute to theories of affective social integration and advance methodological approaches by combining self-reported network data with passive sensor data collection.

OS-167: Network Approaches to Political Dynamics 2

Location: Room 107 Session Chair: Tod Stewart Van Gunten Session Chair: Guillermo Romero Moreno

How Social Ties Mobilize and Polarize: Social Network Determinants of Election Outcomes

<u>Yuliia Kazmina</u>, Eelke Heemskerk, Frank Takes, Eszter Bokanyi University of Amsterdam / Leiden University, Netherlands, The

Recent European elections have witnessed a rightward shift, with populist and far-right parties gaining ground. Many explain this shift through demographic polarization. It pertains to a growing divide between urban and rural voters, younger and older generations, and those with differing education levels, driven by economic and migration concerns. However, demographic polarization goes beyond mere group identity; it is shaped by lived experiences. Where and how people live, work, and whom they interact with influence their views on social change. This study expands the traditional sociodemographic lens.

We hypothesize that, beyond voters' sociodemographic profiles, it is the social networks they are embedded in, that shape political behavior, specifically turnout and polarization. The key characteristics of these networks include size, the degree of closure, and composition with respect to socioeconomic status, education, and migration background. Additionally, we examine the spatial dispersion of an individual's social environment. We focus this analysis on the 2023 Dutch general elections. We enrich neighborhood-level election results with insights into the social networks of residents. Social networks are sourced from Dutch registers covering the country's population and providing information on one's socio-demographic profile as well as comprehensive mapping of social networks. The relational aspect of registers sheds light on formal links such as kinship, neighbors, classmates, colleagues, and household members. By integrating population-scale network analysis with electoral outcomes, we aim to uncover how social structures mediate the relationship between demographic factors and political behavior, offering a nuanced understanding of polarization dynamics in contemporary European democracies.

Network Determinants of LGBTQ+ Activism

<u>Tara McKay</u>, <u>Cassy Dorff</u>

Vanderbilt University, United States of America

LGBTQ+ activism has a long history in the U.S., but it is not always clear who participates and why, especially given the risks involved. Recent work investigates individual drivers of participation in LGBTQ+ activism and, consistent with other groups, finds that experiences of victimization increase the likelihood that LGBTQ+ people participate in protest. Building on that work, this study identifies network drivers of participation in LGBTQ+ activism, including political marches, demonstrations, and protests. We use novel data from Wave III of the LGBTQ+ Social Networks, Aging, and Policy Study (QSNAPS), which includes 981 midlife and older LGBTQ+ adults who report on the characteristics and political behaviors of 13,412 network ties. Data were collected throughout 2023 from adults in 22 US states. We test the hypothesis that network characteristics and perceived alter behaviors are associated with respondent's participation in LGBTQ+ activism. Specifically, we observe whether the respondent discusses politics or differs in political opinion from each alter and alters who the respondent thinks are also LGBTQ+, are kin, or who attended a protest, march, or political demonstration in the last year. Regression analyses show that greater discussion of politics is associated with a higher share of LGBTQ+ ties and a higher share of ties who know the respondent's LGBTQ+ status in one's network. Respondent's participation in LGBTQ-related but not general protest is significantly associated with protest participation within one's network. These results contribute to understandings of how networks shape political activism among a minoritized, politically targeted group in the US context.

The Impact of Extended Networks on Political Talk: A Factorial Survey Experiment Among Multiple Ethnic Groups in the Netherlands

Bas Hofstra¹, Jochem Tolsma^{1,2}

¹Radboud University, Netherlands, The; ²University of Groningen, Netherlands, The

Everyday political talk is key to deliberative democracies, and political talk solely between similar persons leads to echo chambers and polarization. Here we study how social networks influence the willingness to engage in political discussion with others. We do so with a focus on tie strength, similarity (opinions and identity dimensions), and extended network size and diversity. As such, we contribute a novel consequence of extended networks: whether discussing politics with others depends on how acquaintanceship networks are structured. We capture the willingness to engage in everyday political talk with a unique factorial survey experiment. We describe fictive situations and political discussion partners, and respondents then rate willingness to engage in political talk. This approach comes closer to a causal effect of extended networks compared to previous work. We introduce a multiethnic group perspective, scrutinizing how the impact of one's extended network on engaging in political discussion depends on ethnic background, because, social network effects likely vary by ethnic group. We test our conjectures by analyzing novel data from 2022: the Netherlands Longitudinal Lifecourse Study (NELLS). This data sources includes an oversample of Turkish-Dutch and Moroccan-Dutch persons in the Netherlands. It includes an innovative survey experiment on political discussions, and a pre-tested Network Scale-Up (NSUM) instrument to tap into the size and composition of extended networks of acquaintances. We employ multilevel models with random intercepts and random slopes, interaction terms between our vignette attributes (e.g., background and political opinion of discussion partner), and respondent-level variables (e.g., extended network size/composition).

Trade facilitaing IGOs facilitating trade: a co-evolutionary view

Michael Christopher McCall

Syracuse University, United States of America

Intergovernmental organizations (IGOs) are believed to stimulate trade among their members, even without being explicitly designed to do so. Yet the relationship between IGOs and trade is frequently acknowledged to be bidirectional: IGOs stimulate trade, and trade stimulates joint IGO membership. This endogeneity is a fundamental characteristic of the social structure of the international system, as bilateral and multilateral relationships co-evolve in tandem with each other. Therefore, examining only one direction of the bidirectional relationship at a time may produce invalid estimates of effects. Implementing a co-evolutionary SAOM, this study demonstrates that these effects do operate in a co-evolutionary fashion, but differently than expected. Trade fosters joint IGO membership, but it is the similarity of IGO portfolios, rather than the raw strength of the IGO connection, that best predicts major trade relationships among countries.

OS-128: Corporate Networks 5

Location: Room 108 Session Chair: Roy Barnes Session Chair: Mohamed Oubenal Session Chair: Roberto Urbani

Socialization of Moroccan Bourgeoisie: Upper-Class Neighborhoods and the Sun Beach Private Club in Casablanca.

Mohamed Oubenal

Institut Royal de la Culture Amazighe (IRCAM), Morocco

While traditional research emphasizes interlocking directorates, this presentation explores the socialization of business elites outside of the corporate world, using the Moroccan bourgeoisie in Casablanca as a case study. We argue that upper-class neighborhoods and exclusive private clubs are essential locations for building networks and accumulating social capital. Our analysis, based on a socio-historical approach incorporating ethnographic fieldwork and over twenty interviews, examines the residential patterns of Moroccan's bourgeoisie and the changing dynamics of the Club des Clubs de Casablanca, Morocco's most prestigious and exclusive club.

The Changing Face of Power. The Evolution of the Inner Circle in France

Catherine Comet

Université Paris 8, France

The inner circle has been recently subject to debates in the literature on US corporate networks. Some scholars argue that the fragmentation of corporate elites leads to the disappearance of the inner circle (Chu and Davis 2016), while others suggest that it remains influential but requires new approaches to be detected in the context of the decline of interlocking directorates (Murray and Jordan 2019).

Beyond these debates, little attention has been paid to how the composition of inner circles evolves over time. While research has highlighted the growing importance of foreigners and women among national corporate elites in different EU countries, the mechanisms that shape inner circles remain largely underexplored. Importantly, the inner circle does not simply reflect corporate elites at large; its selection processes vary across national contexts.

My previous research has shown that in France, the inner circle is primarily composed of corporate leaders who graduated from École Polytechnique and/or ENA, often belonging to prestigious state grands corps such as Mines, Ponts et Chaussées, and Inspection des Finances. I investigate whether these selection mechanisms have remained stable since the 2000s, or whether they have evolved to include other fractions of corporate elites with alternative visions of public action.

I assess these changes by analysing several waves of data on the directors of large companies and think tanks. I first examine alternative indicators for identifying members of the inner circle and propose an approach based on the social mechanism of regulation. Secondly, I apply this approach to several waves of data in order to measure changes in the inner circle. Finally, I consider the consequences of these possible changes on policy-making processes.

