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Online social networking platforms can have a significant impact on how users conceptualise social relatedness. Such platforms mediate forms of social interaction giving way to the emergence of new characteristics of social ties. Such dynamics of digitally mediated social interaction can give way to alternative forms of interpretations in terms of the perceived quality of social relatedness. Thus how do individuals using online social networking platforms perceive the characteristics of digitally mediated social ties in their networks? In this paper, I aim to trace the perception of digitally mediated social ties by way of enabling study participants to freely express their interpretation of digital social connectedness. Applying an innovative qualitative approach to social network research, I have used hand drawn network maps to enable study participants to elicit data on the nature of digitally mediated social ties. By using this qualitative approach I managed to (a) trigger anecdotal responses regarding how individuals perceive what digitally mediated social ties are (b) to determine in what circumstances they become relevant and (c) how individuals evaluate the relevance of these specific ties as part of their networks. The results show that respondents’ perceptions concerning the quality of digitally mediated social ties go beyond the predominant concepts of social ties. Most strikingly, digitally mediated social ties seem to deviate significantly from the strong tie – weak tie categorisation, which have so far been prevailing concepts in social network analysis. In specific, my results show that this established dichotomy is insufficient when trying to explain the perceived nature of digitally mediated social ties. Showcasing examples from my empirical research with creative professionals, I thus put forward a concept for a new type of social tie, which I shall call “liquid tie”. Liquid ties are characterised primarily by their amorphous quality, resulting in the fact that digitally mediated social ties cannot be categorised per se as either weak, strong or latent. Rather, it seems highly contextual whether digitally mediated social ties take on the shape of weak or strong ties. Interestingly, digitally mediated social ties seem to be perceived as taking on shape and thus emulating the qualities of strong ties for example only in very specific contexts. Thus, these social ties are not perceived as a durable element of individuals’ social networks, but rather as temporarily shaping an individuals’ personal network contingent on context and interpretation. In this paper, I also make a first attempt to harmonise and integrate my findings with existing tools of social network analysis, preserving the ability of systematic analysis of individuals’ social relationships, yet taking into account the diversity of interpretations of social relationships.

Jimi Adams
University of Colorado Denver
Ryan Light (University of Oregon)

A Multi-level Life Course Model of Knowledge Production

We argue that the means by which projects spanning multiple disciplinary boundaries (e.g., interdisciplinary, multidisciplinary or transdisciplinary research) are evaluated has been under-theorized. In response to this limitation, we develop a dynamic model of how disciplinary boundaries are constructed, maintained and crossed, as a means to identify how academic research fields change as they develop. This model offers three improvements over previous research on disciplinarity by: (1) explicitly identifying the dimensions along which disciplinary integration takes place; (2) accounting for temporal dynamics in the evolution of research fields across those dimensions by adopting a life course perspective of change; and (3) resolving tensions in previous models by accounting for disciplinary (lack of) integration that varies simultaneously across multiple levels. To empirically investigate this model, we employ a combination of bibliographic coupling networks and topic models of scientific abstracts, focusing on research from demography, religion and HIV/AIDS to identify observed trajectories. These examples demonstrate how the proposed model advances both our understanding of interdisciplinary dynamics, and the ability to evaluate their successes.

Filip Agneessens
University of Surrey
Johan Koskinen (University of Manchester)

**Individual, dyadic and group effects of attributes on trust formation: Multilevel ERG modelling**

The emergence of trust ties in work groups can be explained by a variety of processes at different levels. First, individual employees differ in their propensity to trust and their likelihood to be trusted. Hence, we investigate which characteristics (such as gender, age, etc) might make them more likely to trust their colleagues and which characteristics make some employees more trustworthy than others. Second, homophily has long been considered a crucial basis for trust, as similarity in characteristics makes it easier to understand each other. Third, trust is likely to emerge in close triads, leading to a need to incorporate triad effects. To study these different effects, we use ERG models allowing us to incorporating individual, dyadic and triadic structural effects. Finally we also incorporate group effects, as the emergence of trust might also be impacted by the composition (such as diversity in gender, age, etc) of the group as a whole – whom do you trust when team’s job satisfaction is low; is the homophily effect stronger when diversity is high? . The inclusion of both individual, dyadic, triad and group level effects requires a multilevel ERG models, with the individual, dyadic and triadic effects being nested within group level effects. Data consists of the trust relations among 300 employees in 27 teams.

Aliakbar Akbaritabar
Allameh tabatabaei University

Jafar Hezarjaribi (Allameh tabatabaei University)

**Virtual-Cyber Social Capital; a new method to measure Online Social Capital**

Main question that this research project have been trying to answer based on Nan Lin's theory of Social Capital is what affects user's structural position in online social network in order for him/her to gain access to more potential social capital. After that, what aspects of individual's personality or SES has more influence on their will and ability to mobilize this potential social capital to result in person's possession of different outcomes and supports. we have mixed three different types of generators for social capital measurement titled as Name, Position and Resource generators in an integrated Online application that let us see all members of a users' personal social network along with combining it with supports and resources s/he has gain access to based on this people's socio-economic positions. Beside that, we have utilized measures for health and quality of life (designed by WHO), and we have developed scales for Virtual Social Capital and Netizenship, that when a user decides to give our Online application (http://socialvillage.me) access to his/her data, and when s/he answers these scales questions, s/he will see his/her score in real-time and also we have put some interpretations for them to be able to get much more knowledge of their online life and see their most relevant people's picture in an interesting way, in exchange for their participation in this research.

Fruzsina ALBERT
Károli Gáspár University of the Reformed Church in Hungary, Sociology Department

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**What happens to ties during incarceration and what are the consequences for reintegration? Results of a two-wave qualitative survey**

Prisons are total institutions that intend to regulate (among many other aspects) the maintenance of friendship and family ties of the incarcerated persons. Contacts with family members and friendship networks are limited and made difficult by the restrictions, administrative and financial burdens. Prisons would provide plenty of time and opportunity for the formation of new friendship ties among inmates. However, lack of trust and fear of consequences have an effect, too. These results are clearly seen from our study (financed by OTKA-101325): 80 young men who served their prison sentence of up to three years as first-time offenders were interviewed some months before leaving prison and then again after spending some months out of prison (we could reach slightly more than one third of our original sample). Our results show that the prison experience plays a very significant role in the (re)evaluation of ego's interpersonal ties. While in most cases ties with parents become stronger, in many cases romantic partnerships are at risk and friendships are also put to a test. Considering that social capital is extremely needed after re-entry, we investigate the perceived role of strong and weak ties in the
The provision of housing and employment opportunities and emotional support, that is, their role in the success or failure of reintegration.

Meltem Alemdar  
Georgia Institute of Technology

Christopher Cappelli (Georgia Institute of Technology)

**An Assessment of the Collaborations for inter-institutional translational research Using Social Network Analysis**

The Atlanta Clinical and Translational Science Institute (ACTSI) is a multi-level, multi-organizational collaboration to foster the rapid and efficient translation of scientific discoveries to community practice through research collaboration, training, and community engagement. One of the primary goals of the ACTSI is to engage clinical researchers, basic scientists, public health researchers, community-based practitioners, and private sector partners to foster translational research across diverse disciplines, organizations, and institutions. One way to demonstrate collaboration is through the use of social network analysis (SNA) tools. SNA has long been used for objectively characterizing collaboration networks (Otte & Rousseau, 2002). The present study was undertaken as part of a comprehensive evaluation to assess changes in patterns of inter- and intra-organizational research collaborations during a seven-year period (2007-2014). During this period, the average number of ACTSI awarded projects varied from a low of 309 in 2007 to a high of 642 during 2010. In 2014, the number of ACTSI awarded projects was 444. The current study uses a secondary data source, such as publication data, to assess changes in patterns of intra- and inter-institutional research collaborations for the period of March 2006 - December 2014. Additionally, this study seeks to show if the pattern of collaboration between partner institutions has changed. An analysis of main components in the publication network indicated increasing collaboration between network affiliated actors for the study period, with 44% and 76% of actors connected in the main component for the years 2006 and 2013, respectively. In addition, other network metrics indicated increasing collaboration during the study period, such as the average degree, which increased from 2.62 in 2006 to 3.80 in 2013. The current study will also include 2014 publication data. In Spring 2014 and 2015, a SNA survey was also distributed to ACTSI investigators to collect data on various attributes to explain the nature of investigator collaboration. Preliminary survey results show that investigators who found ACTSI resources beneficial are more centrally located in the network than investigators who did not find the resources beneficial. In this study, we will also provide a basis for assessing longer-term contributions of support to scientific discovery and transdisciplinary science. The challenges that we have experienced throughout the process of conducting a SNA study as part of a complex, multi-organizational infrastructure program will also be discussed.

Klara Alen  
KULeuven

Koenraad Brosens (KULeuven), Jan Aerts (KULeuven), Astrid Slegten (KULeuven), Fred Truyen (KULeuven), Paul McClean (Rutgers University), Neil de Marchi (Duke University)

**MAPTAP: multi-dimensional data, dynamic networks, creative atmosphere. A new approach to early modern tapestry**

This poster aims to introduce a new methodology for the study of artistic networks in early modern Europe. Historical network research has barely found its way into art history. This is because (1) art historians traditionally focus on artists and works of art (rather than on networks), and (2) they tend to believe there is not enough archival data to warrant a network-centered approach. Unfortunately, pioneering attempts to reconstruct, visualise and analyse networks in art history have been counterproductive, not in the least because they fail to explain the complexities and development of the datasets fueling the approach and because they fail to elucidate why it can help us to understand artistic developments (e.g. Rubens’s network in Ecartico). The poster first introduces MapTap. MapTap, short for ‘Mapping the Antwerp-Brussels-Oudenarde Tapestry Complex via Social Network Analysis (1600-1700)’, is a project funded by KULeuven and the Flemish Science Foundation. MapTap’s design and ambition are inspired by a handful of recent studies suggesting that tapestry entrepreneurs invested highly in the development of their social networks. These networks were a means to minimize the...
manifold risks and uncertainties characteristic to their capital-intensive business. The project aims to investigate (1) how producers developed and managed their networks, and (2) how these collaborative networks both shaped and responded to artistic developments. The poster then discusses the database design developed to accommodate a wide array of archival documents revealing categorical, relational and spatial data on actors and works of art. The database now includes about 2200 nodes and 70,000 edges mined from more than 1,000 different archival documents and is daily growing. Finally, the poster shows some of our first attempts to visualize and analyze the dynamic networks emerging from the rich dataset. Experiments in Gephi, processing.org, and Tableau look promising: betweenness centrality measurements, for example, have identified chokepoints between the Brussels and Antwerp production centers that were as yet minimized or unknown – and that shed new light on artistic developments and the creative atmosphere. Rubens’s Network in Ecartico: http://www.vondel.humanities.uva.nl/ecartico/networks/index.php?ego=6423 MapTap: https://www.arts.kuleuven.be/studiesinwesterntapestry/maptap2

Daniel Alexandrov
National Research University Higher School of Economics – St. Petersburg

Valeria Ivaniushina (National Research University Higher School of Economics – St. Petersburg), Vera Titkova (National Research University Higher School of Economics – St. Petersburg)

Network structures and adolescents’ sense of school belonging

Our proposed paper deals with the relation between the structural properties of social networks and attitudes and psychological characteristics of their members, specifically the sense of belonging to an organization. Large network data sets with many networks analyzed are necessary to show convincingly how network structures are related to nodes attributes. Researchers of adolescence agree that the level of psychological comfort, sense of belonging, and identity formation of teenagers depend on peer support (Newman et al., 2007; Shin et al., 2007), but little is known how the structure of adolescence peer networks and characteristics of ties affect individual attitudes. In the framework of network analysis peer support may be operationalized as number of friends that form a close-knit group in class (clique). The paper is based on our own large original data sets consisting of friendship information from 200 schools, that includes almost 800 classes (= complete class based networks) and nearly 15 000 students. In the classroom networks we identified more close-knit groups of friends using Kliqufinder algorithm (Frank, 1995). Students characteristics used in regression models were sense of school belonging, socio-psychological attitudes (academic motivation, school engagement, anti-school attitudes), psychological characteristics (aggression, social anxiety, depression), socio-demographic characteristics (parental education and occupational status, ethnicity and migration history). On the school level we used data on school type, school size, locality (urban or rural). The analysis is performed in two stages. On the first stage, we computed structural characteristics of every network or subnetwork/clique (density, reciprocity, transitivity, clustering coefficient). On the second stage, these network characteristics are entered into hierarchical regression model. Software: for structural analysis of networks we used R packages sna and igraph; for hierarchical regression modeling we used HLM7 software. We expected the sense of belonging to be associated with structural characteristics of friendship networks: students would have higher level of sense of belonging if they are embedded in highly cohesive networks. Our hypotheses are as follows: (1) on school level: in small and/or rural schools density of friendship networks is higher and it is positively related to the sense of belonging; (2) on classroom level: network clustering is positively related to the sense of belonging; (3) on clique level: cliques’ size, reciprocity and transitivity are positively related to the sense of belonging of their members – in larger and more densely connected groups the sense of belonging is higher. We found that sense of belonging is related to density, reciprocity, and transitivity of classroom friendship networks. Four-level hierarchical model (individual, clique, class, school) demonstrates that clique-level variables (structure of clique networks and socio-psychological attitudes) are more important than class- and school-level in explaining the variation of sense of belonging on individual level. Most important finding is that the relation between psychological comfort and some network characteristics is non-linear.

Zack W. Almquist
University of Minnesota

Yang Yang (University of Minnesota)
Heuristics and data-collection strategies for dynamic network sampling

The popularity of conditional dynamic models for network panel data has greatly increased over the recent decade; however, there are few practical heuristics for what level of temporal sampling -- e.g. weekly, daily or hourly snapshots -- of the evolving dynamic network is required for modeling and estimation purposes. We investigate these models through simulation so as to ascertain when these models are appropriate and when these models should be avoided. Here, we use parameters from empirical models in the literature to inform a series of simulation based studies where we generate synthetic datasets which we then subsample at well chosen time intervals to test the model's ability to recreate the known parameters and macro-level network properties of interest. Beyond purely testing for parameter degradation we will examine a series of predictive checks as proposed in the literature.

Gloria Álvarez-Hernández
Universidad Complutense de Madrid & dubitare

Óscar Pérez Zapata (Universidad Carlos III de Madrid)

Knowledge sharing in intra-organizational networks: Network position and innovation

Knowledge is increasingly important to support key competitive advantages. However there is a need for a better understanding of the knowledge sharing/creation processes that drive innovation and performance in real organizational contexts, more and more structured as virtual social networks. The research uses qualitative and quantitative data from a knowledge sharing network in an engineering community in a multinational corporation. The engineering community goal is to optimize the performance of radio networks. We are aiming for a better understanding of the knowledge sharing networks parameters that affect individual innovation. Dependent variable are innovative contributions at expert conferences. Independent variables are knowledge network indicators taken from the monitoring of 918 emails sent to a distribution list (across ~5 years period and including 173 people in 13 regional and 1 central customer engineering units). Our key variables are centrality measures based on knowledge sharing indicators (frequencies of "questions to the distribution list" or "answers to a question of a distribution list") and other indicators at individual and department level. We use qualitative analysis (email collection and participant observation) to detect patterns of behaviors in the knowledge sharing network. Quantitative methods (multilevel analysis) are used to model innovation indicators. We will discuss the multilevel nature of our setup. Among the main results we found that individuals that have more central positions in knowledge sharing network (higher knowledge Outdegree and Indegree) show more innovative contributions. We also found that the regional customer units that have more central positions in knowledge sharing network (higher knowledge Outdegree and Indegree) show fast technology adoption and better radio performance. Finally we obtain that the central support unit has higher outdegree (members answer more questions) while regional customer units have higher indegree (members receive the answers to questions they posed). This study suggests that knowledge sharing topology is relevant to understand radio network performance and individual innovative behaviours. KEY WORDS: Knowledge networks, knowledge sharing, knowledge creation, Innovation, Multilevel Innovation Networks, Social Network Analysis, Mixed Methods Studies, Multilevel networks, Intra-organizational Networks, Community of Practice

Viviana Amati
University of Konstanz

Felix Schönenberger (University of Konstanz), Tom A. B. Snijders (University of Oxford and University of Groningen)

Using non-cross-lagged statistics to estimate Stochastic Actor-oriented Models for the co-evolution of networks and behaviour

Stochastic actor-oriented models can be applied to analyse the role of selection and influence processes given panel data, where a network and an actor-level variable (‘behaviour’) are observed at several time points $t_0, \ldots, t_M$. In the study of the co-evolution between these two, the network $\mathcal{X}$ and the behaviour $\mathcal{Z}$ are jointly the two dependent variables. The parameters of these models are usually estimated using the method of moments (MoM). Statistics modelling selection (dependent
variable: network) are distinguished from those modelling influence (dependent variable: behaviour) by using time-lagged variables: the combination of values of $X$ at time $t_{m}$ and $Z$ at time $t_{m-1}$ are used to estimate parameters of the selection model, while the combination of values of $Z$ at time $t_{m}$ and $X$ at time $t_{m-1}$ are used to estimate parameters of the influence model. Statistics where all the dependent variables are taken at the same time point, $t_{m}$, are never used, although they do carry information on the simultaneous observation of network and behavioural changes. Here, we present an estimator based on the generalized method of moments (GMoM), using more statistics than parameters, to include simultaneous (non-cross-lagged) statistics in the estimation procedure. The GMoM estimator results from the minimization of a quadratic function based on the difference between the expected values of the statistics and their sample counterparts. A modified version of the Robbins-Monro algorithm is used to approximate the solution of the minimization problem. For some examples we study the resulting gain in statistical efficiency.

Spyros Angelopoulos
University of Nottingham

Erin Connelly (University of Nottingham)

Ingredients Network of Medieval Medicines

In this paper we incorporate a network-based approach to explore the impact of ingredients in medieval medical recipes, as identified in the most ambitious work of Bernard of Gordon, the Lilium Medicinae. Bernard of Gordon was a medical doctor and lecturer in Montpellier, who completed the Lilium Medicinae, in 1305 AD. The Lilium is an extensive treatise on disease aetiology, diagnostics, personal case studies, and treatment recipes. The text was widely disseminated during the medieval period; the Latin text of the Lilium is extant in several dozen manuscripts and multiple printed editions. Furthermore, it was translated into a range of vernaculars, including Hebrew, French, Spanish, and Irish. There is only one extant translation in English, the Lylye of Medicynes, which survives in a fifteenth century manuscript. There are 359 clearly indicated and formally presented recipes in the extant Middle English manuscript, which in several cases include weights, measures, and clear preparation instructions. Based on the dataset of medieval recipes, as extracted for the needs of our study from the Lylye of Medicynes, we built a bipartite network (Newman, 2003; Albert & Barabasi, 2002; Dorogovtsev et al., 2008) consisting of two types of nodes and one type of ties: i) the 359 medieval recipes, and ii) the 656 ingredients identified in the recipes, while the ties indicated the relationship between ingredients and medicines. Whilst ingredient networks are usually represented as bipartite networks, network analysis is rarely applied to them directly, and most often, such networks are first projected to one-mode ones (Ahn et al., 2011; Teng et al., 2012). Projection is a process that transforms a bipartite network to a one-mode one, which in the case of our dataset occurs by linking together the ingredients that are co-present in the same recipe. Thus, for the analysis of the Bipartite network of medicine-ingredients we projected the bipartite network of medicines-ingredients, to a one-mode network of ingredients. In our study we explore the importance of the ingredients of medieval medical recipes through their structural properties in the projected ingredients network. The findings of our study reveal the most significant ingredients from a network perspective, and highlight the need for further research on medieval medicines, and more specifically the systemic and systematic analysis of their ingredients networks. To the best of our knowledge this is the first study exploring the ingredients of medieval medicines through a network-based approach. References Ahn, Y.Y., Ahnert, S.E., Bagrow, J.P., & Barabási, A.L. (2011). Flavor Network and the Principles of Food Pairing. Scientific reports, 1. Albert, R. & Barabasi, A.-L. (2002). Statistical Mechanics of Complex Networks. Reviews of Modern Physics, 74, 47. Dorogovtsev, S.N., Goltsev, A.V. & Mendes, J.F.F. (2008). Critical Phenomena in Complex Networks. Reviews of Modern Physics. 80, 1275–61. Newman, M.E.J. (2003). The Structure and Function of Complex Networks. SIAM Review. 45, 167–256. Teng, C.Y., Lin, Y.R., & Adamic, L.A. (2012). Recipe Recommendation Using Ingredient Networks. In Proceedings of the 3rd Annual ACM Web Science Conference, 298-307.

Artem Antonyuk
St. Petersburg State University

Nikita Basov (Center for German and European Studies, St Petersburg State University – Bielefeld University)
Finding One's Place in Collective Meaning Structures: Sociosemantic Network Analysis of Discoursive Roles

The paper focuses on ways to analyze relationships between individuals and collective meaning structures in communities through interconnection of social and semantic dimensions. We discuss how socio-semantic network visualization and analysis grounded in duality perspective may be employed. We apply a set of techniques to study four art communities located in St. Petersburg using textual, ethnographic and social network data. Visualization of two-mode network data allows to map complex relationships between individuals and meanings underlying production of art and to identify common or specific areas of produced discourse. Further formal network analysis helps to identify which types of semantic structures are associated with different members; to what extent these individuals join collective meanings; whether they are linked to more complex collective meaning structures on their own or when teaming up with others; and finally, how individuals’ positions in communication structures may be related to their discoursive roles. Limitations of the approach and its relevance to theory and practice, requirements to data gathering and processing are also discussed.

Benjamin Armbruster  
Northwestern University  
Li Wang (University of Washington), Martina Morris (University of Washington)

Forward Reachable Sets: Analytically derived properties of connected components for dynamic networks

Analysis of the emergent structural properties of dynamic networks is largely uncharted territory. Forward reachable sets (FRS) are an extension of connected component measures to dynamic networks, defined as the set of nodes that can be reached from an initial seed via a path of temporally ordered edges (Moody 2002). We derive closed form expressions for mean and variance of the exponential growth of the FRS for temporal networks with both edge and node dynamics. The analytic properties are compared for different cross-sectional degree distributions (Poisson and Bernoulli) and edge durations. For networks with node entry and exit, we calculate thresholds for the growth of the FRS. The effects of finite population size are explored via simulations and approximation. The size of the forward reachable set gives an upper bound for epidemic size in disease transmission network models, and our analysis is related to SI and SIS epidemic modeling (Ferguson 2000, Eames 2004).

(note: we are OK if the presentation is moved to the Mathematical Modeling session)

Elena Artyukhova  
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Regional migration in Europe from a network perspective

This study analyzes patterns of intra-country regional migration in Europe. Using network analysis we study structures and properties of interregional migration networks, their similarities and diversity among the countries and their evolution over time. Although migration flows could be perfectly represented as a network, only a few studies have tried to analyze patterns of migration using a network perspective (Slater 2009, Fagiolo 2013, Davis 2013). Thus, topologies of migration networks as well as their evolution over time still remain poorly understood. We expect to find considerable differences in formation of regional migration between “old” (developed) and “new” (post-soviet) European countries. In particular, our main hypothesis is that centripetal forces are stronger in transition (post-soviet) countries where industrial forces are more rapid than in developed countries, those are already industrialized, and growth is stable. These distinctions could be identified through a comprehensive network analysis. The Eurostat's data set on bilateral migration flows between regions for 14 European countries for a period 2000-2007 allows investigation regional migration patterns through a network outlook. We employ networks analysis techniques proposed by Fagiolo at al. (2013), who analyzed world-level international migration from a complex-network perspective. As we show these techniques effectively reveal the nature of intra-country human-movements networks as well. Moreover, to capture pattern of regional migration in more details, we also use methods of reducing weighted complete networks (Batagelj at al. 2014) and analysis of their binary projections.
Martine Azam  
LISST-CERS, Université Toulouse Jean Jaurès

Nathalie Chauvac (LISST-CERS, Université Toulouse Jean Jaurès, Scool)

What became of them at last ? An analysis of trajectories and networks of artists along 25 years.

25 years ago, a survey was leaded on 300 artists's trajectories living in Midi-Pyrenees region (Azam : 1998). Analyses led then had allowed to release types of trajectories corresponding to 3 regional art worlds and a clear report : the difficulty for the artists to drive there activity. Indeed, whatever is the art's world, the level of training, the level of professionalism, the level of recognition, the shape of art they practiced..., all the artists shared great difficulties to find place for exhibition in the region and outside the region and to live on their works. We decided to take back this investigation with this question "what became of them, at last ? ". Our feeling was that, despite their will at the period of the survey, many of them must have abandoned their artistic activity. Our first investigations were done with the Internet. On the Internet, we have looked for traces for 71 artists. And we also made interviews. This exploratory research tends to give some results on trajectories of those artists. We fast noticed that even the most fragile and the least known had pursued their activity of exhibition (exposure). Most of them always live in Midi Pyrenees, continue to have an artistic activity. They have had few turning points. We notice also few professional forks (fields of activity, style of creation or jobs) or cases of change of region. And there is a little visibility at the national and international level, rather a continuity of average visibility. In parallel, interviews give us access to more information particularly on the process, and access to resources, as studies by Grossetti, Chauvac and Barthe (2011), with a quantified narrations method. We rebuilt the narrations chains of each sequence of access to a resource to understand how those artists get the things, advices, locals, they need to continue their activities. The communication will present the results of the two parts of this research. After a rapid presentation of the corpus of artists, we will describe the traces of theirs visible activities on the Internet, and analyze theirs trajectories using social network analysis to understand their embeddedness in art world.

Benjamin E. Bagozzi  
University of Minnesota

Zack W. Almquist

Using Extremist Texts to Uncover Network Structure and Network Features

In their efforts to call attention to environmental problems, communicate with like-minded groups, and mobilize support for their activities, environmental extremist organizations produce an enormous amount of text. These texts, like environmental extremist groups themselves, are often (i) densely connected and (ii) highly variable in the protest activities. Given a corpus of environmental extremist texts, can one uncover the underlying network structure of environmental extremist groups? If so, can one then also identify which extremist groups (and which sub-networks) are more prone to violent versus peaceful protest activities? Using a large corpus of British environmental extremist texts (1992-2003), we seek to answer these questions through a novel integration of network discovery and unsupervised topic modeling that builds upon extant approaches such as Nubbi-LDA (Chang, Boyd-Graber, & Blei 2009) and more recent extensions of the Author-Topic Model (Broniatowski & Magee, 2010, 2011). Using these networks we apply classic network descriptives and more modern statistical models to carefully parse apart these questions. Preliminary findings suggest that our proposed methods can uncover a wide range of revealing insights into the networks and nature of environmental extremists and their texts.

SOUNDARARAJ, Balamurugan  
UCL

(Watson, E.), (Pryke, S.D.), (Addyman, S.), (Badi, S)
A case study of the structure and dynamics of inter-organisational information exchange networks in large, complex infrastructure projects.

Unlike non project-based organisations, organisations formed for large, complex infrastructure projects are temporary, transitory and constitute a number of structurally and functionally diverse organisations which deliver project design and production, post contract. Through analysis conducted as part of a pilot study, it has been demonstrated that these temporary organisations stay cohesive and function efficiently not only through the formal, contractual and functional links between them but also through a non-contractual information exchange network formed between individuals in these organisations, which is different from the former in terms of structure and characteristics. Since the infrastructure industry is moving towards a stronger vertically integrated approach in design and construction by involving contractors early in the design process, it has become important to understand these non-contractual inter-organisational information exchange networks, their structure, dynamics and impact on project performance. In this study, we have closely followed the first six months of the detailed design stage of the Bank Station Capacity Upgrade Project in London, which involves around 220 people employed by more than 18 different organisations working under 20 distinct functional disciplines. We chose a multidisciplinary work package within the project which posed significant design challenges and tracked its performance in terms of cost, risk and schedule. Most importantly, we captured the information exchange network between the individuals involved in the preparation of the work package, in two stages with an interval of three months, by conducting comprehensive surveys asking them to identify and evaluate the information exchange they had with other participants. The structural properties of the resulting network such as size, density, diameter, average path length, distribution of degree, various centralities, size and structure of communities, resilience and dynamics of the above mentioned properties over time between the two stages are presented alongside the discussion on their significance in relation to the performance of the work package and the overall project context. This study serves as a starting point in the broader research to create a network based theory and practice in project management which can be used by managers of large, complex infrastructure projects to ensure efficient design of the organisational structure and timely interventions preventing adversarial behaviour and enhancing project performance.

Ildikó Barna
Eötvös Loránd University, Faculty of Social Sciences

Beáta Dávid (Hungarian Academy of Sciences, Centre for Social Sciences, Institute for Sociology), Éva Huszti (University of Debrecen, Faculty of Health), Ágnes Lukács (Semmelweis University, Doctoral School of Mental Health Sciences)

Contact diary: representative national sample research design and field work experiences

Contact diary is an alternative way to explore ego-centric networks, where respondents give detailed daily records of all their interpersonal contacts during a given period of time. To date, researches applying this method were limited to small and/or special sampling designs, mainly for reasons such as time and money. As participants of a consortium at the Hungarian Academy of Sciences focusing on Integrative and Disintegrative Processes in the Hungarian Society, our research team had the exceptional opportunity to apply contact diary, to our knowledge for the first time, on a representative national sample (n=600). In order to apply contact diary method on such a sample of reasonable size a very thorough preparation phase was carried out. As a result of this a contact diary questionnaire for the recording of two consecutive days was compiled. Since the questioning has just started and by June only preliminary results are to be expected, in our presentation we will focus on introducing the research design and the experiences of field work in our ongoing research. We will give a detailed account of the process how we developed our contact diary questionnaire, including the conceptualization and operationalization of the different Granovetter-type dimensions of tie-strength. We will also introduce the different phases of questionnaire formation and the preparatory procedure of field work. Moreover we will approach the introduction of difficulties and experiences of the field work from different angles. We will present respondents’ reactions to contact diary, field workers’ and interviewers’ experiences, and also the knowledge we, researchers gained from applying contact diary in an unprecedented situation.
Political contributions and brokerage roles, a preliminary analysis

There are substantial bodies of literature on political contributions and the incidence of interlocking corporate directorates, as well as women and directors of color holding important positions within the network by virtue of their multiple board positions. This paper explores whether directors that serve to broker ties between diverse directors are more active in making campaign contributions. This paper first develops a fine-grain analysis of brokerage roles based on race and sex and describes the “decomposition” of the various brokerage roles on the basis of whether the brokerage role represents racial and/or gender diversity. Given this decomposition, the total basket of brokerage roles for a specific director is then characterized by the proportion of roles encompassing race, sex or both race and sex differences. These measures can then be used to determine if higher rates of sex diversity and or racial diversity are associated with higher rates of political contributions.