The Hardcore Brokers: Core-Periphery Structure and Political Representation in Denmark's Corporate Elite Network

Lasse Folke Henriksen¹, Jacob Lunding², Christoph Houman Ellersgaard¹, Anton Grau Larsen² ¹Copenhagen Business School, Denmark; ²Roskilde University

Who represents the corporate elite in democratic governance? In his seminal work on the "corporate inner circle", Useem (1986) identifies the emergence of three network-related mechanisms that shaped the composition and political organization of American and British corporate elites in the postwar era: organizational brokerage, elite-level social cohesion and network centrality. Subsequent research has found similar dynamics at play across a variety of capitalist societies but all studies on corporate political representation rest on network analyses of a highly select sample of leaders from the top ranks of very large publicly listed firms. We cast a wider net. Analyzing new population data on all members of corporate boards in the Danish economy (~200,000 directors in ~120,000 boards), we locate ~1,500 directors that operate as brokers between local corporate networks and measure their network coreness using k-core detection. We find a highly connected network core of ~275 directors, half of which are affiliated with smaller firms or subsidiaries. Statistical analyses show a strong positive association between director coreness and the likelihood of joining one of the 650 government committees epitomizing Denmark's social-corporatist model of governance (net of firm and director characteristics). The political network premium is largest for directors of smaller firms or subsidiaries, indicating that network coreness is a key driver of business political representation, especially for directors without claims to market power or weight in formal interest organizations.

The role of network centrality in firms' entry modes: evidence from European greenfield investments and m&a

Gabriele Galli, <u>Roberto Urbani</u>, Valerio Deriu LUISS Guido Carli, Italy

The role of network centrality in firms' internationalization strategies has become increasingly relevant in understanding their choice of entry modes. While previous studies have explored the impact of network positioning on international activities, research focusing on greenfield investments and mergers and acquisitions (M&A) remains limited, particularly from the home-country perspective. Existing studies are also geographically concentrated in non-European contexts, often rely on fragmented data, and lack comprehensive measures of firm networks. Here, we examine how firms' network centrality—measured through degree, betweenness, and closeness—affects their likelihood of engaging in greenfield investments versus M&A. Using panel data on firms in 14 European Union countries between 2015 and 2022, we construct inter-firm networks based on managerial

interlocks and analyze their impact on firms' entry mode choices. Our results show that firms with higher degree and betweenness centrality are more likely to undertake greenfield investments, while closeness centrality negatively influences such decisions. These findings suggest that well-connected firms leverage their network ties and intermediary positions to reduce uncertainties and identify new opportunities for autonomous international expansion. In contrast, firms with high closeness centrality, being tightly embedded within the network, may favor alternative strategies, such as collaborative ventures or acquisitions, rather than independent greenfield operations. This study offers a novel analysis of firms' network positions and internationalization strategies by integrating multiple databases and methodologies. It expands the literature by providing empirical evidence from a European home-country context and highlights the distinct roles of network centrality in shaping firms' strategic decisions for global expansion.

The spatial relay roles in ownership linkage network: from individual firms to cities' properties

Celine Rozenblat

University of Lausanne, Switzerland

Many global corporations have several levels of ownership going through some cities which constitute "mandatory pathways" to reach other ones. The position of "relay", "intermediate" or "bridge", affords cities better access to the whole network as well as increased control over information transfers (Burt, 1992, 2007, 2015). One can interpret this cumulative process of concentration as a reinforcement of "social capital" of big cities as sociologists do at the micro level (Gould, Fernandez, 1989; Walker et al., 1997). The position of relay should be more precisely defined in urban geography, as in sociology this concept integrates the role of "tertius Gaudens" or structural hole (Simmel, 1922; Merton, 1957; Granovetter, 1973; Hannan & Freeman, 1977).

To emphasis cities of the world that have "relay" role of firms from 2010 to 2022 (every 3 years: ORBIS database), we will develop different kinds of indexes. In fact, observing the relays at the micro level of companies, but building indexes at the city level, numerous possibilities exist to reveal the size and the specialization of cities in these roles. Beyond the main results of this empirical implementation, the purpose of the presentation will be to discuss how far different indexes could reveal diverse aspects of this spatial role for cities and for their dynamics. Which ones reflect more the attractiveness and power dynamics of the cities? Which ones could reveal resilience properties or spatial balance? We will discuss these measures for better using these properties of relay in the future.

OS-71: SNA, collective mechanisms and social capital

Location: Room 112 Session Chair: Emmanuel Lazega

An agent-model approach to price formation in an artisanal fishing community in Chile

Miroslav Pulgar, <u>José Luis Molina</u> Universitat Autònoma de Barcelona, Spain

Social mechanisms are essential processes within a social system (Bunge, 2004) that emerge as responses to the various challenges actors face in their daily practices (Gross, 2009). The significance of social mechanisms in relation to social reproduction and change (Lazega, Snijders & Wittek, 2022) can be more effectively examined at the meso level (Lazega, 2022; Fine, 2006).

This paper adopts an agent-based approach to understand the social mechanisms that account for the price formation of fish catches in an artisanal fishing cove in Chile. Based on previous ethnographic research (Pulgar, Gómez & Molina, 2024), we identify two interconnected domains of social practice: the ecological landscape (the sea) and the harbor fish market.

In the ecological domain, fishers employ three strategies to gather information about navigation conditions and the localization of their catches: returning to the location where they fished the previous day, following trusted fishers, or exploring new areas. These strategies have resulted in the formation of close-knit cliques among fishers at sea, centered around productive catches. However, resource decline may strain these connections and encourage more individualistic strategies.

The market domain operates on a concatenation principle: the first fisher to arrive establishes the price, known as the "reference price." Later, fishers observe this price and add it to their margins and costs to determine their own prices, creating a price chain in which every price formation influences the next one. This mechanism, shaped by the sequence of arrivals and the observation of established prices, illustrates how economic information disseminates and mediates the interactions between buyers and sellers.

The combination of two social mechanisms -the actual fishing strategy and the price chain in the market—account for the social production of new value, marketed fish catches in this case.

Collaborative Strategies for Market Structuration: The Relational Interdependence of Educational Technology Firms

Chloé Daveux

Université Paris-Dauphine, France

Educational technology companies (Edtech) develop digital educational resources such as educational video games, learning platforms, and interactive textbooks for teachers and students. This study, conducted among Edtech entrepreneurs operating in primary education, explores the conditions underpinning the emergence of an Edtech market shaped by public policy.

Public support for the French Edtech sector is closely tied to the state's prerogative in education, acting as an intermediary between Edtech firms (supply) and the teaching community (demand). Unlike traditional market mechanisms, teachers cannot directly purchase digital educational resources; acquisitions are mediated by local authorities. This structural constraint has led the French Edtech sector to form a dense network of collaborations, partnerships, consortia, and subcontracting arrangements. After addressing network boundary definition, this presentation explores relational interdependence and its effects on market structuring.

To establish a comprehensive interorganizational network (Eloire et al., 2011), the study expanded its scope beyond Edtech firms to include actors from professional associations, incubators, foundations, and investment funds. This qualitative empirical approach—combining netnography, interviews, and observations at trade fairs and summer schools—has identified 78 individuals involved in primary-level digital resource development or the broader Edtech ecosystem. The findings underscore how information exchange (technical skills, funding opportunities, commercial prospects) and informal relationships among competitors mitigate market uncertainty and contribute to structuring the sector. In this competitive landscape, collaboration among competitors depends on their social capital (Lazega, 2008).

Additionally, interviews (16) with Edtech entrepreneurs (14) and officials from the Ministry of National Education's Digital Directorate (2) provide insights into entrepreneurial trajectories, sectoral dynamics, network segmentations based on social capital, and public-private collaboration.

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Collective Mechanisms Supporting the Functioning and Expansion of Multi-Level Marketing Networks <u>Gwladys HADJIMANOLIS</u>

Clersé, France

This presentation examines the collective mechanisms that sustain the functioning and expansion of multi-level marketing (MLM) networks. Adopted by companies such as Tupperware, Vorwerk, and Travorium, this business model relies on the mobilization of an independent sales force to distribute products and services. Its specificity lies in its recruitment-based development structure, which gives it both a reticular and hierarchical organization, where income levels and status depend on the breadth and depth of a member's downline. By combining interviews, digital and in-person ethnography, and social network analysis, this study highlights the relational work performed by individuals who join such structures. It reveals the ambivalence of these relational infrastructures, where members are simultaneously micro-entrepreneurs – often engaging in MLM alongside another professional activity – while being subjected to a rigid hierarchy that guides, or even prescribes, their practices. Particular attention is given to the role of members with significant social and relational capital (those positioned at the upper levels of the hierarchy and compensation structure) and their ability to influence both individual and collective dynamics. The key issue is to understand how these actors, by establishing interdependent relationships and leveraging collective learning mechanisms (such as the transmission of sales and recruitment techniques) and social control

(through sponsor and peer monitoring), organize the work of lower-ranking members to extract both economic and symbolic gains.