Social networks and coupled outcomes in a marine social-ecological system

Effectively managing the current and unprecedented level of anthropogenic impacts on the marine environment requires a clear understanding of the components of natural resource systems and their interrelationships. Yet we lack essential information on the social behavior of resource users, and how this behavior may scale up to influence system-level outcomes. To understand these relationships, we linked information on fisher’s cooperative information sharing networks to detailed data on catch and effort and economic cost-earnings in Hawaii’s longline fishery. First, we examined network-level effects of homophily – the tendency for actors interact solely with similar others – on rates of shark bycatch, a significant global environmental issue. Second, we examine the role of social capital, measured from a network perspective, on fisher’s economic productivity. We find that patterns of information sharing mediated by ethnic diversity and social exclusion are strongly related to rates of shark bycatch, providing novel empirical evidence that homophily may impede the diffusion of sustainable behaviors among resource users. Our results also indicate that prominent fishers firmly embedded within ethnic groups are significantly more productive than others, while fishers that broker between ethnic groups have a measurable economic disadvantage. Taken together, this research uncovers potential tensions driven by the social organization of resource users between achieving both ecological sustainability and economic productivity, having important implications for management and policy.

Inequality in Job Seeking Strategies: Social networks and mobilization of labour contacts among Spanish young adults

Higher mobilization of weak ties might generate more opportunities to find a job (Granovetter, 1973; Obukhova, 2013). Networking skills can be a social ability beyond social inequalities (Hughes, 1945)
or, on the contrary, a competence constructed in unequal manners following class and status patterns (Sennett, 2013). Drawing on social capital theory and life course analysis, this paper studies the possible relationship between the social attributes of Spanish youth (gender, class, cultural capital) and how they mobilize the contacts in their personal social networks. Our general hypothesis suggests that having higher levels of economic capital and, especially, of cultural capital implies more efficient patterns of mobilizing personal contacts when looking for (and finding) a job. On the one hand, there is a social inequality in job seeking strategies (Duncan, 2005; Bradley and Davedeson, 2011; Portes, 2013). On the other hand, the choices made throughout the labour trajectory come from expectations constructed by unequal socialization processes as product of internalization and routinization of class and gender divides (Evertsson & Nysman, 2011; Bhiele & Michelson, 2012). These facts can generate unequal opportunities in mobilizing contacts to construct social capital (Bourdieu, 1998; Savage et al. 2013; 2014; Bradley, 2014). We present an exploratory analysis based on a sample of 250 young adults aged 20 to 34 from the Barcelona metropolitan area (northeast of Spain). The analysis carried out tries to respond to the following questions: What is the role of weak ties in job seeking? Are there social differentials in how the young mobilize their contacts and particularly in the type of contacts activated with their economic and cultural capitals? We analyze the presence of strong and weak ties, networks' volume and density and the degree of status homophily in personal networks. We collected our data in 2014 by means of a multi-method fieldwork design that combined the following methods: a) a personal network questionnaire; b) life grids to collect the labour trajectories; c) a short open-ended questionnaire with three questions about the subjective meaning of events, agency and perceived support of interviewees; and d) the visualization of ego networks. The questionnaire also collected gender, education and occupational category characteristics of interviewees and their contacts. The research draws from the R+D Project financed by the Spanish Ministry of Economy and Competitiveness (Ref. CSO2012-36055).

Luisa Barthauser  
TU Braunschweig

Daniel Spurk (Universität Bern), Simone Kauffeld (TU Braunschweig)

Gender Differences in the Structural Setup of PhDs' and Postdocs' Developmental Networks

Developmental networks are ego-centered networks that evolved from the mentoring idea and were found to be beneficial for career success and career development. It is especially worthwhile to look at support in career development in academia due to variance limitation in career opportunities and its up-or-out character. In general, the structure of networks was identified to be relevant to career-related outcomes. Thus, knowledge of structural aspects of developmental networks could foster the conscious and strategic elicitation of career outcomes. Therefore, this study examined the structural setup of German researchers' developmental networks (i.e.; egocentric networks), while firstly controlling for differences in gender, and secondly for status (i.e.; PhD vs. postdoc) and research area. Based on previous research results, we expect the network structure to vary for male and female researchers for different career stages (i.e.; PhD vs. postdoc) between research areas. The sample consists of 556 egocentric networks of PhDs and postdocs working in a broad range of research areas (i.e.; mathematics, IT, natural sciences, technology, social sciences, humanities) at German universities and research institutes. Network parameters were calculated by means of R (i.e.; effect size, constraint, efficiency, centralization, density, network size, gender homophily) and variance analysis was conducted in SPSS. Results reveal that the networks of female and male researchers are different in structure; also when controlling for status and research area. Research on gender specific analysis of network structure showed mixed results so far. In this study, female researchers’ networks are bigger in size, less constrained, less dense, and more central. They are also more effective and efficient in comparison to the ones of male researchers. Examining the gender distribution in researchers’ networks, we found a balanced gender distribution for female researchers whereas male researchers showed a preference towards homophily. Moreover, gender homophily was particularly apparent within male-dominated research areas (i.e.; mathematics, IT, natural sciences, technology). Beyond homophily, we also found status-related differences in researchers’ networks. In contrast to PhDs, male and female postdocs varied significantly concerning all investigated network parameters. To conclude, the network structure of developmental networks is different for male and female researchers from diverse research areas in German academia, which should be taken into consideration when aiming for career outcome improvement through the social network. Taken together, the results provide more
insight into the network structure of male and female researchers’ developmental networks, and hence facilitate distinct future analyses with regards to career outcomes.

Ilia A. Baskakov
National Research University Higher School of Economics

Alina V. Vladimirova (National Research University Higher School of Economics)

Leaders among Leaders: Managing Networks for Educational Objectives

"Regional School Parliament" is a special educational program for young leaders of public organizations, which has been implemented last 18 years in Krasnoyarsk Krai, the second largest federal subject of Russian Federation. The program was designed to help adolescents of 12-18 years old to develop a range of managerial and civic skills by involving them in social initiatives practices and processes. Considering Russian history and characteristics of political culture this program is very important and highly demanded with more than 40,562 student in 57 municipalities participating. But such a large network does need smart monitor and correction systems to maximize effectiveness of educational objectives gaining, thus, we have decided to conduct applied network research. With this paper, we provide an overview of "Regional School Parliament" network structure and present data on 108 students gathered during the Congress meeting in 2015. We were interested in exploring professional and friendship networks that existed before the meeting, as well in capturing changes happened during the week of extensive on campus training. We want to use our findings on networks to develop a list of recommendations on how to improve the program for young leaders.

Nikita Basov
Center for German and European Studies, St Petersburg State University – Bielefeld University

Wouter de Nooy (University of Amsterdam), Artyom Antoniuk (St. Petersburg State University), Aleksandra Nenko (Center for German and European Studies, St Petersburg State University – Bielefeld University)

Emergent Meaning Structures: Sociosemantic Network Analysis of Creative Communities

For "Words and Networks" session (missing in the Session drop down list). The paper jointly considers text data and social network data to study construction of differences in cultural patterns as based on social structure and practice following the duality tradition (Friedland & Alford 1991). We address this by applying structural approach to interpretation of collective meanings and combining formal analysis for reducing complexity of meanings with qualitative analysis of meaning structures (Mohr 1994, 1998, 2000). The paper uses data on artistic communities – groups of artists involved in intense interaction with each other. Such communities develop in constant (re-)interpretation of the essence of art, discussions on the themes and formats for artworks, continuous interaction during collective creative activities and representation of artworks. In these processes subgroups normally emerge in communication networks of communities and explicit subgroup-specific structures of meaning are developed. Basing on 2-mode approach (Breiger 1976) we introduce sociosemantic network analysis techniques to locate those subgroups as well as to detect and to visualize how their meaning structures intersect and vary. Further, qualitative analysis links these contrasts and intersects to specific traits and similarities of the subgroups attempting to reveal how the peculiarities of social structure and practice condition emergence of a variety of meaning structures.

Vladimir Batagelj
Institute of Mathematics, Physics and Mechanics, Ljubljana, Slovenia

Temporal analysis of bibliographic networks

In bibliographic data sets we usually have information about the publication date (year) of each work (paper, report, book, etc.). Using this information we can construct corresponding, often two-mode, temporal networks. A general construction is as follows. Let a binary matrix A=[a(e,p)] describe a two-mode network on the set of events E and the set of of participants P: a(e,p) = 1 iff p participated in the event e; otherwise a(e,p) = 0. The function d : E -> T assigns to each event e the date d(e) when it
happened. \( T = [\text{first}, \text{last}] \). Using these data we can construct two temporal affiliation matrices with entries in a form of temporal quantity \([s(i), f(i), v(i)) : i \in I]\), where \(s(i)\) is a starting time and \(f(i)\) is a finishing time of the activity time interval \([s(i), f(i)]\), and \(v(i)\) is a link value on the interval: - instantaneous: \(A_i = [a_i(e, p)]\), where \(a_i(e, p) = [(d(e), d(e)+1, 1)] \) iff \(a(e, p) = 1\); otherwise \(a_i(e, p) = []\). - cumulative: \(A_c = [a_c(e, p)]\), where \(a_c(e, p) = [(d(e), \text{last}+1, 1)] \) iff \(a(e, p) = 1\); otherwise \(a_c(e, p) = []\). Using the multiplication of temporal matrices over the combinatorial semiring we get the corresponding instantaneous and cumulative co-occurrence matrices \(C_i = \text{trans}(A_i) \ast A_i\) and \(C_c = \text{trans}(A_c) \ast A_c\). A typical example of such a matrix is the works authorship matrix where \(E\) is the set of works, \(P\) is the set of authors and \(d\) is the publication year. In this case \(C_i\) and \(C_c\) determine co-authorship (or collaboration) networks. The triple \((s, f, v)\) in a temporal quantity \(c_i(p, q)\) tells that in the time interval \([s, f)\) there were \(v\) events in which both \(p\) and \(q\) took part. The triple \((s, f, v)\) in a temporal quantity \(c_c(p, q)\) tells that in the time interval \([s, f)\) there were in total \(v\) accumulated events in which both \(p\) and \(q\) took part. The diagonal matrix entries \(c_i(p, p)\) and \(c_c(p, p)\) contain the temporal quantities counting the number of events in the time intervals in which the participant \(p\) took part. Instead of co-appearace of authors we can study also the co-appearace of keywords, countries, institutions, etc. In a similar way we can construct a temporal citation network and analyze it. It can also be used to obtain different derived temporal networks. The proposed approach to analysis of temporal bibliographic networks will be illustrated with some analyses of bibliographic networks obtained from WoS.

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Krzysztof Sobieszek (University of Warsaw)

When to play? The role of opinion leaders and the structures of interactions among players in large online gaming community

When to play? The role of opinion leaders and the structures of interactions among players in large online gaming community. User behavior in online communities depend on what others are doing. A particular example is the gaming community on social networking sites, where users can recommend games and challenge one another. However, little is known about the mechanism of social influence in these communities. In this article, we analyze the data from the social networking site with over 8 million users, among which there are about 1.5 million active players. Here we show, how playing games depends on the behavior of others in the user's social circle. We verify what factors and personal network characteristics have greater impact on users decisions to play a particular game. Among others questions, we analyze to what extent people whose friends are playing games are more likely to play them as well? How players behavior depends on the influence of opinion leaders, or the influence of a peer group? Is the number of other players in the personal network important? What is the role of the different mechanisms of dissemination of information about what a user's friends are doing? The results of the analyzes are important for the design of mechanisms that facilitate the dissemination of games on social networking sites.

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Learning Organizational Knowledge in a Sociomaterial Network: A Multilevel ERGM of Health Care Best-Practice Communication

The development of multilevel ERGMs in MPNet offers new opportunities for analysis of multimode networks. MPNet was designed for hierarchically nested data, with each mode representing a different level of the network, making it a valuable tool for organizational research. However, MPNet also accommodates a network that is not inherently hierarchical, allowing it to capture complex organizational systems that are not necessarily nested. In such a "nonhierarchical" multilevel network model, the definition of the levels is not determined by the hierarchical classification of the nodes (e.g., individuals vs. groups), but by attributes of the nodes (e.g., human knowledge sources vs. ICT knowledge sources). In this study, I used multilevel ERGM to examine how best-practice knowledge is communicated in a health care organization in which the nonhierarchical levels represent two types of nodes: people who are seekers and sources of knowledge, and the knowledge artifacts, such as websites, databases, and newspapers, that also serve as knowledge sources. I examined how the attributes of the knowledge seekers and sources, and the structure of the networks connecting the two,
influenced how physicians in the organization learned about a new set of best-practice guidelines for patient care. Using survey and administrative data collected on 143 physicians and 56 knowledge artifacts, I constructed three knowledge networks representing how physicians learned about the guidelines: a unipartite physician-to-physician network, a bipartite physician-to-artifact network, and a combined multilevel network. I present the results of ERGMs fitted for all three networks, illustrating how physicians’ knowledge acquisition from colleagues differed from their knowledge acquisition from artifacts, and how each network influenced the other. These results offer insights on the opportunities offered by multilevel ERGM; the sociomateriality of organizational knowledge networks; and how attributes of knowledge seekers and sources affected (or had no affect on) the communication of best-practice knowledge in a health care organization.

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Mapping social milieus and cohesion patterns. Exploiting the potential of occupational position generator

Though pioneering works in the field of social network analysis (like those by Laumann, Pappi, Breiger etc) made important steps for using relational methods studying social structure and stratification, relatively little effort has been devoted to carry on these lines of research. Out of standard techniques for assessing social resources and, at that, stocks and uses of social capital, the occupational position generator introduced by Lin and Dumin is not only a relatively simple and reasonably available instrument, but one also possessing wider structural and cultural implications (job categories as status signals of one’s self-identified social circle) beyond the original focus on the role of contacts and nexus diversity in accessing social positions. Modelling the segmentation of social milieus and the structuring of social capital based on this method has started in the last decade or two (eg. the studies of Erickson, Lin-Chen-Fu, Angelusz-Tardos). As a novel development, Savage et al have built on this methodology in a constitutive way when approaching the British class structure. In the wake of the latter initiative, Róbert et al have recently launched a survey for a new outline of social differentiation in Hungary. The present paper is based on this study as the empirical basis and is accompanied by three earlier databases using the respective technique in the last two decades, from 1997 on, to assess change and stability in the setup of social milieus and cohesion patterns. Equivalence of samples (national surveys from the size of 1000 to 2000) and measurement (with 19 items practically identical throughout the four waves) allows temporal comparison. Though horizontal segmentation is also targeted by these analyses, their vertical output (providing for a proxy of occupational prestige for Hungary) is somewhat related to the objectives of the CAMSIS project (based on the interactive approach of the Cambridge scale). Structural analyses (by means of both exploratory and confirmatory techniques) have resulted in a relatively stable scheme of four milieus facets partly reminding of those from other contexts (such as the aforementioned China/Taiwan/USA comparative study). Further details permitted by the application of Goodman RC and LC models, too, suggest a more varied picture with the gradual shift of the intermediate lower middle segment toward the lower manual milieu, and at the same time, certain divergence of the poles on the hierarchical dimension. Analyses in progress on the relative gain of inclusive or, exclusive (or, with some cultural connotation, „omnivorous” vs. „univorous”) nexus profiles may result in further details for the temporal patterns of social cohesion in Hungary.