Lawyers, Priests and Scientists: Comparing Networks of Collective Learning as Indicators of Social Mechanisms

Emmanuel Lazega, Saint-Clair Chabert-Liddell Sciences Po, France

The current literature on comparisons of networks is often based on a broad network science perspective, with the assumption that general local mechanisms drive, on their own, the emergence of global patterns. In this presentation, we extend a neo-structural approach to social mechanisms by comparing networks. We use stochastic blockmodels (SBMs) to find variations in similar social processes of collective agency across different organizational contexts. SBMs help us understand and compare how actors manage cooperation dilemmas in these contexts. As an empirical illustration of our approach, we focus on processes of collective learning as measured by advice networks in three different organizational settings, i.e. among lawyers, among priests, and among scientists. Analyses reveal differences in role systems and strategic uses of acceptable homophily across these settings, skilfully mitigating the divisive effects of rigid status differences in efforts to construct common bodies of knowledge.

Social Cohesion and Collective Action: The Power of Inter-Class Friendship Ties

Sergio Perez Schjetnan

University College London, United Kingdom

Collective action refers to the coordinated efforts of individuals toward a shared objective. Understanding the social determinants of large-scale collective action is crucial for addressing pressing societal challenges, such as pandemics. However, the structural conditions that foster large-scale collective action remain insufficiently understood.

This study examines whether social capital facilitates large-scale cooperation by leveraging the onset of COVID-19 non-pharmaceutical interventions in the United States as a natural experiment. I investigate how three dimensions of social capital within counties shape the community's collective response to these interventions: (i) inter-class friendship ties between individuals from different income levels, (ii) network interconnectedness—the clustering of local social networks, and (iii) civic engagement—the prevalence of voluntary associations and civic organizations.

Employing a difference-in-differences design and causal forests to study effect heterogeneity, I analyze fine-grained geolocation and mobility data and social media friendship networks in 2020-2021. My findings indicate that ZIP code areas (N = 23,028) with a higher prevalence of inter-class friendship ties exhibited greater compliance with shelter-in-place directives, as measured by reductions in geographic mobility. The other two forms of social capital have no effects on collective action.

This suggests that economic diversity in social networks, rather than network interconnectedness or civic engagement, enhances cooperation at scale in an emergency. These results underscore the potential of inter-class social integration for facilitating collective action—an insight of increasing relevance as societies face challenges that require urgent and widespread cooperation, especially where economic inequality has been rising.

OS-10: Changes of social networks over time Location: Room 116

Session Chair: Fruzsina Albert

Individual Agency vs. Structural Influence: Modeling Social Network Changes Over Time

Eszter Bokanyi^{1,2}, Eelke Heemskerk¹, Yuliia Kazmina¹, Frank Takes² ¹University of Amsterdam, The Netherlands; ²Leiden University, The Netherlands

In large social networks, even a few individual observations can become interdependent due to short path distances between nodes. Therefore, it is hard to disentangle the cause of changes in the network structure over time. Is this due to gradual behavioral shifts across the population, or do the decisions of a few individuals to rewire their networks drive large-scale changes? We revisit this question in a population-scale social network of the entire country of the Netherlands. Using a yearly snapshot of the family, work, school, household, and neighborhood

connections of the whole population between 2011 and 2021, we find that the network is becoming sparser, with average social cohesion measured by closure declining by up to 10% over a decade. By following changes in the ego networks of people year after year, we observe a group of people with changes in the work, school, or neighborhood layers leading to a substantial drop in everyone's ego network closure. Using a synthetic network model, we replicate this pattern by selectively rewiring the connections of a small subset of individuals, confirming our empirical observations. Our work helps in understanding large structural shifts in contemporary societies from a social network point of view, and gives a new multi-layer model of temporal social network evolution.

Change and Stability in Core Discussion Networks in South Korea

Yoonyoung Na¹, Chaeyoon Lim²

¹Seoul National University, Korea, Republic of (South Korea); ²University of Wisconsin-Madison, WI, USA

South Korea has undergone rapid social change in recent decades, often described as compressed modernity. This study examines how these transformations have shaped the size, composition, and structure of Koreans' intimate personal networks, with a particular focus on the role of kin and non-kin ties in core discussion networks.

Traditionally, Korea's strong family-oriented culture has emphasized kin ties, but economic prosperity, demographic shifts, and technological advances have fostered individualistic lifestyles. However, contemporary Korean individualism, shaped by Confucian and familial legacies, may differ from Western models. The sociologist Chang Kyung-sup characterizes it as "individualism without individuals" or "familial liberalism," where the family remains the basic social unit.

Using four nationally representative surveys spanning three decades—the Survey of Consciousness and Values in Transitional Society (1996), the Survey of Social Order (2002), the Korean General Social Survey (2011), and the Culture and Attitudes in Everyday Life of Koreans Survey (2024)—we analyze trends in core discussion networks. These are the only national Korean surveys with an "important matter" name generator module, allowing for direct comparison over time.

Preliminary findings indicate a recent decline in network size, primarily due to a reduction in non-kin ties over the past decade, which has led to an increased proportion of kin ties. Additionally, network density has risen. These results suggest that despite sweeping social change, Koreans' intimate networks have become more tightly centered around family. We also explore evolving gender differences, as economic and cultural shifts likely affected women's networks more than men's.

Could you cope? Coping strategies of highly educated migrant youth during COVID-19

Dóra Boelens¹, Éva Huszti²

¹ELTE, Hungary; ²University of Debrecen, Hungary

This study focuses on the changes in the personal social network of young immigrants and foreign students and its impact on their subjective well-being during the first period of the COVID-19 pandemic. Data was collected in two waves: the same individuals were interviewed in the period before the first recorded coronavirus infection (early 2020) and during strict epidemiological restrictions (early 2021) in Hungary. Respondents with favourable sociodemographic characteristics (N=30) had extensive networks in both years, with only a slight decrease between the two data collections. Our data shows that although the average network size did not change significantly between the two data collections, changes in the network compositions show a decrease in the weaker ties to the host society, which implies an integration deficit for the studied population. The network size and the subjective well-being indicators did not show a correlation in the sample: regardless of an extended network, one can feel lonely. In the first period of the COVID-19 pandemic, the subjective well-being of those was better who, due to their personality, did not desire a large social network, but enjoyed the support of a stable network of emotionally close people. Regular and personal contact was important for being able to maintain subjective well-being during the pandemic, but the density of the micro-network was found to be a more important factor than its extent.

The Impact of Facebook Relationship Event Posts on the Dynamic Changes of Newlyweds' Social Networks

Ming-Yi Chang¹, Chih-Ya Shen²

¹Fu Jen Catholic University, Taiwan; ²National Tsing Hua University, Taiwan

This study explores how Facebook relationship event posts affect the changes in newlyweds' social networks at different stages, including acquaintance, dating, cohabitation, and marriage. Using survey data and social media post records, we reconstruct key relationship events and examine how social media interactions change before and after these events.

We analyze whether relationship strength changes over time and identify key factors influencing these shifts. Using multilevel analysis, we consider the effects of individual factors (gender, age, education, personality), relationship factors (relationship type, mutual friends, shared interests), and interaction factors (post engagement, response rates).

This study offers insights into how newlyweds' social networks develop and how digital interactions shape intimate relationships. The findings contribute to a better understanding of social media's role in influencing relationship dynamics in the digital era.

Interaction Preferences and Social Stability in Young Galápagos Sea Lions: A Bayesian Social Network Approach

Alexandra Childs¹, Oliver Krüger¹, Sean D. Twiss²

¹Bielefeld University, Germany; ²Durham University, United Kingdom

Understanding social interactions in wild animal populations provides insights into the ecological and evolutionary drivers of social behaviour. Social bonds formed early in life can have lasting effects on development, survival, and fitness, yet the stability over time and consequences of these relationships remain poorly understood. In this study, we investigate individual interaction preferences and the stability of social relationships in young Galápagos sea lions (Zalophus wollebaeki) over the first two years of life using a combination of proximity loggers and direct observational data. By integrating these two data collection methods, we demonstrate that observational data, despite its snapshot-based nature, provides a reliable measure of social relationships in this species at the juvenile stage. Social interactions were analysed using Bayesian Inference for Social Networks (BISoN), a statistical framework that accounts for confounding variables and models effects at the level of individual observations. We examined how conspecific density and location at birth shapes early interactions, and explored the relationship between early social bonds and survival outcomes. Our findings reveal non-random social associations influenced by factors such as kinship, sex, and prior social experience but that same-age conspecific density at birth is not a predictor for the quantity of later social interactions. This study highlights the importance of early social relationships in Galápagos sea lions and demonstrates the value of combining invasive and non-invasive methods with Bayesian social network analysis to study animal social structures.

OS-42: Network Change, health, and Wellbeing

Location: Room 125 Session Chair: Soli Dubash

Social Network Intervention to Improve Blood Pressure Control After Stroke: Lessons from the TEAMS-BP Randomized Clinical Trial

Amar Dhand^{1,2}, Katherine Crum^{1,2}, George Usmanov^{1,2}, Niteesh K. Choudhry^{1,2}

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After major health events, personal social networks serve as conduits of resources, support, and information to facilitate healthy recovery. However, mobilizing network resources to improve outcomes remains elusive, particularly within individualistic approaches to healthcare in the United States. An open question is whether personal network structure may be an important factor that deserves consideration when attempting to mobilize network resources during health setbacks. To address this question, we conducted a two-arm randomized controlled trial on blood pressure management after stroke, comparing individual counseling with a network-engaged approach that incorporated and supported patients' existing personal networks. We recruited 45 stroke survivors: 21 in individual counseling and 24 in the network-engaged group. In the aggregate, the groups had no statistically significant differences in systolic blood pressure after 3 months. However, survivors in the network-engaged group with high constraint networks had significant blood pressure reduction compared to those with low constraint networks. These results indicate that patients and their network members in high-constrained structures may be more receptive to, or may reinforce, novel information about blood pressure management strategies. These results should be considered preliminary due to the small samples and limited network engagement, which offers lessons for future trials. However, the trial does suggest that aligning behavior change strategies with network

structures has promise. This study offers important insights for clinical applications of personal network interventions.

Characterizing social network structure, composition, and support among young adult cancer patients

Sarah E Piombo^{1,2}, Kayla de la Haye³, Britni Belcher⁴, Jonathan Kaslander⁴, Junhan Cho⁴, Joel E Milam⁵, David R Freyer^{6,7}, Gino K In⁸, Kimberly A Miller⁴

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Background: Many young adults (YA) diagnosed with cancer report feelings of social isolation following a cancer diagnosis, which can negatively impact health outcomes. This study (1) characterizes social network structure and composition and (2) examines the associations between social network metrics and social health outcomes among YA cancer patients over time.

Methods: The Social Health Study is a longitudinal study of YA cancer patients in Southern California surveyed at four timepoints over the first year following their cancer diagnosis. Participants (N = 163) completed an egocentric network survey and questionnaires on social health outcomes including loneliness, emotional, information, and tangible support at each study timepoint. Data were collected on alter relationships, demographics, and provisions of support: closeness (strength of connection), confidence (can confide in alter) and contact (interaction frequency). Multivariable linear mixed effect models with random intercepts for participants were run to test the longitudinal associations between network statistics (density, transitivity, constraint), provisions of support and each social health outcome while controlling for patient gender, age, and Hispanic/Latine ethnicity.

Results: Having a greater number of close alters was positively associated with greater feelings of emotional, information, and tangible support, while having more alters to confide in was associated with greater emotional and information support. Hispanic ethnicity was associated with lower information and tangible support.

Contributions: Social networks provide multiple forms of social support among YA cancer patients. These findings identify disparities in social support among Hispanic/Latine patients, highlighting the need to further investigate social health challenges among this patient population.

Health Events and Their Varied Impact of Personal Networks

Renáta Hosnedlová¹, Shira Offer²

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Health issues can exert a profound but varied influence on individuals' social networks. On the negative side, previous research suggests that the occurrence of a health event may impair an individual's physical ability to be active and socialize with others or generate interpersonal conflict that can result in less contact with network members, thus leading to smaller and more constrained networks. On the positive side, health events may also give people the opportunity to mobilize their networks by strengthening existing ties and reconnecting with dormant ones, while also forming new social ties with professionals, service providers, and others. Hence, health events can constitute an important trigger for change leading to a reconfiguration of personal networks that modifies their composition, structure, and functioning.

In this study, we discuss how the diagnosis of a serious illness, chronic conditions, disability or injuries shape sociability and personal networks. Given the far-reaching consequences of health events, we posit that they can act as powerful catalysts for network transformation, altering in complex ways the composition and characteristics of an individual's social connections. We draw on three complementary datasets—the Normandy Panel, the Toulouse Older People Panel, and the University of California Social Networks Study—to examine the relationship between health events and network dynamics, focusing on the structure, function, and content of personal networks over time. To promote comparability, we created similar measures for the experience of a serious health problem at different observation times and examined variation in network characteristics, including network size, density, lost alters, added alters, change in number of kin and non-kin members, and churn, depending on whether the individual experienced a serious health event. Then, using qualitative data, we studied individuals' life course trajectories and the network evolution of several contrasting cases to better understand the network variations

following a health event. The findings highlight nuanced effects of health-related events on personal networks. The occurrence of a serious health issue is not significantly related to change in network size. It is, however, associated with member churn and subtle structural changes. The quantitative findings suggest that there is a decrease in network density due to diversification that mainly consists of adding extended kin in older people and adding nonkin in younger people. At times, this diversification is linked to new commitments to activities. In other cases, diversification is the result of adding professionals to the network. Despite the slight decline in densification in the quantitative analyses, our analysis of the qualitative also point to cases or stages characterized by an inward turn, where refocusing on stronger ties with close family took place after the health event. Furthermore, health events often coincided with other life events, like breakups or job changes, and health issues that occurred to a close alter, for example a spouse or intimate partner, sometimes impacted networks more than the ego's condition. This study highlights the need to contextualize analyses of health events' impact on personal networks and resilience across life stages.

Leveraging Social Networks to Enhance Weight Loss: Baseline Findings from the ROBUST Clinical Trial

<u>Kayla de la Haye</u>¹, Natasha Wasim¹, Caitlin Potter², Briana Phillips Bell², Jaleel Poole², Anika Lewis², Mussarat Nahid², Paul Christos², Katie Hootman², Ginger Winston³, Erica Phillips²

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The Reducing Obesity Using Social Ties (ROBUST) study examines how social network processes can support weight loss in Black and Hispanic adults with obesity (BMI \geq 30 kg/m²). Using a randomized controlled trial (RCT), we compare a 24week social network-enhanced lifestyle intervention with an individual-level intervention (control), modeled after the Diabetes Prevention Program. Participants in the network-enhanced intervention (egos) recruit one or two social network members (alters) as 'support partners', who then engage in virtual sessions focused on communication and social support strategies to help the ego achieve their health goals.

We present baseline findings, including the composition and characteristics of participants' personal networks, assessed using Network Canvas. We describe the demographic and health profiles of recruited alters, as well as their network roles, support functions, and positions. Analyses explore whether alter characteristics predict their selection as 'support partners' and whether these associations vary by the ego's gender, race/ethnicity, and health indicators.

These baseline results will inform the full RCT evaluation, shedding light on the role of communal coping in weight loss and whether alter characteristics influence their engagement and effectiveness in the intervention. By explicitly targeting a population historically less responsive to lifestyle interventions, ROBUST aims to refine and tailor strategies for leveraging social networks to enhance weight loss outcomes.

No one person or institution can do it alone

Gail Linday Carson ISARIC, United Kingdom

For outbreak preparedness and response, the role of networks has been valued and useful for decades. The examples I will share have differences including in terms of governance yet all are impactful.

With personal experience of a number of such networks, I would like to share with you a practitioners experience of how these networks have evolved over the years including which methods were used to evolve and why they had to change.