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“Whatshisface said what?” Direct influence of indirect peers among university students in Russia

Social influence literature focuses on two separate levels of influence: one based on the peer information, and the other – on aggregate information from the population (the aggregate attitude could be perceived as a social norm). Scholars have paid relatively little attention to the interaction of these levels, as in the case when information about a social norm comes with a peer-level signal. An example would be when an individual learns about a prevailing opinion of a group he does not belong to (social
norm) together with the fact that his friend has ties with the group (peer-level signal). For this study, we have designed an experiment in which we analyze the influence of the attitudes of an individual’s peer's peers. In other words, if A has a two-path to C, what is C’s influence on A, provided that A does not have a direct tie to C and A knows that they are connected through B? The data (currently being collected) comes from several groups of Russian university students. For the experiment, we first collect data on student friendship and advice, then record their individual evaluations of various images (nature, people, abstract compositions). We then present each of them with analogous images coupled with manipulated social information. This information consists of (i) evaluation of the image by a varying number of people either unknown to the individual or with whom he has only weak ties, and (ii) indication of the individual's peer who has ties to these people. Finally, we record their influenced evaluations of the images. We expect our findings to show the effect that individual's tie with the peer (from whom the signal comes) will have on the influence of social norms (group evaluation) coupled with a peer-level signal (indication which peer has ties to the group).

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Comparing fields of sciences: multilevel networks of research collaborations in Italian academia

Much of the work in the sociology of science observes scientific communities from a micro perspective, focusing on interactions in laboratories. In doing so, they try to uncover the impact of social and cultural norms in the everyday production of scientific results. Other studies approach the topic from a macro perspective, analysing scientific organizations and the reciprocal influence they have with wider society. Less attention has been paid to the meso level of interactions within and between scientists and the environments they work in. Methodologically, the gap in the literature can be filled by the recent advancements in multilevel analytical approaches, especially by the combination of statistical multilevel analysis with social network analysis. This combination allows to model structural effects on individual behaviours, where these effects are at work at different levels of social interactions being it between individuals, disciplines, organizations. The paper adopts the structural approach of Lazega et al. (2008) and analyses the local system of public funding to academic disciplines in Italy using bipartite networks. Such analysis has been already done for the two academic areas of physics (Bellotti 2012) and philosophy (Bellotti 2014). Here we extend the analysis to all the areas of research in Italian Academia, in order to compare the results across different scientific fields. By doing this, we observe the variability of structural effects across disciplinary areas, that we expect to be organized in different but comparable ways. In particular, previous analysis of physicists and philosophers showed in both cases the overarching importance of academic ranks and of brokerage roles in obtaining research funding, together with some other interesting effects, like the less impacting but still significant importance of working with a long term established group of colleagues, and the advantages of working on specific sub-disciplines (Bellotti 2012 and 2014). Here we want to see if these results replicate across other disciplinary areas, and/or some interesting differences can be found. For this purposes, we analyse 12 years (1999 – 2011) of the Italian Ministry of University and Research funding of Projects of National Interest (Prin) in all the disciplinary areas of academia. The micro (collaborations between scientists), macro (collaborations between institutions and between disciplines) and meso level (the combination of network measures at a micro and macro level) of interactions are firstly independently analysed, and results are used to model the total amount of money researchers have received over the 12 years against the variables that meaningfully describe the network structures of collaborations to research projects.

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Cuihua Shen (University of California, Davis)
Group Closure and Brokerage: Social Capital and Group Effectiveness in Massively Multiplayer Online Games

Using synchronous and asynchronous communication technologies, virtual teams have become a ubiquitous form of organizing. How social structure within and outside of team boundaries may influence virtual team effectiveness remains an underexplored area. This study examines the connection between group social capital and team effectiveness in a Massively Multiplayer Online Games (MMOGs), where individuals in guild teams collaborate to create benefits for both individual players and the collective group, resulting in multilayered player social networks within and between guilds. The ideal level of intragroup and intergroup player dependence was tested using two types of group social capital, closure and brokerage, on predicting guild effectiveness. Groups with high closure, where actors share connections in a social network, tend to have stronger and more trustworthy ties (Krackhardt, 1992). Groups with high brokerage, where actors have unique social ties, often have greater access to diverse information (Burt, 2004). In the MMOG Dragon Nest, a snapshot of 11,549 players from 804 guilds and their individual/guild attributes and social networks was collected. Three different forms of virtual collaboration, including friendship, teaming, and trading social networks, were tested on their ability to predict guild effectiveness. Because high closure bars access to diverse information, group effectiveness often has a curvilinear relationship with closure (Oh, Chung, & Labianca, 2004). As suggested, controlling for group size and member experience, guilds with a moderate density of ties were the most effective in each of the three networks. Likely due to the greater access to diverse resources, guilds with more diverse teaming and trading intergroup networks were the most effective. Finally, in the teaming network, group leaders who brokered connections to other group leaders had more effective guilds.

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Networks of knowledge as sponsors of scientific and technological research projects

In this study, the term Networks of knowledge is referred to as the relationship between educational institutions and national as well as international enterprises in order to promote scientific and technological research. The aim of this work is to present and to analyze the relationships held among the Coordination of Innovation and Development (CID) of the National Autonomous University of Mexico (UNAM) and both public and private institutions to promote research projects that benefit Mexican society. The network of knowledge we present in this research is a macro network due to the fact that it is integrated by CID-UNAM and many others institutions. It has multiple interconnections, and its research projects are focused on many sectors of Mexican society such as enterprises, government and non-governmental institutions. As part of the supports that this network of knowledge generates, there are some annual scholarships for researchers in areas such as science, engineering and technology. Besides the scholarships, CID-UNAM looks for the integration of enterprises like L’oréal, non-governmental institutions, f.i. United Nations Educational, Scientific and Cultural Organization (UNESCO) and government institutions such as Consejo Nacional de Ciencia y Tecnología (CONACyT), Academia Mexicana de Ciencia and La Comision Mexicana de Cooperacion. As an isolated example of the results of these agreements among UNAM and international institutions we would like to mention the contest TECH – 2015 an annual contest held by researches in technology and science areas and it is supported by The global Innovation Through Science Technology and The Advancing Science Serving Society. In that contest, Mexican researches participated. One of the main objectives of this contest is to promote that networks of knowledge foster scholars’ skills and put up the money for research projects to solve current problems of the society. Another aim of networks of knowledge is students’ mobility. Institutions like CONACyT promote short assignments in the US taking advantage of bilateral agreements (f.i. Foro Bilateral sobre Educación Superior, Innovación e Investigación, FOBESII). There are also alliances between academies and companies for example the Mexican Secretary of Public Education (SEP) and MITACS, a Canadian non- governmental institution, which’s aims are to provide resources for researches, training, PhD degrees and professional development. In this kind of programs participate national and international universities, Canadian government, companies and enterprises; all of them interested in academic and professional interchange.

Richard A. Benton
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Managerial Entrenchment and Structural Cohesion Among America's Corporate Elite.

Corporate governance refers to the firm level provisions that allocate power among dispersed shareholders and managers. In some corporations shareholders retain sizable power to monitor, control, or replace management, while in other corporations managers are considerably more “entrenched” or autonomous. Over the past thirty years institutional and legal changes have promoted shareholder rights and curtailed executive entrenchment. This shareholder-value movement emphasizes that firm’s primary responsibility is to maximize shareholder wealth. However, some corporate executives retain sizable power and influence despite the rise of shareholder-value oriented reforms. This variation in corporate governance orientations can be explained by structural cohesion in the director interlock network. Cohesion describes the extent to which multiple independent pathways bind together subgroups and represents a structural component of collective action. I argue that structural cohesion in the interlock network provides a platform for entrenched corporate elites to resist the shareholder-value movement and maintain managerialist corporate governance practices. Analysis of the U.S. interlock network reveals that corporations in highly cohesive subsets display considerably more managerialism than more isolated corporations. Contrary to notions that interlocks spread normative views about corporate governance, these findings suggest that cohesion in the interlock network provides collective action resources for entrenched or powerful managers to resist some of the normative prescriptions of the shareholder-value movement.

Patrick Bergemann
Columbia University

Prashant Loyalka (Stanford University), Dan Brown (University of California-Berkeley), Joshua Cohen (Apple University)

Is Quitting Contagious?

For this research project, we ask a simple question: is quitting contagious? Unfortunately, due to voluntary exit customarily being a rare event, it can be difficult to estimate a contagion effect without a massive dataset. It can also be difficult to deal with issues of endogeneity, and therefore little research has been done on this question. In order to deal with these issues, we make use of a work environment where up to 50,000 workers are employed simultaneously and where voluntary exit is not a rare event. We also use a novel analytical strategy to deal with endogeneity concerns. For our analysis, we use a unique dataset of 239,000 workers over the course of 13 months at a factory in China that performs final assembly for a leading consumer electronics firm. Average tenure at the factory is approximately 8 weeks and the rate of attrition averages 5% per week for the duration of the study. We have access to the full HR database, which includes demographic information (e.g. gender, age, province of origin), work characteristics (e.g. type of work, day or night shift, line worked on), compensation (base salary, overtime, bonuses), and living arrangements (dorm room assignment). Within this context, there are two important sources of peer influence within the factory: lines and dorms. Workers work with up to 150 other employees on a single assembly line, and they take their breaks and lunches together. 88% percent of workers also live in factory housing, in dorm rooms that usually contain 8-10 individuals. Both lines and dorms are randomly assigned. Although we do not observe the networks of the factory directly, we can use shared lines and dorms to estimate the effects of peer influence in the context of quitting behavior. To perform this analysis, we code the data by week and use survival analysis to estimate the likelihood of quitting the factory. To estimate the effects of peer influence, we focus on the proportion of people who quit the previous week on the line (the line effect), and whether or not a roommate quit from a particular dorm room in the previous week (the dorm effect). We run these models in several different ways, controlling for a host of demographic and work related characteristics, along with the broader attrition rate of the factory. We also estimate our model using fixed effects for line, dorm, and week. We find that quitting rates for the previous week on the lines and in the dorms both have a significant effect on an individual’s likelihood of exiting in the present week, and that this effect is magnified the more characteristics those who previously exited share with the individual (e.g. being from the same province). Due to endogeneity concerns, we also use an instrumental variables approach to assess the robustness of our results. Focusing on the dorm effect, we use dormmates’[t-1]
Disrupting criminal networks: The robustness and resilience of drug trafficking networks to law enforcement targeting

A common law enforcement strategy is to dismantle criminal networks by identifying and removing critical nodes. Their identification is usually performed with the aid of various social network analysis measures, including centrality measures. Yet, not all networks are equally vulnerable to attacks and disruption strategies should consider the variations in the structure of criminal groups. This paper analyzes the topology of various drug trafficking networks, simulates different types of attacks (e.g., random, based on centrality, based on nodes’ attributes) and identifies the most effective disruption strategies. The adaptation of criminal networks after node removal is also considered to identify their sources of resilience.

The Construction of Identities in Narrative Interviews – A Methodological Suggestion from Relational Network Theory

This contribution deals with constructions of identities in narrative research interviews and their relation to constructions of identities in less artificial settings in everyday life. Proponents of big stories rely on detailed analyses of texts produced in research interviews to reconstruct identities, while proponents of small stories prefer to investigate spontaneous and potentially fragmented identities in quotidian life. The latter criticise the former for taking identities established in a single situation and under extraordinary conditions to be representative of all identities established in the cacophony of ordinary life. However, renouncing big story research would be taking far too drastic measures. Therefore, I develop an integrated methodology that focuses on small stories in big story narratives, like e.g. stories about friendships or exceptional situations. Theoretically, the approach takes recourse to Harrison C. White’s relational network theory and in particular his identity theory. I distinguish five nested types of identities and show how these can be scrutinized using Positioning Theory as methodological guide. To illustrate the procedure I draw on narrative interviews with nascent entrepreneurs and reconstruct their positioned identities. I conclude that big story research can learn from small story research not only in studying autobiographical texts but also in guiding where and how to look for identity constructions beyond narrative interviews. Considering everyday identity performances systematically enhances knowledge derived from narrative interviewing. In the case of nascent entrepreneurs we may find such performances in business plans, in interactions with investors and customers or in the organisation of working spaces.

Matching user profiles in multilayer networks through smartphone camera fingerprint

In the last decade, various types of social platforms, have been introduced on web. These various networks cater the specific needs of the users. For example, LinkedIn for professional networks, Facebook for more social interactions, Instagram for photo sharing, WhatsApp for instant messaging on mobiles to name a few. Another important reason for the huge popularity of social platforms among users is the increase in usage of smartphones, which in turn has introduced changes in the user habits with respect to multimedia content on social networks. Researchers have started analysing the holistic view (combination) of individual networks, which is often termed as multilayer network. One of the important problems in multilayer network is about user resolution across different networks. That is, to identify if two user profiles from two different networks with different user ids or nicknames belong to the same user. The problem is more meaningful for resolving different profiles in digital forensic and criminal investigations. Recently, various approaches have been proposed to identify smartphones
based on microphones and speakers embedded in smartphones, smartphone accelerometers or by combining these sensors. However, our approach exploits the images being posted as image sharing is one of the main activities on social network platforms. We explore the possibility of uniquely identifying two different user profiles from two different networks based on the pictures being posted on them, assuming taken by the same smartphone’s camera. A smartphone can be uniquely identified (to some extent) by exploiting the characteristic noise present in the images taken by the smartphone’s camera. Each image has a characteristic noise, due to defect in the smartphone’s camera, which is introduced during the manufacturing process. Therefore, this characteristic noise can be used to define the digital fingerprint can be obtained for the source camera from images being captured by it. The unique identification of the camera basically maps to the smartphones, and thus characteristic noise transitively maps to the users, who are registered owner of the smartphone. Thus, if two profiles’ images map to the same smartphone camera, with high probability we can assume that two profiles belong to the same user and thus, helping in user resolution. The method is robust enough to identify the smartphones in spite of the fact that the images get downgraded during the uploading/downloading process. Also, it is capable enough to compare different images belonging to different SNs without using the original images. We evaluate our approach using real dataset of 1000 high-resolution pictures. We select five different smartphones with two pairs of identical models and with each model having a camera with different characteristics. For each of these smartphones, we have taken 200 photographs under different conditions, in order to obtain independent samples. We perform our experiments on the images being processed by Facebook, Google+ and WhatsApp. Even in the worst case our approach can provide profile identification up to 92.52% and profile matching up to 98.78%.

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Robert Hellpap (Oxford University)

Triadic homophily and the role of mediating actors in promoting interethnic friendships in networks

Several research findings indicate strong tendencies for ethnic segregation and ethnic boundaries, which are examined by methods of social network analysis. In accordance with the theory of ethnic homophily, people preferably bond to other members of the same ethnic group. Because of this preference friendship networks often seem to be (sub-)clustered in ethnically homogenous higher-order network structures, such as ethnically homogenous triads. The aim of this study is to extend the notion of ethnic boundaries in social networks beyond the dyadic scope, and in particular focus on processes of homophily with regard to triadic structures. The balance theory suggests, that positive relations between two actors will be more likely to emerge when both have positive relations to a common third party. Based on this theoretical foundation, the current study examines different tendencies of closure for triads with varying ethnic compositions. Assuming an enhanced propensity for ethnic homogenous triads to be closed over time, this investigation can contribute to a better understanding of network processes causing ethnically segregated networks, besides and additionally to the preliminary explanation of being a product of ethnic homophily between two actors. However from another perspective, 2-path connections within ethnically mixed triads may have a positive influence for creating new interethnic ties. Therefore we start with an investigation of the relevance of an actor’s already realized ethnic out-group contact in regard to the formation of new interethnic friendship ties. Following this, the specific role of intermediate actors in triads in promoting the creation of new interethnic ties and consequently leading to a possible closure of ethnically heterogeneous triads will be analyzed. By doing this examination we will try to give an answer to the question, if the creation of an interethnic friendship relation will be more likely, for example whenever an ingroup friend has a direct friendship connection to an outgroup member. If so, this would indicate, that a 2-step indirect connection to a person from a different ethnic group is more likely to evolve a direct interethnic connection over time and consequently showing potentials to overcome ethnic boundaries. For our analyses we use data from a longitudinal study called “Integration by Friendships” (2010-2012), which was conducted in Bremen, Germany. The study provides information about friendship networks of about 30 classrooms which participated in three consecutive years, starting in the 5th grade. The applied empirical analyses method is based on stochastic actor-based models for longitudinal network data by using the RSIENA package.

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Shepley W. Orr (University College London)

**Triad-based corruption games under uncertainty: bribes or gifts?**

Corruption is a complex phenomenon, and its manifestations are varied in nature. What is common to most cases is the importance of trust between corrupt partners. Social network ties facilitate information exchange that fosters trust, which is an important factor in establishing and sustaining corruption. This work develops a model of decision-making processes in corrupt agreements, linking economic and social network ties with formation of subjective probabilities over potential outcomes. A sequential game with three actors (an official, a company representative and an intermediary) is presented. An infrastructure company representative seeks to obtain an unfair advantage over competitors in an infrastructure project bidding process. The representative chooses how to frame the offer to the official (a gift or a bribe) and the method of offer delivery (directly, or via an intermediary). The decision processes are formulated under conditions of uncertainty over the official’s preferences. The representative cannot quantify the risks, but can form beliefs about the relative likelihood of a successful corrupt agreement under different frames. That is, subjective probabilities of official’s responses (bribe acceptance and provision of an advantage) under different frames are ranked, and then the likelihoods of different outcomes are pair-wise compared by the representative. This model forms a part of a social norm-based simulation model under development.

Robert Birkelbach
Universität zu Köln

**Evolution of intergenerational closure**

Social capital has been studied extensively in the context of sociology of education and different social mechanisms, such as the intergenerational closure mechanism, have been proposed to explain differences in schooling outcomes. Intergenerational closure is a social network structure, where parents are connected to the parents of their children's friends. This network structure creates opportunities for checking whether the children are telling the truth when claiming that their friends for example do not have to learn for a mathematics test. The basic hypothesis is that parents with many ties to parents of their children's friends should have better performing children. However, most research overlooked that norm enforcement should only be beneficial for achieving good grades if the norms of the parents and the norms of the other parents are positive towards education. Contact to parents of children with migration background should be associated with performance. However, different theories of assimilation predict different outcomes, which is why no directed hypothesis is given. For example, classical assimilation theory would predict negative outcomes, while the theory of segmented assimilation implies better schooling outcomes when parents are connected to first generation migrants rather than with natives, but worse schooling outcomes when they are connected to second generation migrants. Contacts to parents of higher socioeconomic status should increase the school performance. Intergenerational closure with parents of the same or higher educational aspiration levels should be associated with positive schooling outcomes, whereas contact to parents of lower aspirations is predicted to yield negative schooling outcomes. Using the German CILS4EU panel data, a more fine grained analysis of the intergenerational closure hypothesis is performed compared to previous studies. The CILS4EU data provide complete classroom networks. To analyze these complete network panel data, stochastic actor-oriented models for network change are going to be employed.

Julie M. Birkholz
CHEGG, Ghent University

**Considering context: recasting the SIENA model to consider contextual factors as determinants to social network structures.**

Research in social network dynamics have brought an increasing complexity of analysis techniques. Naturally, each of these methods have their limitations stemming from underlying theoretical assumptions. However, a number of gaps exist in current knowledge on network dynamics which cannot be considered within existing network methodological specifications, specifically the role of exogenous contextual factors -- the setting or environment. Through a review, we identify a blind spot in existing
methods for exploring the effect of context as a determinant on the generative mechanisms that explain observed network structures. To that end, we propose a recasting of the use of SIENA to qualitatively compare models such that it allows for understanding of the effect of contextual factors on the generative mechanisms the explain these structures. We test this methodology on individual scientific collaboration patterns of Dutch Computer Science researchers within several academic departments. Our findings show that exogenous contextual factors influence the strength of the observed generative mechanisms of researchers’ networks. Thus questioning how contextual factors play a stronger role in network dynamics than currently theorized, and that such a recasting provides insights at which to advance both empirical and theoretical terrain for investigating social network dynamics.

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Thomas N. Friemel (University of Bremen)

Bullying and Cyberbullying in Adolescent Social Networks – The Relationship between Victimization and Friendship Nominations

Bullying among adolescents has always been regarded as a group phenomenon (Olweus, 1993). From a social network perspective it has been argued that involvement in bullying is a matter of status in peer groups. Depending on school climate and other factors bullies may gain social status in their class by bullying others or receive less friendship nominations because of his/her behavior. Students who are bullied may withdraw from socializing and send out less friendship nominations or receive less nominations from others. So far, however, only a few studies focused the relationship between involvement in bullying and status in the peer network with a social network approach. Salmivalli et al. (1996) found that sociometric status is related to the role children and adolescents play in bullying. Another study found that especially children who are not well integrated in the friendship network of their school class are prone to be victims of bullying (Salmivalli et al., 1997). Regarding the relationship of likeability and bullying behavior it was also argued that students who bully others decrease in likeability over time but receive more friendship nominations from others with the same level of bullying (Sentse et al., 2014). More evidence on the subject is needed. In this paper we address the research question on the relationship between bullying victimization and social status in the friendship network with a cross-sectional approach. We hypothesized that students who are bullied differ from their peers 1) in their social status indicated by friendship nominations and 2) in their probability of nominating others as friends. To answer our research question we collected network data from adolescents in five German schools (grades 8 – 11, n = 353). We gathered data about friendship nominations, experience with various forms of bullying (traditional and cyber) and media usage among others. Friendship networks were analyzed with exponential-family random graph modeling (ERGM). Our results indicate that when controlled for structural effects like reciprocity, transitivity and activity/popularity, as well as for homophily regarding to sex, class membership and school achievement students who are bullied receive significantly fewer friendship nominations in their grade. However, this is not true for students who are cyberbullied. The results will be discussed under the aspect of visibility of the two types of bullying for others.

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Christoph Stadtfeld (ETH Zürich), Tom Snijders (Universitly of Groningen)

ERGM vs. SAOM: Differences and consequences for empirical research

Two approaches for the statistical analysis of social network evolution are widely used. The tie-based Exponential Random Graph Model (ERGM), and the Stochastic Actor-Oriented Model (SAOM), or Siena-model. Until recently, the ERGM was applied to cross-sectional network data, while the SAOM was used for longitudinal networks. However, recent developments outdated this distinction, as numerous extensions to the ERGM that allow the analysis of longitudinal data were proposed. At the same time, researchers are starting to apply the SAOM to model cross-sectional data. By now, the choice for either model seems to depend mainly on the scientific and regional area scholars come from. Yet, there are important differences between these models; current literature on this comparison is sparse and tends to miss the important theoretical and empirical points. In this paper, we analyse how
the models’ tie-based or actor-based assumptions lead to fundamental differences in the structure and processes of networks that either model can represent. 1. The ERGM is defined on the macro-level, while the SAOM is defined on the micro-level. 2. The dependence assumptions in the SAOM are generally stronger than in the ERGM. Starting with the simplest model, SAOMs that include only a density parameter already assume dependence between ties – in other words, it is not possible to represent a Bernoulli graph with a SAOM that uses only standard parameters. 3. The SAOM allows for asymmetric dependence between ties, i.e. a tie from i to j can be dependent on a tie from j to k, but not vice versa. This is not possible in the ERGM. While this allows for more flexibility in the SAOM to specify effects that correspond closely to social theory, it also means the SAOM is a less parsimonious model for cross-sectional data. Resulting from these differences, meso- and macro-level properties of networks simulated with seemingly equivalent model specifications can differ substantively. Thus, some types of networks can be represented well with ERGMs, while others are modelled better with SAOMs. Consequently, analysing the same network with two equivalently specified models in ERGM and SAOM can lead to distinct results, as we show in an empirical example – where neither model can claim to be more correct. Consequently, the theoretically informed choice for either model is crucially importance for empirical researchers.

Zsófia Boda
University of Oxford
Bálint Néray (Hungarian Academy of Sciences, Centre for Social Sciences, Institute for Sociology)

Inter-ethnic social ties in secondary school

This presentation investigates the effect of ethnicity on relationship formations among Hungarian secondary school students. For this, we introduce and measure two different aspects of ethnicity: self-declared ethnicity, and ethnicity based on peer perception. Our previous, cross-sectional results on the same sample show that majority students tend to dislike peers whom they perceive as minorities, regardless of these peers’ self-declared ethnicity. Moreover, minority students seem to prefer others whom they perceive as minorities; but they tend to reject those whom they perceive as minorities, but who, at the same time, identify with the majority group. In this project, we focus on the fact that not only ethnicity does affect race but also the other way around; therefore, we estimate stochastic actor-oriented models to separate the cross-network dependencies. Our results show that the effect of friendships on ethnic perceptions is partially responsible for our earlier results; if we control for these processes, we find less evidence for inter-ethnic preference and cross-ethnic rejection.

Örjan Bodin
Stockholm Resilience Centre, Stockholm University

Eric A Treml (School of BioSciences, University of Melbourne), Pedro Fidelman (Sustainability, Research Centre, University of the Sunshine Coast), Stuart Kininmonth (Stockholm Resilience Centre, Stockholm University), Julia A Ekstrom (Natural Resources Defense Council, San Francisco, California)

Analyzing the (mis)fit between the institutional and ecological networks of the Indo-West Pacific

Critical to improving environmental governance is understanding the fit (alignment) between institutional arrangements and key ecological processes. This is particularly true for biodiversity hotspots and ecologically sensitive areas that are subject to significant impacts from human activities. Here, we have developed an innovative network-centric approach to quantify ecological-institutional alignment across an environmentally and politically complex large-scale marine social-ecological system. We mapped the trans-boundary ecological networks of marine population dispersal corridors, and intersected these with estimates of cross-country institutional (social) linkages related to marine management and conservation. In integrating large-scale ecological-institutional networks, we identify geopolitical fit and misfit between a region’s ecological processes and its governance. We have demonstrated this approach in the Indo-West Pacific region, a global marine biodiversity hotspot in the Indo-West Pacific. We present region-specific institutional and ecological networks, highlight current challenges, and suggest future directions to refine the proposed approach to quantify alignment between ecological
processes and governance arrangements. Ultimately, our method has the potential to assist management efforts in prioritizing and strengthening governance to effectively safeguard ecological processes across multiple jurisdictions

**Folkert F. Boer**
Tilburg University

Roger T.A.J Leenders (Tilburg University)

**Temporal Network Analysis in Performance Teams to Identify Team Processes**

An important challenge in team research lies in the measuring of processes within teams. Defining a process as “who does what, with whom, where, when and how” it becomes clear that measuring a process requires highly detailed longitudinal event data. Although organizational theory often talks about process, in reality process is rarely measured; states and other derivatives are typically measured instead. A main reason for not measuring processes in traditional organizations is that it is very hard to get good longitudinal, detailed team data from organizations. This results in team research that barely focuses on the processes leading to the outcomes. We study teams in an industry where it is easy to measure employee and employee interaction objectively and in great detail, as they perform their job: professional sports. This enables us to measure in great detail team processes through time (match and season). In this research, team process is measured through the ball pass interactions between the players in a soccer team. These pass patterns are dynamic and fluent and can be analyzed as event networks. We conducted a limited case study on matches by a professional soccer team playing in the highest Dutch competition to explore a proof of concept. Our findings suggest that there are differences in network characteristics (length of the networks, duration of the networks, number of networks) in won matches compared to lost or drawn matches. This research suggests that there are different team processes at play and further research is needed (and has started) to generalize these findings. This kind of analysis helps us to gain more knowledge on process development in performance teams. Moreover, due to the use of detailed player interaction data (collected every match) it is possible to analyze the temporal development of team processes and analyze factors influencing team processes, for instance newcomers to the team or managerial change within the team.

**Michal Bojanowski**
University of Warsaw

**Composition and structure of networks in Polish school classes: a multilevel perspective**

We study the structure of networks among Polish 6-year-olds in a sample of 176 school classes. We look into explaining the structure of networks within classes using, among other things, mechanisms of homophily (e.g. according to gender) and hierarchy (e.g. with respect to social status of parents) as well as selected structural effects of ERGM models. Results show substantial variability between classes in terms of network structure. To explain these differences between school classes, a multilevel model is used to asses the importance of compositional and contextual (e.g. school neighborhood) factors.

**Cathleen M. Stuetzer**
University of Technology Dresden, Germany

**Social Map of Scientific Activities and Collaborations. A Network Study about Social Organizational Structures in Online and Offline Scientific Communities.**

The objective of this study is to analyze and visualize social behavior within scientific communities with the help of network analytics to detect social organizational structures in the online and offline context of scientists. The study focuses on answering following questions: (1) How do the social infrastructure of scientists look like? (2) How we could describe the impact factors for network evolution? For exploration of social behavior within online and offline scientific communities the social network paradigm and key techniques as network analytics were used. Relational (quantitative) data about scientific behavior derived from activities of scientists in their scientific online and offline context. First, online data were extracted from the social media usage of scientists at an online research platform via tracking methods of integrated social media tools. Second, offline data were collected by listed project collaborations within a special research foundation between 2012 and 2013. The whole data set
includes 119 scientists within 112 acquired projects within this research community. The systematic analysis of structural data shows that during the project acquisition scientists keep in touch with each other to apply scientific projects and raise project funds together. The structural analysis demonstrates that social organizational infrastructures of scientists in both contexts based on the evolution of project elites in which scientists often co-occur and collaborate in different project teams. Approximately 80% of the scientists emerged within these project elites. About 10% of the scientists acquired isolated projects, operated independent from group processes, and acquired only a few projects over time. Scientists established in the project elite working in more than five projects. At the individual level the study shows that gatekeepers emerge online and offline. Thereby, central key actors differ less structurally more likely context-oriented at the individual level. They operate with different activity, intensity and diversity and emerge in the network. Furthermore, the study demonstrates evolution processes of social structures. The results show that collaboration may be understood as strategy for success in the scientific business and evolution of elites and gatekeepers are features for functional scientific communities.