I hope that I can learn from others to strengthen and further grow the ISARIC network, which is a federation of networks - a network of clinical research networks spanning over 130 countries. ISARIC is currently localising to the LMIC partners with decentralised decision making and leadership of research and capacity building.
OS-212: Qualitative Network Research: Understanding network dynamics 3

Location: Room 203 Session Chair: Laura Behrmann Session Chair: Theresa Manderscheid Session Chair: Benjamin Moles

Use and Allocation of Strategic Resources in Lone Parents' Personal Networks: A Longitudinal and Mixed-Methods Study

Benjamin Moles¹, Betina Hollstein², Laura Bernardi¹

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Lone parenthood is a critical life course transition that extends beyond the individual, redefining the personal network within which parents and children navigate over time. While the personal network paradigm has proved to be crucial to understanding the positive impact of personal networks on well-being during diverse family transitions (Bernardi, 2011), its application to study vulnerable processes in lone parent trajectories remains scarce and has significant limitations (Keim, 2018). This study, drawing on the 11-year Swiss data panel "The Multiple Paths of Lone Parenthood (2012-2022)" and using a mixed-methods approach combining longitudinal qualitative and quantitative ego-network data, aims to fill this gap. The study seeks to answer: How do lone parents' personal networks contribute to overcoming vulnerability over time? Specifically, it will examine: 1) the role that the structure and composition of lone parents' personal networks play in the allocation and use of resources across life domains; 2) the life domains and types of resources most strategic provided by these networks; and 3) the subjective meaning lone parents attribute to their personal networks. We will present preliminary findings from this work-in-progress paper at the session, offering initial insights into how personal networks shape lone parent trajectories across life domains and over time.

OS-144: Intergroup Relations in Social Networks 3

Location: Room 204 Session Chair: Tobias Stark

Opportunities for Within and Cross-Group Ties among First-Year University Students

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The transition to university provides first-year students the opportunity to forge new friendships from what is oftentimes a diverse pool of peers. Nonetheless, the friendships that develop are disproportionately within-group, versus cross-group, across a variety of dimensions. Explanations for such homophily include ingroup preferences, though within the constraints provided by the composition of the population, including consolidation, biased opportunities for meeting (e.g., foci), and amplification through network mechanisms. Prior efforts to understand the relative strength of homophily-inducing mechanisms often consider the combined effect of preferences and opportunities. We offer greater clarity to the origins of within and cross-group ties by isolating the opportunities for each type of tie available through various network selection micro-mechanisms. Our method allows us to compare how much foci, consolidation, and network mechanisms funnel students into within-group opportunities or, in limited cases, increase exposure to outgroup peers. We illustrate our method using longitudinal network data from 1,800 students in two consecutive first-year cohorts of a STEM major. We discuss the implications of our results for efforts to understand and promote intergroup relations on campus and the generalization of our method to investigate differential opportunities for any definition of tie types via network micro-mechanisms.

Perceiving Gender and Ethnic Homophily: Determinants of Adolescents' Perceptions of Friendships in the Classroom

<u>Anniek Schlette</u>¹, Tom Nijs¹, Tobias H. Stark¹, Johan Koskinen² ¹Utrecht University, Netherlands, The; ²Stockholm University, Sweden

We examined to which extent adolescents perceive gender and ethnic homophily in peers' friendships in their classroom. While social network research consistently finds that friendships form more often between similar individuals, leading to gender and ethnic network segregation, it remains unclear to what extent people also perceive homophily when they infer the friendships around them. However, as perceptions shape various behaviours and attitudes, overestimating others' homophily could limit adolescents' willingness to form intergroup

friendships. In this paper, we first examined to what extent perceived segregation aligned with actual network segregation. Then, we explored factors that could explain perceptions of peers' friendships. Since segregation results from homophily and relational mechanisms, we investigated to what extent perceptions can be explained by relational mechanisms (e.g., balance) and attributes (e.g., gender, ethnicity) of the actors and the targets. We expected that friends and similar actors (e.g., males) would have more similar perceptions of the friendships in their class. Additionally, we examined perceived homophily by testing whether similar dyads (e.g., ethnic minority members) were more often perceived as friends. We applied a novel statistical method, which was introduced by Koskinen and colleagues (2023), using multilevel exponential random graph models in MPNet to model the two-layer network: self-reported friendships and the perceived homophily in adolescents' perceptions of peers' friendship relations, while accounting for relational mechanisms and attributes that could explain these perceptions.

Second language acquisition and peer learner interactions during study abroad: Insights from longitudinal computational SNA

Michał B. Paradowski¹, Nicole Whitby², Piotr Bródka³, Michał Czuba³

¹Institute of Applied Linguistics, University of Warsaw; ²independent researcher; ³Network Science Lab, Wrocław University of Science and Technology

Input, output, and interaction have been considered central to the process of second language (L2) acquisition. This contribution analyses the longitudinal development of the social interaction network and its influence on L2 gains of a complete cohort of 41 U.S. sojourners enrolled in a 3-month intensive study-abroad Arabic program. Unlike extant research, the current study i) focuses on students' in-the-wild interactions with their alma mater classmates as well as other agents, ii) reconstructing a complete network of the former, iii) traces the impact of each individual student's position in the social graph using established centrality metrics, and iv) includes a dynamic developmental perspective with three measurement points at 4-week intervals each, gauging the extent to which changes in the network configuration translate to changes in both self-perceived and objectively measured progress along a range of dimensions.

Objective proficiency gains were negatively influenced by predeparture proficiency (negatively), multilingualism, perceived integration of the peer learner group (negatively), and the number of fellow learners speaking to the student. Analyses reveal relative stable same-gender cliques, but with changes in the patterns and strength of interaction. We also discuss interesting divergent trajectories of centrality metrics, L2 use, and progress, predictors of self-perceived progress across skills, and the interplay of context and gender.

Sources of Critical Consciousness Socialization

<u>Ashwin Rambaran</u> Radboud University, The Netherlands

In a growing diverse society, young people are confronted with concerns for critically understanding dehumanizing social conditions of marginalized groups in society. The term critical consciousness (CC)—grounded in critical pedagogy (Freire, 2000)—deals with awareness, motivation, and agency of oppressive systemic forces in society against marginalized groups. In the foreground is the way young people come to learn about and read the social world. Limited work suggest peer socialization (Heberle et al. 2020), through discussion of social issues and support of critical perspectives on issues of injustice. Yet, measures of socialization and CC are fragmented and inconsistent, rendering mixed findings. Moreover, the source of CC socialization remains unclear: Are young people influenced by all peers equally?

Recent data was used from 742 freshman residing in four learning communities at a large, public university in the American Midwest (two cohorts; two waves yearly). Students reported on three dimensions of CC (validated ShoCCS; Diemer et al. 2022), three items each (reflection, motivation, action; $\alpha s = 0.77$). Students also reported about their networks listing the names of up to ten peers with whom they "hang out" in their community.

The preliminary findings from a SAOM (RSiena; Snijders et al. 2010), in which the average similarity effect (capturing socialization) was split into two (intra-ethnic relationships and inter-ethnic relationships), reveals that CC reflection and action are influenced in inter-ethnic relationships rather than intra-ethnic relationships. This study illustrates that diverse (inter-ethnic) peer networks function as socialization agents for the development of CC in young people.

The Network effect on Accommodation

<u>Guillaume P. Fernandez</u> University of Geneva, Switzerland

Linguistic behavior is a key marker of identity, enabling individuals to position themselves within social spaces. One primary way people use language to signal social belonging or exclusion is through convergence or divergence. Aligning one's linguistic behavior with that of an interlocutor signals social proximity and affiliation, whereas linguistic divergence indicates that the other is perceived as a member of an out-group. Despite the inherently relational nature of this process, empirical evidence utilizing social network analysis (SNA) remains limited. This study seeks to uncover how social structures influence accommodative behaviors, employing SNA for the first time in this context.

We examine the adverbial practices of twenty-five young adult speakers across seventy-five interactions with members of their personal networks. Using Generalized Estimating Equation (GEE) models, our findings reveal that accommodation is influenced by two structural levels: the overall social network structure and the integration of alters within it. At the network level, higher clustering and increased homophily are linked to greater linguistic convergence. At the dyadic level, when an alter is central within the emotional support network, ego exhibits a stronger tendency to converge linguistically. Additionally, our results suggest that the structural effects interact with the composition of the personal network.

These results underscore the combined impact of network structure and composition in shaping linguistic behaviors, offering new insights into how social connections reinforce norms and drive linguistic variation

OS-190: Social Capital and Social Inequality 2

Location: Room 105 Session Chair: Rochelle Cote Session Chair: Steve McDonald

Class, personal networks and political attitudes in Chile

<u>Gabriel Otero</u> Universidad Diego Portales, Chile

Existing research on the class divide in political attitudes has largely focused on individual class positions, with limited attention given to the role of class-based personal networks. To address this gap, this paper examines the relationship between individual class positions, the class composition of personal networks, and political attitudes toward both socioeconomic and sociocultural issues. I propose two main hypotheses regarding the role of personal networks in shaping political attitudes. First, personal networks may influence political attitudes independently of an individual's class position. Second, the influence of personal networks on political attitudes may vary depending on an individual's class position. This study utilizes quantitative data from three waves (2016–2023) of the Chilean Longitudinal Social Survey (ELSOC), a representative panel survey of the urban Chilean population. Explanatory analyses using multivariate regression models reveal that variations in political attitudes are significantly shaped by network composition. Specifically, individuals with heterogeneous networks tend to display more progressive and egalitarian views, while network segregation leads to notable attitudinal differences, particularly across different classes. These findings highlight the critical role of personal networks in understanding how class influences political attitudes.