Christian Bokhove
University of Southampton

Exploring classroom interaction with dynamic social network analysis

This paper reports on a proof-of-concept project in which technology and dynamic social network analysis (SNA) were used for modelling classroom interaction. SNA focuses on the links between social actors, draws on graphic imagery to reveal and display the patterning of those links, and develops mathematical and computational models to describe and explain those patterns (Freeman, 2004). Dynamic SNA extends SNA and builds on previous research on network change (e.g. Moody, McFarland & Bender-deMoll, 2005). The proposed techniques enable researchers to study classrooms by analysing classroom interactions and the patterns of communication. Utilizing data from six videos from the TIMSS video study (Hiebert et al., 1999) and a convenience sample of five observations of maths lessons in a secondary school in the south of the United Kingdom, a methodology for dynamic SNA was developed. The methodology uses technology for capturing data through video analysis and an observation app for tablet computers. The data was subsequently converted into a format that allowed for the use of SNA metrics and animations that conveyed the dynamic nature of the classroom interaction. The results are in two ways relevant for the conference. Firstly, it shows a promising application of an existing ‘computer science’ methodology like SNA to an educational topic, namely classroom interaction. Secondly, it gives an example of the use of mobile technology for fieldwork data collection. Limitations of the approach are discussed.

Mireia Bolíbar
University of Bremen

Social capital over the life course: youth unemployment and cumulative (dis)advantages

The paper aims to enhance the understanding of how social capital reinforces social inequalities by looking at its embeddedness in the life course. More specifically, this paper aims to analyse how the weak presence of young people in the labour market (in the form of unemployment and/or underemployment) at the beginning of their career path affects their relational resources for job-seeking. The novelty of this research is based primarily in the junction of social network analysis and the life course perspective in approaching the process of cumulative disadvantage in labour career paths. The analysis is based on the ‘Personal networks of the youth in Barcelona’ survey. This survey, carried on in the Metropolitan Area of Barcelona in 2014, interviewed 250 young adults (20-34 years old) following a quota sample strategy. It has very rich information on the events that make up the interviewees’ labour trajectory, as well as on the structure and use of their personal network. The questionnaire included information about when and where the alters where met, and when and why they have been useful for job-seeking purposes, which enables to trace the coevolution of the personal network and the labour trajectory. The results of the paper delve into the different ways in which social capital is built and mobilised at different stages of an individual’s labour career, looking specifically at: (1) The impact of (long-term) unemployment and precarity on young people’s process of creating and developing their personal network; (2) Its effect upon the ability of networks to produce returns in the labour market and
its consequences for the development of the ensuing labour trajectory; (3) The social class differences on (1) and (2). In sum, the paper explores the “relational side” of the ‘scarring effect’ of unemployment, thus shedding light on how social capital contributes to the processes of social exclusion, mobility and social stratification over the life course.

Isabelle Bonneau
University of Quebec at Montreal

The application of social network analysis to understand shared leadership development across time

Recent research has emphasized the importance of the sharedness of leadership processes in teams, and provided empirically support for a positive relationship between shared leadership, the emergent team property that refers to distributed influence across multiple team members, and team effectiveness. However, relatively little is known about how shared leadership develops across time. The purpose of our study is to explore the development of shared leadership, as a dynamic process involving social network analysis. A time sensitive methodology that collects and analyses qualitative and quantitative data simultaneously and in a coordinated fashion has been developed. The objective is to contribute to the understanding of shared leadership in project teams and to both methodological developments. Social network theory is particularly well suited to the study of leadership in general and of shared leadership in particular because it emphasizes the relationships between individuals and the influence they exert on each other. In this research, we describe the application of social network concepts to better understand the sharing of leadership among team members. This study of three knowledge-based project teams reveals that: 1) the pattern of shared influence not only increases in density across time, but also changes across time (differences in the distribution of leadership sociograms). This is one of a limited number of studies that has examined the development of shared leadership over time.

Basmattee Boodram
University of Illinois at Chicago

Mary-Ellen Mackesy-Amiti (University of Illinois at Chicago), Carl Latkin (Johns Hopkins University)

Personal networks, social geography and injection risk behaviors among young persons who inject drugs from a large metropolitan city

Introduction: Injection drug use is a risk factor for HIV and hepatitis C (HCV) infections. In recent decades in the United States (U.S.) there has been a significant shift in the demographic profile of people who inject drugs (PWID), with initiates being increasingly likely to be suburban and non-Hispanic white. Young white suburban PWID have low rates of HIV and HCV infection, but frequently engage in behavior that places them at risk. This study examines social network and geographic characteristics associated with sharing syringes among young PWID. Methods: We conducted a cross-sectional personal network and geographic study of 164 young PWID, collecting information on drug-using, sexual, and social support network members. Most participants were registered members of a large Chicago Syringe Exchange Program (SEP) with 5 locations in major outdoor heroin and cocaine markets that attract both urban and suburban drug users. Others were enrolled through active recruitment and flyers. To be eligible, participants had to be 18 to 30 years old and have injected drugs in the past 30 days. Results: Participants (n=164) had a median age of 26, were mostly male (65%) and non-Hispanic white (71%) and had been injecting drugs for a median of 6 years (range=0-14). About one third (37%) reported suburban residence(s), 36% reported urban residence(s), and 27% reported both suburban and urban residences (“crossover”) in the past year. After adjusting for network characteristics that influence syringe sharing, respondent characteristics associated with increased likelihood of sharing included female injecting with male partner (OR=3.75, 95% CI:1.45-9.68), “crossover” vs. suburban residence (OR=3.94, 95% CI: 1.44-10.78), and unknown HCV status vs. HCV negative (OR=5.53, 95% CI: 1.92-15.87). Out of the 164 participants, 148 (90%) reported a total of 565 core (i.e. injected with more than once in past 6 months) drug-using network members (median network size=3). Compared to the participants, the overall drug use core network is slightly older (mean=29.7 vs. 26.0) and similarly likely to be non-Hispanic white (69.4% vs. 71.3%). Among participants who injected with others in the past 6 months (n=145), 34% reported sharing a syringe with a network member. Many participants reported at least one drug network member who was a sexual partner.
(31.8%) or social support partner (21.6%) and 36.5% shared a residence with at least one network member. Network characteristics associated with syringe sharing included sex partner status (OR=3.99, 95% CI: 1.11-14.34), male partner of female respondent (OR=5.32, 95% CI: 1.38-20.46), sharing a residence (OR=7.17, 95% CI: 2.08-24.66), and "crossover" vs. urban residence (OR=5.60, 95% CI: 1.24-25.23). Conclusions: This study on young PWID (18-30 years old) from both urban and suburban areas of a large metropolitan city reports novel data on the behavioral and geographic characteristics of young PWID and their injection networks. We identified geographic mobility between suburban and urban locations as a significant risk factor associated with syringe sharing. Further research is needed to understand the role of geographic factors promoting higher risk among these crossover PWID.

**Tobias Bornakke**
Copenhagen University

Jesper Fels Birkelund (Copenhagen University), Kristoffer Pade Glavind (Copenhagen University)

**Data driven relations**

In this paper we experiment with techniques for combining and mixing novel transactional data sources with the goal of exploring methodological ways of understanding the formation of relations in a population of students. Based upon large-scale transactional data gathered via mobile phones amongst the majority of a university freshman class (N≈600), we set out with the goal of tracing the influence of physical proximity in everyday encounters on the dynamic development of social relations. By combining several data sources collected through the phones Bluetooth- and GPS-sensor as well as data logs from call and text-message interaction we are able to gain a detailed glance into the social interaction as it unfolds in the population over the course of two months. In this work we are faced with a methodological question of how traces of social interactions should be assembled in order to reflect the social relations that they presumably are the outcome of. In methodological terms this paper thus explores different ways of mixing and connecting transactional mobile data in order to close in on the dynamic social network that the students form. By exploring these patterns we exemplify how building relationships from millions of data traces confronts the simplified assumption of relations as static edges in a network and (re-)introduce a more dynamic view on social relations. Through our analysis we get insights into how the dynamic surroundings, such as the passing of weekends and holidays, are much more than mere stages for the relation to unfold and to a great degree determine the physical proximity of social encounters. Further we are able to show how the social relations in our population develop and strengthen over the course of time. We conclude the paper by discussing the future potential of tracing physical proximity in everyday encounters based on transactional data and highlight some of the methodological and technical challenges which remain to be answered in order to exploit the potential of these new exciting data sources.

**Moses Boudourides**
University of Patras, Greece

Sergios Lenis (University of Patras, Greece)

**Distribution of Groups of Vertices Across Multilayer Networks With an Application to 3–Layer Twitter Networks**

Here, we understand a multilayer network composed of m(≥ 2) layers as an arrangement of m graphs or digraphs, which are joined together through an m–partite graph. One may consider an equivalent formulation, motivated by balance theory of signed graphs, according to which a multilayer network is a "balanced" edge–colored graph with regards to a cut such that edges in each block of the cut take one of m different colors and all the cut–edges have a different (m + 1)–th color. Our aim here is to study how edge colors are distributed over certain structural groups of graph vertices, such as connected components and (modularity maximizing) communities. In this way, given a subgraph in a multilayer network, the subgraph is said homogeneous (or monolayered) if all its vertices belong to the same layer and, otherwise, the subgraph is called mixed (or polylayered). As an application of the study of layered groups of vertices, we are analyzing a 3–layer network extracted from Twitter data (about 500 K tweets in the period October 18–31, 2013, retrieved through the search term "Obamacare") with the following layers: (i) the layer of retweets among Twitter users, (ii) the layer of following relationships
among these users and (iii) the layer of co-occurring hashtags included in the tweets sent by the Twitter users. Extended abstract: http://www.slideshare.net/MosesBoudourides/sdgmn1

Lampros Bouranis
University College Dublin

Nial Friel (University College Dublin), Florian Maire (University College Dublin)

Bayesian Composite Likelihood Inference for Exponential Random Graph Models

Exponential Random Graph (ERG) models play an important role in network analysis since they allow complex correlation patterns between the nodes of the network, hence making themselves more realistic than usual network models. However, Bayesian parameter estimation for these models is extremely challenging, since evaluation of the posterior density typically involves the calculation of an intractable normalizing constant. The Exchange algorithm of Murray et al (2006) makes the computation of the Metropolis Hastings acceptance probability feasible even for target distributions whose normalizing constant depends on the parameter of interest (doubly intractable problems). Since sampling from the likelihood is not possible in the context of ERGMs, only a computationally demanding version of the Exchange can be used for larger networks. We therefore consider tractable approximations to the likelihood function. Our research is focused on the examination of the performance of a collection of conditional composite likelihood approximations in the context of Bayesian inference. The composite likelihood consists of a product of full–conditional distributions of blocks of nodes. In practice we consider blocks of 3 or 4 nodes, since this allows for computationally tractable full–conditionals. Our analysis is particularly focused on how to choose such blocks and indeed how many such blocks are needed. Synthetic experiments using undirected and unweighted networks are run to test the performance of such composite likelihood approximations under different blocking scenarios, yielding promising performance.

Julien Brailly
Université Paris-Dauphine/SciencesPo Paris

Guillaume Favre (Université Paris-Dauphine), Emmanuel Lazega (SciencesPo Paris)

Multilevel networks in trade fair: Multiple dimensions of proximity of temporary clusters in regional markets for TV programs

Economic geographers and sociologists have shown the importance of temporary events and trade fairs in global pipelines (Aspers & Darr, 2011; Bathelt & Gluckler, 2011). These are highly competitive places where contracts are negotiated between companies, but also where individuals learn from each other. Such events obviously mobilize multiple levels of agency (individual and organizational), but this multilevel character is often oversimplified or ignored in the analyses. Our purpose is to use multilevel network analysis to explore these dimensions in such events and to redefine the concept of proximity for this field of research on temporary clusters. In previous work, we use a multilevel framework to analyze jointly economic networks between firms and informal networks between their members. Based on a network study of a trade fair for television programs in Eastern Europe, we observe that these levels of agency emerge in different contexts and that they are asynchronous, i.e. individuals are caught in a temporality called “next time this year” and organizations in a different temporality coined “same time next year” (Brailly et al., forthcoming). Here we focus more closely on networks of relationships between individual sellers, between individual buyers, and between buyers and sellers in the same market, and at the same time on networks of contracts between the companies in which these individuals are affiliated. Analyses of specific multilevel subs-structures estimated using exponential random graph models (Robins & al., 2005; Lusher & al., 2013) show that proximity in such events and clusters is multidimensional: co-participations that measure one aspect of geographical proximity are different between levels and between milieux (buyers or sellers), but must be looked at simultaneously with specific multilevel local configurations in the social networks between individuals, thus showing the role of multilevel socio-economic proximity for the management of complex coevolution in such markets or industries.

Josefine Bohr Brask
Section for Ecology and Evolution, University of Copenhagen
Social network structure and the evolution of cooperation – integrating empirical data and agent-based modelling.

The evolution of cooperation among unrelated individuals is an evolutionary paradox and requires special mechanisms in order to be maintained. Many social species have been found to have non-random social network structures with a high level of clustering. Models have suggested that such non-random network structure can increase the chance that cooperation is maintained in a population. However, these findings have rarely been connected directly to empirical data. With an integrated approach combining agent-based modelling and empirical data, we investigate the role of social structure for the evolution of cooperation in a classic study system in behavioural science, the Trinidadian guppy (Poecilia reticulata). This small freshwater fish species has cooperative partnerships that are used in coordinated inspection of predators, and the expected level of cooperation in wild guppy populations thus depends on the predation level. Using a standard prisoner’s dilemma framework, we develop a computer model simulating the evolution of cooperation in populations with different social network structures. By means of this model and data from natural guppy populations, we investigate whether social networks of wild guppies support cooperation theoretically, and whether the predicted differences in support of cooperation between high and low predation populations are present. We also investigate the role of specific structural and dynamical network features for the maintenance of cooperation in the guppy system. Preliminary simulation results suggest that social network data from highly predated guppies support cooperation, in accordance with expectations. The role of model assumptions for the simulation results will be critically assessed. With this study we hope to cast new light upon how the direct combination of agent-based modelling and empirical investigations may lead to new insights into the evolution of cooperation in social networks.

Ronald Breiger
University of Arizona, USA

Community Detection for Multiple Directed Networks

A large stream of research spurred by work of Mark Newman has developed methods for the detection of community structure, defined as the appearance of densely connected groups of vertices (relative to a null model), with only sparser connections between groups. Two points (related to each other) that have been noted in a recent comprehensive review are that (a) research on the community structure of multilayer networks is in need of much further development, and (b) much more work is needed on mesoscale features other than community structure, both in single-layer and multilayer networks. I suggest that a particular approach to community detection in the case of networks of directed ties leads naturally to a broadening of the kinds of patterns that are of interest to analysts who employ leading eigenvector community detection algorithms. My talk presents, not a thoroughly new or general method, but rather some hopefully novel insight into directed networks as a distinctive kind of multilayer network, as well as into how multiple directed (and undirected) networks can be modeled within a single analysis based on a straightforward extension of leading eigenvector community detection. A suitable version of the modularity matrix for this task will in general not yield community structure, but rather a pattern in which each identified set in a partition of nodes may in principle have unusually dense (or sparse) connections with every other such set, a pattern that may be distinctive with respect to each of the multiple networks analyzed. This work thus uses fundamental ideas from the community detection literature to move beyond a sole reliance on the pattern of community structure, and thus it enlarges the toolbox of mesoscale patterns available to analysts of multilayer networks. I illustrate the suggested approach by means of analyses of several well-known multilayer networks, including appropriate assessments of model fit.