Economic vulnerability and social capital: lessons from online platform labour

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Over time, the notion of social exclusion has evolved to encompass vulnerability in the sense of exposure to economic insecurity and risk. This is particularly relevant amidst the progressive erosion of the secure, stable career patterns that used to be based on permanent salaried employment, especially in Europe. The recent rise of digital platform work has intensified precarity and poverty risks, reconfiguring inequalities in ways that remain only partially understood.

The proposed presentation operationalises the concept of individual economic vulnerability seen as heightened risk of multidimensional deprivation. We build a composite indicator that incorporates economic-financial and

familial factors, along with human capital (education and skills) and social capital (resources embedded within personal networks), both essential for labour market success. Social capital is particularly important as a buffer against precarity, though its distribution may be uneven and contingent on contextual factors.

We harness original data from a survey of online platform workers in France (n = 908, 2018) and Spain (n = 447, 2020-22), using a position generator to measure social capital. Results show that most workers display signs of exposure to economic risk, with distinct sub-groups combining multiple sources of vulnerability. Notably, groups already marginalized by their gender, age, or migration history exhibit the lowest social capital and highest vulnerability. We conclude that non-standard, technology-enabled job arrangements reproduce inherited patterns of inequality and deprivation.

The Relationship between Social Network Structure, Wealth, and Wealth Inequality Across Cultures

<u>Eleanor A Power^{1,2}, Matthew O Jackson^{3,2}, Samuel Bowles², Monique Borgerhoff Mulder^{4,2,6}, Daniel Redhead⁵, Jeremy Koster⁶, Thomas Rutter³, Sahana Subramanyam³, Justin Weltz², The ENDOW Team⁷</u>

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We present new data collected from over forty rural communities around the world to analyse the relationship between material wealth, inequality in wealth, and a variety of social support networks that connect "sharing units" (households) together. These data were gathered as part of the "ENDOW" project (for Economic Networks and the Dynamics Of Wealth inequality, a large US NSF-funded collaboration). The ENDOW communities show immense diversity in their institutional, cultural, and economic arrangements, ranging from farming villages in India to fishing settlements in Ecuador to pastoral groups in Namibia. Anthropologists working with each community have gathered extensive demographic, economic, and social support network data that form the basis of our analyses.

Looking within communities, we find consistent positive associations between sharing unit wealth and both access to support (out-degree) and provisioning of support (in-degree) within the community, and more mixed associations with access to support beyond the community. We also find a form of wealth homophily in that sharing units that have a greater fraction of their connections to wealthy sharing units are significantly wealthier themselves (economic connectedness, Chetty et al 2022). Across communities, we examine how network features predict which sites have greater material wealth inequality. We find that communities that have less economic connectedness (links across wealth levels) have significantly greater wealth inequality. In contrast, we do not find a correlation between the variance in sharing units' access to or provisioning of support and its material wealth inequality. We discuss the implications of these findings and plans for further explorations.

The role of social capital and place in the provision of social support to young adults in Switzerland

Paul Schuler^{1,2}, Gil Viry¹, Mark McCann²

¹University of Edinburgh, United Kingdom; ²MRC/CSO Social and Public Health Sciences Unit, University of Glasgow

Social capital theories highlight the importance of social relationships for health outcomes and life opportunities. However, research often relies on aggregate measures, neglecting how specific tie and network characteristics facilitate resource flow, such as social support. Moreover, discussions on the bonding and bridging function of ties primarily focus on how actors bridge different social groups, disregarding place and space. Especially for young adults in deprived areas, outreaching bridging ties can be crucial, as local ties may only offer limited informational or instrumental support. In this study, we analyse how social capital, manifested in ties that are embedded in residential areas and personal networks, is associated with the flow of resources-specifically, the provision of different types of social support to young adults in Switzerland. Using cross-classified multilevel models, we analyse data from the Swiss Federal Survey of Young Adults (CHX-YASS; n = 79,000). Our findings show that some network measures of social capital remain associated with received support after accounting for tie and individuallevel covariates. At the individual level, social support depends on demand for receivers and available resources for providers, though this varies across support types. Spatial bridging social capital is associated with more advice and encouragement but not with more emotional support. This study contributes to the literature on social capital and social support by illuminating both social and spatial functions of social capital. The combined consideration of network and residential characteristics enriches our understanding of the interplay of contextual factors in the provision of social support.

Racial Differences in Social Capital Volunteering Activities: How Race Influences Opportunities.

Ester Villalonga Olives

University of Maryland, United States of America

Introduction and Aim:

Volunteering is a form of social capital that fosters trust and reciprocity within communities. However, measures of volunteerism often assume uniform experiences across racial groups, overlooking unique perspectives, particularly those of Black individuals. This study aims to quantitatively test for differential item functioning by race (DIF) in survey questions assessing volunteerism and qualitatively investigate reasons for finding DIF.

Methods:

We analyzed publicly available longitudinal data (1995–2016) from the Midlife in the United States Study (MIDUS) (n=6,695). Structural Equation Modeling and Item Response Theory analyses were used to detect DIF by race. Additionally, after identifying DIF items, we performed qualitative interviews (n=47) to explore explanations for DIF.

Results:

Findings revealed racial differences in volunteerism patterns. Black individuals were more likely to volunteer in social organizations ($P(\chi^2,2) = 0.00$), while White respondents were more engaged in youth-related work. Several survey items showed DIF by race, particularly "volunteering at schools or other youth-related work" and "volunteering for other relevant organizations or causes." Qualitative findings reinforced these results, highlighting that Black participants were more often employed by community organizations, reflecting structural and cultural differences in volunteer engagement.

Conclusion:

Our findings emphasize the need for intervention planners and policymakers to account for racial variations in volunteerism. Standard survey measures may inadequately capture these differences, leading to biased assessments of social capital. Future research should refine measurement tools for cultural relevance and examine how structural factors shape racial disparities in volunteer work.

Generosity and Reputational Concern Across Cultures: Networked Dictator Games in Five Countries

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We conduct experimental economic games to study how reputational stake influences people's decision-making. Players make a series of "Dictator Game" decisions, splitting an endowment between themselves and a recipient. Crucially, recipients are not anonymous strangers but are other community members, presented via photo. By varying the identity of the recipient and whether they will come to know the identity of the donor, we effectively vary the reputational exposure of the donor's decision. We expect that players will be more generous when their decisions have greater reputational stake. This greater reputational stake could come from: the revelation of the donor's identity, the social proximity of donor and recipient, and their respective network positions. We conduct these games in eight rural communities in five countries (India, Colombia, Nepal, Morocco, and Mexico), where we already have full sociodemographic and social network data. This entails over 1500 players and almost 50,000 allocation decisions.

While there is substantial cross-site variation in the average amount given (implying different cultural norms), we find strikingly similar effects of social proximity and revelation across sites. Donors give more of their endowment to friends or friends-of-friends, as opposed to more distant recipients. We further find a small but consistent effect of revelation on Dictator Game allocations: donors give more of their endowment when their identity is revealed, as opposed to being kept anonymous. There is greater heterogeneity in how revelation interacts with social proximity and the network position of donor and recipient, the implications of which we discuss.

OS-189: SNA, collective mechanisms and social capital 2 Location: Room 112 Session Chair: Emmanuel Lazega

Sparking Institutional Entrepreneurship: Mobilizing Support for a Non-traditional College

<u>Ajay A Shah</u>

Emory University, United States of America

Networks serve as important enabling conditions for individual actors to pursue and implement changes to organizational models that diverge from existing institutions (i.e. institutional entrepreneurship). While much work on institutional entrepreneurship has considered the organizational-level of analysis, lesser attention has been paid to the role of individual actors' embeddedness in local geographic communities as a facilitator of divergent institutional change. I examine this domain by drawing upon Obstfeld et al.'s (2020) network assembly perspective of entrepreneurial action. I leverage archival documents (e.g., correspondence, newspapers, etc.), oral histories, and secondary sources to examine a historical case of a public downtown college in the Southern United States. Largely catering to a non-traditional working adult population, institutional entrepreneurship efforts were challenged by strong political and institutional resistance to the divergent organizational form. Nonetheless, these change efforts succeeded, ultimately elevating the college's designated status from a junior to senior institution. I argue the enterprising spirit and personal popularity of the college's director, and later president, played a critical role in ensuring internal and community-level network resources could be mobilized, ultimately securing political and institutional legitimacy for the college. This work contributes to the literature by using a process approach to examine Obstfeld et al.'s (2020) model within the context of institutional entrepreneurship (as opposed to new ventures/start-ups). At the same time, this study considers the crucial role networks embedded within local geographic communities played in institutional change efforts, while considering how individual characteristics (e.g., personal popularity) contributed to successful network mobilization efforts.