Julia Brennecke
Centre for Transformative Innovation, Swinburne University of Technology

Olaf Rank (Chair for Organization and HRM, Albert-Ludwigs-University Freiburg)
Seeking advice in the knowledge space – A multilevel investigation of inventors’ network embeddedness

Innovation is a social process critically relying on informal exchange. In this study, we link an informal network among inventors in an organization to their knowledge space – a network composed of connections between knowledge elements derived from patents. We investigate how the knowledge elements inventors possess, and particularly the position of these elements in the knowledge space, impact the transfer of advice. We argue that the diversity, uniqueness, and combinatorial potential of inventors’ knowledge elements as well as cognitive proximity of inventors in the knowledge space affect the informal transfer of work-related advice in specific ways. To test our assumptions, we combine survey data on inventors working in a multinational corporation with headquarters in Germany with information on the inventors’ knowledge space derived from patent classes of all patents that the inventors have been listed on in the past 5 years prior to the survey. Results from multilevel ERGMs show that the structure of inventors’ technological knowledge crucially shapes their embeddedness in the advice network. Knowledge diversity, uniqueness, and combinatorial potential impact inventors’ advice-seeking activity and their popularity as advisors. Cognitive proximity plays an important role as inventors sharing knowledge elements are more likely to engage in the informal transfer of advice. Investigating how individuals come to occupy their position in the advice network as a function of the technological knowledge space that they occupy this study seeks to extend the literature on the drivers of informal exchange in organizations and contributes to research on the micro-foundations of innovation.

Tymofii Brik
Social Science department; University of Carlos III, Madrid (Spain)

Political mobilization and the obstacles for the emergence of social capital on Facebook: Some evidence from Ukrainian EuroMaidan revolution

Online social networks, especially Facebook, are often regarded as the important tool for mobilization during the 2013-2014 EuroMaidan revolution in Ukraine. Furthermore, online social networks allegedly contributed to the developments of social capital among Ukrainians who hitherto mistrusted anonymous others and rarely invested in common resources. The present study investigates empirically to what extent Facebook activities among EuroMaidan supporters were mutually oriented, and whether these activities yielded social capital. A unique data set of 27,458 posts and 946,776 comments from the Facebook page of EuroMaidan was collected. Using social network analysis techniques proves that the bridging social capital among online activists was limited and their communication in general cannot be described as mutually oriented. An absence of stable social ties did not allow social capital to be generated and accumulated. The present investigation challenges a common wisdom of previous Ukrainian EuroMaidan studies and provides an alternative explanation of the link between Facebook communication and social capital developments. The present study suggests that online social capital began to develop only after the end of the revolution when the overall magnitude of posts decreased dramatically. In terms of social theory, some clarifications to the theory of the logic of connective action are discussed in the conclusions. This theory states that an introduction of digital media affects dynamics of the logic of connective action dramatically. However, the theory of connective action has no clear differentiation between linear and nonlinear impact of digital media on connectivity. The present quantitative analysis reveals nonlinear relationship, i.e. social ties creation is more plausible at the lower rates of digital spreading of messages. Some practical implications for media and policy are drawn in the end of the article.

Arturo Briseno
Tecnologico de Monterrey
Bryan Husted (York Univeristy), Timothy Rowley (University of Toronto), Jorge Rocha (Tecnologico de Monterrey)

Board Interlocks and the Diffusion of Social and Environmental Practices in Mexico

This study concentrates on the diffusion of managerial practices in an interlock network of listed firms in Mexico. Management literature traditionally aim to understand on the one hand, the factors that impede diffusion such as knowledge barriers (Attewell, 1992; Cabral & Leiblein, 2001; Fichman &
Kemerer, 1997) uncertainty (Barden, 2012) or complexity (Hargadon & Sutton, 1997; Weigelt & Sarkar, 2009) and on the other, factors that ease diffusion such as institutional mechanisms (Gibbons, 2004; Lounsbury, 2001; Westphal, Gullati & Shortell, 1997) or popularity (Abrahamson, 1991). However, many of these studies do not take into account the complex social system in which firms are embedded. Social network theory recognizes that organization’s actions are not random but embedded in a social system (Granovetter, 1985). For firms, network ties can consist of board interlocks, i.e. a board member who participates in two or more firms. The ties among firms in the network help to communicate and diffuse practices (Mizruchi, 1996; Ornstein, 1984; Shropshire, 2010). Focusing on the collective linkages can provide a better understanding how influential other firms can be in terms of practice adoption (Phan, Lee, & Lau, 2003). To analyze the relationships presented in ties that actors has in a particular network, such as in the case of board members, social network analysis helps to explain how social interactions shape individual and organizational behavior (Wasserman & Faust, 2009). According to this literature, it is the relationships among actors that determine behavior and provide richer understanding of the process of social reality. In particular we concentrate on a Corporate Social Responsibility (CSR) practice in Mexico. Social and environmental practices such as health care programs or ISO 140001 are increasingly a focus of attention in management research (Griffin & Mahon, 1997; Margolis & Walsh, 2003). ESR (Empresa Socialmente Responsable) is a social and environmental certification granted by a Mexican NGO to those firms that achieve a certain commitment to Corporate Social Responsibility issues. We demonstrate empirically how listed firms in Mexico are arranged in networks that can influence practice adoption via board interlocks. Using a panel data from 177 firms listed in Bolsa Mexicana de Valores (BMV) from 2002-2012 we found that network ties does influence practice adoption. The number of connections that a firm has does influence the adoption of the ESR practice, however direct contact with those who have adopted is a better predictor. When direct contact is included, the number of interlocks loose explanatory power. Besides direct contact, we compare other influencing factors such as Markov clusters, industry and ownership.

Chiara Broccatelli
University of Manchester, Mitchell Centre for Social Network Analysis

Johan Koskinen (University of Manchester, Mitchell Centre for Social Network Analysis), Martin G. Everett (University of Manchester, Mitchell Centre for Social Network Analysis)

How Do People Act Under Secrecy? Network Analysis for Covert Networks

Increased interest in analysing covert networks has fostered a huge debate regarding the possibility of utilising SNA to investigate them. Since covert networks are formed by people who tend to keep secret their relationships to outsiders, the reconstruction and the analysis of these networks is challenging. Authors have been discussing a number of theories which can explain the individuals' motivations behind structural patterns of interaction in covert networks. Nevertheless, the limited access to these kinds of data increases the complexity of testing hypotheses empirically, as well as of comparing results and of making generalisations. As a consequence, the existing literature on covert networks does not define clearly the nature of covert ties. In addition, it has been argued that traditional application of SNA measures may lead to a misinterpretation of internal dynamics (i.e. misrepresentation of key actors, overestimation of ties). The question that arises is to what extent existing SNA techniques are suitable for analysing these kinds of networks. Here, we consider the case of different covert networks such as UK Suffragette's co-offending networks, terrorist networks and criminal networks in their two-mode format. In this paper, firstly, we distinguished these networks in terms of the type of relationship considered. Secondly, we analyse patterns of interactions over-time by using standard SNA measures such as centrality and cohesive subgraphs in the context of two-mode networks. Thirdly, we explore possible adaptions of these measures in order to provide a deeper insight into these groups.

Maria Brockhaus
CIFOR

Monica Di Gregorio (Leeds)
Longitudinal analysis of developing policy networks in forest based mitigation of climate change: moving towards transformational change?

Policy making is driven by negotiations of interests of multiple actors and tend to take place in policy networks (Marsh, 2000). Such policy networks integrate societal actors beyond the state, all of which aim to different degrees at influencing ongoing policy processes and outcomes. Policy arenas and the policy networks within can change over time, with new actors joining and others dropping out, as the context develops. Policy coalitions within these networks may also change over time, as interests, beliefs, or patterns of resource exchange such as finance or information shift. Policy processes around Reducing Emissions from Deforestation and Forest Degradation (REDD+) represent an emerging policy domain, in which actors cooperate and conflict in network structures, build coalitions and try to control information and finance flows relevant for REDD+ decision making. Where powerful coalitions advocate for policy reforms, these changes are more likely to occur (Fischer, 2013). Within the REDD+ policy domain this would translate, in an ideal case for example, into more consistent and effective progress in the development of REDD+ strategies and changes in policy directions from business-as-usual to tackling the major drivers of deforestation and forest degradation. While in the past, policy network analysis has been criticized for focusing primarily on structural and stable features of policy domains (Börzel, 1997), it is possible to investigate changes in policy networks over time. Longitudinal analysis advances the value of policy network analysis through the analysis of policy networks at different point in times (Snijders et al., 2007), and helps to understands dynamic policy processes. Thereby it is strengthening the explanatory power of policy network theory and social network analysis as a method in the investigation of environmental governance. This paper presents a longitudinal, comparative research design studying dynamics in policy processes in national REDD+ processes. We apply social network analysis to generate evidence from a set of country case studies first investigated in 2012, which include Brazil, Indonesia, Cameroon, and Vietnam. The studies provided evidence of how power structures that are embedded in interactions among a variety of different policy actors with different interests and ideas shaped the development of REDD+ strategies. We gained insights into the agency and drivers behind policy change, as well as of the powerful forces that hinder such change. The position of powerful actors in policy interactions, the distribution of power within these networks and the features of the dominant policy coalitions in national REDD+ contribute to explain REDD+ outcomes, with some countries advancing more than others. The second field phase is currently ongoing in 2014 and allows to study the network over time, and how any changes have affected decision making in REDD+ policy arenas. Combined with qualitative interview data with policy actors from the researched countries, such a longitudinal and comparative design allows us to identify the drivers of, and constraints to, transformational change, which is required to realise the objective of reducing emissions from deforestation and forest degradation.

Piotr Bródka
Wrocław University of Technology

Przemysław Kazienko (Wrocław University of Technology)

Group Extraction in Multi-layered Social Network

One of the crucial problems in multi-layered social network analysis is community extraction. In order to cope with this problem the CLECC measure (Cross Layered Edge Clustering Coefficient) was developed based on the idea of edge clustering coefficient measure introduced by Radicchi et. al. [Defining and Identifying Communities in Networks]. It is an edge measure which expresses how much the neighbours of two given nodes connected by that edge are similar to each other. CLECC measure is based on a multi-layered neighbourhood of a given node x i.e., a set of nodes, which are neighbours of node x on at least α layers in the Multi-layered Social Network (MSN). Based on the cross layered edge clustering coefficient measure a new algorithm called cross layered edge clustering coefficient method (CLECC) is proposed. Application of multi-layered neighbourhood allows the CLECC measure to respect all layers simultaneously. The adjustable method parameter α is responsible for restrictiveness of the algorithm. This is especially suitable, if a multi-layered network consist of layers with significantly different number of edges. When layers with the high density exist along with sparse ones, the probability for two vertices to be in the multi-layered network for α equal |L| is very small, thus the method output would contain only the strongest communities. However, by lowering α the method limitation enforced on measure decreases, unveiling more of underlying community structures. Hence, the parameter α sets robustness of communities delivered by the method. The first set of tests
performed on reference networks, GN Benchmark and LFR Benchmark indicates that the CLECC method works properly for a single-layered social network (SSN), and despite the fact that it is not the best method for SSN, it performs very well, especially for high values of mixing parameter. The second part of tests on virtual world networks extracted from Timik.pl clearly shows that using the multi-layered network provides much better results than analysing each layer separately, both in algorithm quality and execution time. To perform the last series of tests the extension of LFR Benchmark was worked out. The new extension called mLFR Benchmark (http://goo.gl/AyQsjm) provides the possibility to generate multi-layered test networks. Based on these networks, the last series of test has been carried out.

Anthony Brown
Leeds University

The role of emigrant political network acquisition as an extension of social networks in returnee entrepreneurial enterprise’s success.

Political capital as a separate but linked part of social capital, allows for the exploration of the role these networks play in the valued added inputs an entrepreneur makes into his/her enterprise. This idea has started to be explored in entrepreneurial research, however the distinct imprint returnees bring to the enterprise has yet to be explored in depth. Issues such as duality of networks, built overseas and at home; erosion of capital within the network due to distance and time, and comparative studies to those that have not migrated and returned have yet to be explored. It is my contention that the interlocking multiple networks returnees adds significant more value than the single home country network non-returnees possess to the performance of the enterprise. The idea that returnees, through the additional acquired political network built outside their home country, add a level of value that supersedes the erosion of value of their home network and positively impact their enterprise success over and above those started by non-returnees is the focus of this paper. Building on both social capital theory and the economic based entrepreneurship’s judgemental decision making theory, political capital as a direct input of value creation for an entrepreneurial enterprise, I will be exploring the relationship between the domestic and foreign political networks developed by the entrepreneur; and how these add value above and beyond the network developed in the home country only. The study will look at where the networks have been acquired, if location is of real value, the linkage of these networks within a single entrepreneur or group of entrepreneurs (and if a group is formed to create these layers of networks) and establish a demonstrable link with the enterprise’s performance when compared to non-returnees and their enterprise’s performance. The ability of individuals to influence persons, within the institutions, or the powers derived from these institutions in order to add value to their enterprises is of interest to both the IB and network researchers since the link between these political networks, enterprise formation and enterprise performance has not yet been explored and understood, especially from a cross cultural, cross geographical perspective. Consequently the findings have practical implications particularly as regards to informing government practices and policies with regards to developing policy, and/ or supporting new venture incentives. This will be of particular importance for nations with high émigré populations as well as nations trying to attract entrepreneurs to establish their enterprises in their respective countries, especially in highly dynamic or continuously changing competitive landscapes. The key contribution(s) of this research is thus two-fold; first, it will establish the importance of looking at aggregate value of multiple networks both from an entrepreneur development perspective and from a value perspective at the enterprise level. Second, it will help expand current understanding of acquisition and trans-formative value of networks among both groups, returnee and non-returnee, of entrepreneurs.

Tom Brughmans
Department of Computer and Information Science, University of Konstanz

Exploring dependence assumptions for visibility networks in archaeology

In a visibility network a line of sight from an observation location to an observed location is represented as an arc and a pair of nodes. Visibility networks are used in archaeological research to study a variety of past phenomena. They can serve as representations of past communication networks using visible smoke or fire signals to communicate a message between two places that were visible from one
another. Visibility networks are also often used to represent resource extraction sites or other settlements the access to which could be visually controlled from a given settlement. What most archaeological studies of visibility networks have in common, however, are assumptions about the network data patterns one expects to see if specific phenomena occurred in the past. For example, a non-trivial signalling network consists of at least three locations with at least two lines of sight between them. In this paper I will discuss the dependence assumptions for visibility networks that are most commonly used in archaeological research. I will argue that their formal representation as network data allows for hypotheses about the structure, role and change of past phenomena that concern visibility to be represented and falsified. However, the study of visibility networks through the lens of dependence assumptions and formal network science is still in its infancy. I will therefore conclude the paper with an overview of the archaeological and methodological challenges that emerge from this discussion of dependence assumptions.