Synergy or Segregation? Dissecting Collaboration Regimes in Al Repositories on GitHub

Antoine Hugo Houssard¹, Sylvain Fontaine^{1,2}

¹CNRS; ²Sorbonne Université

Scientific collaboration between academia and industry is now commonplace, particularly in technical fields of research [8,6,9] such as AI [4,1]. While many sociological, economical and research policy studies highlight the motivation, profile, and impact of scientists and institutions involved in such research [8], only a few focus on the various forms of cooperation between academics and industrials.

Among the latter, we can cite the notable work by Shinn and Lamy [10], who proposed a categorization of collaboration regimes. The authors contrast the "Academic" ethos, characterized by punctual, limited, and strategic involvement, with "Pioneers" who develop long-lasting and synergetic working relationships.

However, the field of AI challenges this partition. Authors such as Ahmed et al. [1] or Jurowetzki et al. [5] show that industrials dominate the field, with scientific and technical productions centered around a few companies, and Garousi [3] highlights the difficulties of collaboration in software development.

These facts may contribute to reinforce boundaries between academia and industry.

Through an in-depth analysis of collaborative project within GitHub repositories, our study questions the relevance of the aforementioned categories in the production AI technoscientific objects and provides new insight in the way academic and industrial actors organize their collaboration.

For our initial investigations, we focus on two deep learning repositories authored by both academics and industrials: Scikit-Learn [7] and Apache-MXNet [2].

To conduct our research, we have collected extensive information on users and commit's and issue's history. In addition, we have retrieved institutions using the users' profiles and a manual retrieval for the most active committers. We then have classified users as belonging to either academia, industry or a mixture of institution types. Finally, based on the commits, we have constructed time-aggregated co-modification networks for the repositories, which constitute proxies for collaboration networks.

Our analysis reveals two distinct collaboration regimes among programmers involved in the two projects.

First, the development of Scikit-Learn is almost equally shared between academicians (39%) and industrials (43%). This is shown by the inter-commit time, which follows very similar trends between the two groups, as well as the response time in issues' discussions. Moreover, the collaboration network of the repository exhibits a significantly high probability of collaborations between users' types. These observations testify to an equal division of technical labor in the repository.

This mixed regime contrasts with that of MXNet, which is mostly invested by industrials (70% with 27% coming from Amazon). Initially developed with an uneven distribution of collaborations since 2015, the repository experienced the withdrawal of academic contributors in 2020, resulting in full industrial management that have reinforced this asymmetry.

Overall, Scikit-Learn shows a strong academic-industrial synergy, with users embracing the "Pionners" ethos, whereas MXNet seems more fragmented in the labor distribution over the course of its development.

Although this initial research shows significant differences in collaboration regimes, further research is needed, focusing on issue discussion threads and committer diversity across files/modules. Finally, we plan to extend our investigation to other repositories to get a broader view of possible collaboration regimes.

The relational emergence and impact of organizational dissonance: case study results for further theoretical and empirical investigations.

Selene Greco

Sapienza University of Rome, Italy

The paper deals with the problem of interaction between conflicting orders of worth in organizations. When multiple orders of worth interface in the same setting, this state of organizational dissonance leads to situations of frictionbased conflict. Friction constitutes a double-edged sword for organizations, as status competition can be. If well channelled, it can foster reflexivity and innovation enhancing corporate social capital; if mishandled, it can cause structural distress, jeopardizing corporate social capital. This research has the dual aim of exploring the relational emergence of dissonance and the collective mechanisms that mediate its impact on organizations. To this end, the paper presents an explorative case study of a non-profit organization. Using a qualitative research strategy, the interacting orders of worth are reconstructed visualizing, in a two-modes network, their links to the structural positions of their bearers while analysing the dynamics of friction within the hieratic style of the organization under investigation. Drawing on Harrison White, we conceive ties as bearing prisms of meaning as identities' efforts at control entail their footing in specific angles of perception. Thus, the partition of organizations' relational infrastructure in specialized substructures is linked to the emergence of differentiated orders of worth in the identities coexisting in different relational positions. Moreover, the quality of the orders of worth is reconnected to higher-level social formations addressing the organization's embeddedness within its operational environment. Finally, the relational infrastructure is hypothesised to have a mediating role for the outcomes of dissonance through the mechanisms activated by strategic interdependence between specialised compartments.

Transitivity and Social Capital in Migrant Organizational Networks: A Comparative Network Analysis Across Five European Cities

Foteini Panagiotopoulou

University of Leicester

Transitivity as a structural property of social networks reflects cohesion and can relate to the formation of social capital. In the context of migrant organizational networks, transitivity provides insight into collaborative structures, advocacy potential, and the distribution of resources. This paper explores transitivity within migrant organizational networks across five European cities -Zurich, Budapest, Barcelona, Madrid, and Athens- using binary and weighted networks to investigate cohesion and tie strength. Findings show variation among cities in terms of global cohesion, with both Athens' and Madrid's networks having higher binary transitivity, thus denoting higher levels of cohesion. In contrast, the networks in Zurich and Budapest are characterized by lower binary transitivity, suggesting more fragmented, less cohesive networks that possibly do not develop strong integrating structures. The measurement of weighted transitivity focuses on strong ties, as observed in Budapest, where fewer triads exist, nevertheless potentially fostering social capital. The results relate to the role of network structures in shaping migrant organizations' capacity for information exchange, resource mobilization, collective and political action, and civic engagement. Thus while a high level of transitivity reflects higher levels of cohesion, the differences between binary and weighted measures suggest that it might be the strength of the ties that matters for the effectiveness of the networks. This comparative study contributes to discussions about connectivity, bonding and bridging ties, and their role in political participation. It also underlines the need for future research into how network cohesion influences the long-term sustainability and advocacy strategies of migrant voluntary organizations.

COMMERCE DES RESSOURCES HALIEUTIQUES ET SÉCURITÉ ALIMENTAIRE DANS LA SOUS-PRÉFECTURE DE BÉOUMI (CENTRE DE LA COTE D'IVOIRE)

YAYA DOSSO

Université Alassan Ouattara, Côte d'Ivoire

La question de la sécurité alimentaire liée au commerce des ressources halieutiques en Côte d'Ivoire demeure une problématique d'actualité. Dans le pays, la principale source de protéine d'origine animale consommée par les populations est le poisson. Dans la Sous-préfecture de Béoumi, la disponibilité de cette protéine animale est liée à la présence de cours d'eau que sont le Bandaman blanc et le kan. Le dynamisme des activités de pêche dans cette circonscription administrative suggère de s'intéresser à la contribution du commerce des ressources halieutiques à la sécurité alimentaire des populations riveraines. Cette étude vise à expliquer la contribution du commerce des ressources halieutiques à la sécurité alimentaire dans la Sous-préfecture de Béoumi. Pour y parvenir, la méthodologie déployée s'est appuyée sur l'exploitation des données issues de l'observation, la recherche documentaire, des entretiens avec les populations et les acteurs du commerce des ressources halieutiques. Il ressort de cette étude que le commerce des ressources halieutiques dans la Sous-préfecture de Béoumi contribue faiblement à la sécurité alimentaire des populations. Aussi, dans le but de réaliser un maximum de profit, les poissons sont vendus hors de ladite circonscription administrative et coûtent excessivement chers au regard des revenus faibles des populations.

OS-206: Network Change, health, and Wellbeing 2

Location: Room 125 Session Chair: Soli Dubash

Social network turnover and mental health in rural South Africa

Guy Harling^{1,2}, Dorottya Hoór¹, Xanthe Hunt^{2,3}, Vuyiswa Nxumalo²

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Background: Stable close personal ties predict good mental health in adolescence. Evidence among young adults who have left formal education is more limited. We therefore describe how core network stability of rural South Africans predicts psychosocial wellbeing.

Methods: We study the first two waves of a sociocentric network study 20 months apart focused on young adults (ages 16-29) in rural South Africa run from 2022-25. At each wave respondents (egos) are asked to report on their key social contacts (alters); at Wave 2 respondents were asked what happened to their relationship with contacts named in Wave 1. Egos were also asked about their mental health using the 14-item Shona Symptom Questionnaire and the 8-item UCLA Loneliness Scale.

Preliminary Results: 429 individuals have completed both waves by February 2025. Egos named 3.2 alters in each wave, but 45% of alter identities changed. Baseline alters were 59% relatives, 31% friends and 10% sexual partners; family were most often retained, partners moderately and friends least. Poorer mental health at Wave 2 was associated with smaller baseline social networks and independently with greater turnover between waves, conditional on demographics, baseline mental health and network size. Wave 2 perceived social isolation was also greater in networks with more turnover but unrelated to network size.

Discussion: Unstable networks predict poor mental health among rural South African youth, suggesting targets for identifying those at risk and intervening to improve wellbeing. For Sunbelt we add data on alter types gained/lost and reasons for network turnover (e.g., interpersonal conflict, economic mobility), expecting negative peer influence and involuntary network loss to predict poor outcomes.

Mitigate or Amplify? Social Integration and Health Disparities between Never- and Ever-Married Adults

Lijun Song, Zhe Zhang

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Despite the rapid growth of the older never-married adult population, they remain underexplored—both as a distinct group and in comparison to their ever-married peers. Whether social integration mitigates or exacerbates disparities between older never- and ever-married adults remains unexamined. We integrate two competing theoretical frameworks—social precarity (or risk) versus social premium (or resilience) and social exacerbation

versus social compensation—to investigate the relationship between lifelong singlehood and health, as well as the moderating role of social integration. Using longitudinal, nationally representative data from the Health and Retirement Study, our findings largely support the social precarity and social compensation models. Older nevermarried adults experience lower levels of social integration compared to their ever-married peers. However, their health benefits more from social integration than that of ever-married peers, suggesting that social connections play a particularly crucial role in mitigating health disparities for lifelong single adults.

OS-145: Intergroup Relations in Social Networks 4

Location: **Room 204** Session Chair: **Tobias Stark**

Passing on Identity: Exploring the Parental Role in Children's Ethnic Self-Identification

<u>Miriam Feldhausen</u>

Goethe-University Frankfurt/Main, Germany

Parental influence plays a crucial role in shaping children's ethnic self-identification, particularly in families with mixed ethnic backgrounds or migration histories.

Drawing on social identity theory and ethnic boundary-making perspectives, this study examines the patterns and dynamics of ethnic identity transmission from parents to children in Germany.

Using descriptive analysis, I investigate differences in ethnic self-identification of parents and children across ethnic groups and generational status in first- and second-generation immigrant families, considering the interplay of generational status and ethnic group membership.

Using a longitudinal approach on parent-child dyads, I examine how parental ethnic self-identification shapes children's identity formation over time and how parents transmit their ethnic identity to their child.

The analysis draws on longitudinal data from the Friendship and Identity in Schools (FIS) study and the Children of Immigrants Longitudinal Survey in Four European Countries (CILS4EU-DE) to examine ethnic self-identification patterns over multiple waves of data. The analysis offers new insights into the intergenerational transmission of ethnic identity, highlighting the complex dynamics between parental influence, ethnic background, generational status, and children's identity development.

OS-12: Community-Based Participatory Research Approaches in Social Network Analysis

Session Chair: Jennie Rhodes Law

Game Affiliation among Latino Men Who Have Sex with Men: A Two-Mode Network Analysis for HIV Prevention Intervention Development

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Background: Current HIV prevention tools, like pre-exposure prophylaxis (PrEP), do not adequately reach Latino men who have sex with men (LMSM) in the U.S., highlighting the need for innovative strategies. Game-based interventions for health promotion are emerging, but few are tailored for HIV prevention among LMSM. This study aimed to examine online game genre preferences among LMSM to inform the co-development of a culturally-tailored HIV prevention intervention, ensuring it resonates with this priority population.

Methods: LMSM online gamers (n=73) participated in a cross-sectional study from February 2022-August 2023 in Miami, Florida. A two-mode network was created using tie information across 13 game genres. The PrEP Cascade position scale (PrEP Pre-Contemplation, PrEP Contemplation, PrEParation, PrEP Action & Initiation, and PrEP Maintenance) was included as an attribute. An exponential random graph model examined whether LMSM in similar PrEP Cascade positions shared ties to game genres. Visualizations and analyses were conducted in R version 4.4.1.

Results: The network had 225 edges between LMSM and game genres, with a density of 0.237. On average, LMSM endorsed 3.1 genres, with action/adventure, first-person shooter, and strategy games being common. LMSM in the PrEParation stage endorsed more genres than those in the Pre-Contemplation stage (OR: 3.49; p=0.0328). LMSM with similar PrEP Cascade positions were more likely to share game genre ties (OR: 1.12; p<0.0001), suggesting PrEP status influences game genre preference.

Conclusion: Considering LMSM's PrEP Cascade position, game genre characteristics should inform the development of interventions tailored to promote biomedical HIV prevention in this priority community.

les réseaux d'acteur de l'éducation inclusive, de l'établissement aux territoires apprenants

Abdoulaye GADIAGA

Université de Rouen, France

Ce projet de thèse a pour objet principal est d'étudier le dynamisme et les interactions en réseau des acteurs de l'éducation inclusive dans les territoires d'étude du PIA 3 100% IDT ; des territoires académiques à des territoires apprenants. Il participe des travaux des observatoires des territoires inclusifs de l'action 1 du PIA 3 100% IDT, dont l'objectif est de décrire et suivre de manière longitudinale notamment les dispositifs structurels et/ou organisationnels pour une inclusion pour tous dans les différents territoires (ville, REP+, péri urbain, rural en ce qui concerne plus particulièrement cette approche).

Cet article cherche plus précisément à identifier et à cartographier les différents réseaux d'acteurs des territoires apprenants depuis les établissements éducatifs (collèges, IME etc.) pour comprendre et analyser leurs relations structurelles. Une analyse préalable de l'interaction des structures institutionnelles (Education Nationale, médico-social et éducation populaire) est engagée dans la mesure où le fonctionnement de chaque organisation est lié au fonctionnement des autres ; d'où une approche qui s'appuie sur l'interactionnisme structural. Cette thèse a aussi pour objectif d'inscrire les relations entre acteurs dans des dynamiques territoriales pour envisager comment les territoires les affectent mais aussi comment elles font territoire voire territoire-apprenant. Les questionnements sur les stratégies territoriales et la fragmentation des territoires apprenants sont au cœur du questionnement.

Cet article recherche ainsi une analyse critique des organisations structurelles des acteurs de l'inclusion au prisme de leurs pratiques effectives et territorialisées. Elle vise à mettre au jour les dynamiques territoriales spécifiques des différents acteurs et institutions dans la poursuite d'une structuration et du renforcement de l'éducation inclusive des enfants en âge de scolarisation au collège. Il convient pour cela de décrire les dynamismes des réseaux d'acteurs inscrits dans les territories d'étude depuis les établissements scolaires de référence, lieu où se retrouvent tous les enfants de cette classe d'âge.

The Power of Place

Drew Mackie Drew Mackie Associates, United Kingdom

I'm a free-lance consultant in netmapping and analysis based in Edinburgh, Scotland but working throughout the UK for government, corporate, charitable and community clients. I have almost 20 years experience using mapping and analysis tools, exploring the useful hints and insights that netmaps provide and testing them by action in the field.

This paper covers work in communities across the UK to create and analyse network maps of community activities, resources and leadership. These maps have typically been created as part of a wider study of local social and economic capital. They are not academic studies. They provided the hints and insights leading to actions to improve local connectivity and create social capital. Although they are place-based we are careful to advise clients to let the networks define themselves rather than being tied rigidly to geographic boundaries. Often two local actors will connect to each other through a third party that is not locally based.

Map examples will demonstrate the use of Kumu software in:

- * Exploring the power of place in determining collaborative links in the craft sector in Ireland
- * Establishing issues facing local communities through group storytelling to identify local actors
- * Using 'instant participatory maps' to engage actors at events in Milton Keynes, York and London
- * Comparing network position with skills and resources held to assess the capabilities of local organisations.

* Training local groups to understand and use the maps and to update their data to automatically update the map.