Hubert Buch-Hansen
CBS

Lasse Folke Henriksen (CBS)


This paper focuses on two mechanisms through which a group of companies exercise market control: transnational network formation in the form of interlocking directorates and cartelization. Network theory suggests that such mechanisms are used by firms to mute the intensity of competition, thus stabilizing market conditions (e.g., Fligstein, 2001). Considering the importance ascribed to transnational production and trade, protectionism and the power of multinational corporations in International Political Economy (IPE) research, the lack of studies focusing on the relation between business networks and market control is puzzling. Within the discipline of economic sociology a number of prominent theorists have made several significant contributions on this matter (Burt, 1992; Fligstein, 2001), and a number of scholars have empirically substantiated the importance of the relation (e.g., Uzzi, 1997), albeit focusing almost exclusively on a national context, more specifically the United States. By cross-fertilizing insights from economic sociology and IPE this paper studies transnational network formation and cartelization as attempts by a group of major firms to control the European chemicals market from 1960 to 2000. The existing literature dealing with the relationship between interlocking directorates and cartelization asserts that interlocks are sites of coordination that can lead to cartels being established. Drawing on economic sociology and the IPE literature, we suggest that this relationship is less simple and we offer a new set of propositions that relax the suggested directionality of the association between interlocks and cartels. We explore these propositions through a longitudinal network analysis of the dominant actors within the European market for chemicals, focusing on interlocks and collusive ties. We conduct this analysis on the basis of an original dataset collected from EU cartels cases and annual reports from companies from 1960-2000. Existing studies have exclusively looked at board and cartels in a national context. We expand the geographical scope of analysis by looking at network formation and cartelization at the European level. Existing studies also have a narrow temporal scope of analysis. We expand the temporal scope by conducting our network analysis on the basis of longitudinal data. A major challenge for longitudinal network analysis has been that the composition of actors in a network often changes over time, making structural characteristics difficult to compare. The remarkable stability of the population of companies in question allows us to overcome this challenge and explore the long-term temporal associations between the two types of business ties.

William Burk
Radboud University Nijmegen

Moniek Buijzen (Radboud University Nijmegen), Crystal Smit (Radboud University Nijmegen), Leevi Karssen (Radboud University Nijmegen)

Peers can promote water drinking. The question is: How do they do it?
Peer-led interventions initially identify high status adolescents, and then train and support them to promote a specific behavior (e.g., drink more water) within peer networks (e.g., classmates). A growing number of studies have reported the efficacy of this type of intervention in the reduction of health-risk, and the promotion of health-enhancing behaviors. One recent study that used peer leaders to promote increased water drinking found that water drinking increased in the experimental classrooms (and not in those in the control condition). The question is: How did the peer leaders successfully promote increased water drinking? Three hypotheses are tested. The first explanation involves homophilic peer selection and socialization (i.e., initial and acquired similarity between relationship partners). Specifically, peer leaders will initiate new friendships with peers who drink a lot of water, and students will adopt the water drinking behaviors among their classmates. The second explanation involves peer leaders directly influencing their (best) friends’ water drinking behaviors through modeling. That is, peer leaders’ behaviors are expected to predict changes in their best friends’ water drinking behaviors. The third explanation emphasizes the status of the peer leaders. While the high status peer leaders are expected to increase in water drinking (they were instructed to promote water drinking), it is anticipated that low status students will be significantly more likely to increase water consumption in order to gain status within the peer network. The sample included 110 adolescents ranging from 9 to 13 years of age (M = 10.7 years; 52% female) from the five classrooms in the experimental condition of the RCT. All participants provided peer nominations and self-reported water drinking behavior at the baseline assessment and eight weeks later at the follow-up assessment. The first hypothesis was tested using stochastic actor-oriented models of network and behavioral dynamics, which examined students’ tendencies for homophilic selection based water drinking behaviors and the adoption of their friends’ water drinking behaviors. These findings indicated that changes in friendship ties were not associated with water drinking, nor did peers influence one another’s water drinking. The second hypothesis was tested with dyadic analyses in order to determine whether peer leader’s directly influenced their best friend’s drinking behaviors. These findings indicated that reports of peer leader’s water drinking at baseline did not predict changes in their friend’s behaviors at follow-up (partner effects). The third hypothesis was tested using multiple linear regression analysis. Specifically, individual water drinking at baseline, perceived popularity, and the interaction between initial water drinking and popularity were included as predictors of individual water drinking behaviors at follow-up. This analysis indicated that popularity moderated the association between water drinking at baseline and follow-up. Specifically, unpopular students were more likely than popular students to increase in water drinking. Collectively, these findings indicate that peer leaders did not directly or indirectly influence their friends to drink more water. Instead, peer leaders promoted water drinking primarily among those who they were not necessarily connected to within friendship networks (i.e., the unpopular students). Various mechanisms underlying peer-led interventions are discussed.

Katarzyna Burzynska
Lund University

Lending Networks of China’s Listed Companies: The Role of Financial Leverage, Firm Size, and Performance

This study is the first to explore the determinants of the egocentric lending networks of stock listed companies in China. Egocentric lending networks are constructed using the public loan announcements of firms listed on China’s two stock exchanges combined with cross-ownership shares connecting the lending institutions. The data cover 2060 observations over the period of 2007 to 2012. The study demonstrates that large, high-growth firms and firms with low leverage are more likely to have less-constrained lending networks. In contrast, highly indebted firms with poor performance tend to have more-constrained lending networks. The lending networks of firms with higher shares of state ownership, however, are not significantly related to the standard firm characteristics, suggesting that partly state-owned corporations in China still enjoy privileged access to bank financing, despite substantial reforms and growing competition in China’s banking sector.

Vincent Buskens
Utrecht University

Bas Hofstra (Utrecht University), Rense Corten (Utrecht University)

Learning in Social Networks: Selecting Profitable Choices among Alternatives of Uncertain Profitability in Various Networks
ABSTRACT: Social capital theory assumes that information is valuable, but only rarely is this value explicitly modeled, or are mechanisms that connect social network structure to valuable information empirically tested. We model an individual decision problem in which individuals make choices that yield uncertain outcomes, while they can learn about profitable choices from the network. We generate computer-simulated data to derive hypotheses about the effect of network positions and network structures on making profitable choices. We conduct a laboratory experiment to empirically test these hypotheses, and find that on the microlevel, degree centrality has a positive effect on making profitable choices, while betweenness centrality has no effect. On the macrolevel, we see that density has a positive effect on making profitable choices, whereas we did not find an effect of centralization.

Carter T. Butts
University of California, Irvine

Collapsed ERGM Estimation for Multiple-network Models with Hierarchical Baseline Effects

The simultaneous modeling of multiple networks is a problem of growing interest in the social network field. This problem challenges us to balance the virtues of parsimony and feasibility of implementation against the need to accommodate heterogeneity in across networks. In the case of ERGM estimation for multiple graphs (of possibly varying order), capturing variation in the baseline characteristics of the dyad census (i.e., density and reciprocity) is of prime importance, as these properties are known to impact virtually all other aspects of network structure. While current modeling tools support the use of fixed effects for this purpose, such models are cumbersome, fail to share information across graphs, and do not facilitate extrapolation to new networks drawn from the same population. Truly hierarchical models address these difficulties, but implementations are still in their infancy. In this talk I discuss two families of hierarchical mixture models for baseline network properties that can be used as the basis for more general multiple-network ERGMs. Unlike many other hierarchical families, these can be implemented via a "collapsed" ERGM estimation scheme that allows their parameters to be estimated using standard curved exponential family methods. Here I show how this can be performed, introducing a simple set of graph statistics that implement the associated model families. I also provide some illustrative use cases, and discuss degree-based variants that are suitable for graphs of varying order.

Alberto Caimo
University of Lugano
Alessandro Lomi (University of Lugano), Antonietta Mira (University of Lugano), Stefano Tasselli (University of Lugano)

Monte Carlo methods for Bayesian exponential random graphs

Recent research in statistical social network analysis has demonstrated the advantages and effectiveness of probabilistic approaches to social network data. In this talk we will present some recent Monte Carlo strategies for doubly intractable target distributions which improve the efficiency of Bayesian methods for exponential random graph models. These new methods are applied to the context of a social network dataset describing advice relations between 109 professionals working in the clinical nephrology, nutrition and dialysis department of a hospital located in Northern Italy. The analysis is carried out using the Bergm package for R.

Catherine Calder
The Ohio State University
Yanan Jia (The Ohio State University), Christopher Browning (The Ohio State University)

Bilinear Mixed-Effects Models for Affiliation Networks

An affiliation network is a particular kind of two-mode social network that consists of a set of ‘actors’ and a set of ‘events’ where ties indicate an actor’s participation in an event. While event affiliations are fundamental in defining the social identity of individuals, statistical methods for studying affiliation networks are less well developed than methods for studying one-mode, or actor-actor, networks. One way to analyze affiliation networks is to consider one-mode network matrices that are derived from an
affiliation network, but this approach may lead to the loss of important structural features of the data. The most comprehensive approach is to study both actors and events simultaneously. In this presentation, we extend the bilinear mixed-effects model, a type of latent space model developed for one-mode networks, to affiliation networks by considering dependence patterns in the interactions between actors. This model relates the log odds of a tie between an actor and an event to a linear function of actor, event, and actor/event-pair covariates and random effects, plus a bilinear term that is comprised of the inner product of latent actor-specific and event-specific random effects. We demonstrate how the bilinear component of the model can capture the types of fourth-order dependence often seen in affiliation networks. We also briefly describe a Markov chain Monte Carlo algorithm for Bayesian inference. We use our proposed statistical model to explore patterns in extracurricular activity membership of students in a racially-diverse high school in a Midwestern metropolitan area collected by Daniel McFarland (McFarland, 1999). Our statistical model embeds students into a latent space spanning the common patterns of extracurricular activity membership (e.g., membership in multiple sports teams or service clubs). Using techniques from spatial point pattern analysis, we show how our model can provide insight into patterns of racial/ethnic segregation within this latent space. Specifically, we estimate the posterior distribution of the multi-type K-function, which captures the proximity of individuals of the same race as a function of distance in the latent space. By comparing the estimated K-functions to a reference distribution calculated under a random mixing hypothesis, we do not find evidence of wide-spread racial/ethnic segregation among students. However, it appears that the relatively small population of Hispanic students in the high school exhibits more clustering within this latent space than groups of students.

Agusti Canals
Universitat Oberta de Catalunya

Social networks in higher education e-learning environments

In online environments, learning processes take place over different network structures that support knowledge and information flows. Some of these structures reflect formal relationships but others are consequence of informal ties between members of the organization. In this paper we will look at the structure of informal social networks of a very specific kind of network-based environment: an online university. For this, we will characterize the informal social networks formed among students of different undergraduate programs, assess their differences and similarities and relate it to the characteristics of each program. Informal social networks play an important role in the internal dynamics of organizations and its study provides interesting insights for organization scientists [Borgatti and Foster, 2003; Krackhardt and Hanson, 1993; Krackhardt and Raider, 2001]. However, the description of real social networks is not an easy task due to the difficulties associated to data gathering. Traditional methodologies relying on surveys or interviews often are not easy to interpret and represent an important cost in terms of time. Nowadays, electronic communication systems like cellular phone, e-mail or instant messaging may provide us with a big amount of data on social interaction in the form of data stored in log files. This information presents a high degree of accuracy and thoroughness and is ready to be used and analyzed by computerized means. Through the use of this information it is quite feasible to identify and study social networks in diverse settings while being respectful with privacy issues. Of course, not all social interactions take place by electronic means and the analysis of the so-build networks gives only a partial vision of reality. In some modern organizations where these systems are generalized, though, this partial vision may provide quite accurate insights on the structure of the social fabric [Adamic and Adar, 2003]. For instance, information gathered from e-mail systems at organizations where it is extensively used and becomes one of the main communication channels is particularly well suited for this purpose. Just with data gathered by the e-mail server about the sender and receiver of each message—which are present at any log file—it is possible to build the e-mail social network. Instances of this kind of networks have been used in the study of different aspects of social networks, namely network topology [Ebel et al., 2002], search strategies [Adamic and Adar, 2005], information diffusion [Wu et al., 2004], spread of computer viruses [Newman et al., 2002], temporal dynamics [Eckmann et al., 2003], strength of connections [Caldarelli et al., 2003], and community structure [Guimera et al., 2006; Tyler et al., 2003]. We will use this methodology to analyze the informal social networks formed by the students of different undergraduate programs of an exclusively online university, the Universitat Oberta de Catalunya (“Open University of Catalonia”). UOC was founded in 1994 by the Catalan government and offers different undergraduate and graduate programs in Catalan, Spanish and English. Nowadays UOC has more than 40,000 students and more than 2,000 faculty members. All of UOC courses are delivered online making use of an in-house developed Learning
Management System, the Campus Virtual, which features an e-mail system. For the representation of the e-mail social network of UOC we make use of the log data recorded during a period of one month. In that time, 462,033 internal messages were recorded. From the general network, we extract several different sub-networks formed by the subset of nodes and links corresponding to students enrolled in specific undergraduate programs. What we obtain is a set of about 30 networks with an important degree of diversity both in terms of general structure and in terms of the characteristics of ties and nodes. As the structure of those networks clearly influences the information and knowledge transfer processes that take place, their study provides interesting insights on the role and influence of informal social networks on the learning processes in online universities.

Julian Cardenas
Freie Universität Berlin

Networks of interlocking ownership in Latin America

Previous studies on corporate elite networks in Latin America showed the lack of transnational directors in the region and great differences between national networks of interlocking directorates. Before drawing conclusions on how Latin America is ruled, this research tackles a still unexplored issue: networks of interlocking ownership in Latin America. On basis of the ownership ties among the largest firms in Latin America, I investigate several aspects – transnational power, national similarities and differences, overlapping of ownership and director networks, and family business groups. Among the results obtained, the most significant ones are: 1) families are central actors in ownership networks instead of large banks, and 2) North Western firms are transnational connectors between Latin American economies. These findings open up discussion on the competition and connivance between two different ways of ruling: family control vs. foreign corporate control.

Kathleen M. Carley
CMU

Kenneth Joseph (CMU), Wei Wei (CMU), Matthew Benigni (CMU)

Twitter, Trust and Times of Upheaval

As the Arab Spring began to unfold, millions of people in the Middle East began to acquire Facebook and Twitter accounts. This paper describes the use of twitter during this period of high social change. Our concern here is with the role of trust in twitter networks, and the relation of such trust to covert activity, and the level of civil unrest. Using a large corpus of tweets, form a 10% feed, twitter usage for 18 countries from mid 2011 through 2013 are analyzed. We begin by asking, how can trust be measured in Twitter data? Trust is generally characterized as supporting prediction - I can count on you to do x. Trust may, but need not, have an affective component – I count on you to not harm me. Voluntarily reciprocated relations are often thought to be indicative of a trust relationship where both parties trust each other. Assessing who trusts whom, in an observed network such as Twitter, is difficult for a number of reasons: volume of data, lack of direct expressions of trust, ambiguity of the expressed sentiment, only a snapshot of interaction, and data collection may result in only a sample of the network in twitter. Using this data we use a multi-faceted approach to examine trust: 1) we identify reciprocated relations – the “trust” network; 2) we identify actors who are trying to harm – the “un-trusted” actors; and 3) we identify tweets related to trust – the “perception” of trust. We find that the trust network, is miniscule and not representative of the general twitter community. For example, of the ~8m tweeters in our data, less than 40% of them mention another and of these only 4.1% had a reciprocal tie. We find that twitter is used differently, in countries with high and low civil unrest, and the trust networks are distinctive. For example high civil unrest countries are more focused on getting the message out and less on general discussion. We find evidence of multiple classes of untrustworthy actors – e.g., bots and covert actors and they use trust networks differently. We find that the perception of trust varies by level of civil unrest and is related to the type of leader. Additional lessons learned about assessing trust using on-line social network data are discussed. Additional findings related to trust and the Arab Spring are presented.

Professor L. Richard Carley
Carnegie Mellon University

Eric Malloy (Netanomics)
The generation of realistic synthetic networks

Each of us lives in a world where we communicate with many others through a wide array of communications media. In doing so we build, destroy and maintain our ties with others – our social networks. Empirical data on these networks show strong relations between the networks as observed in one media and those observed in another media. In this presentation, we consider what are the mechanisms needed to model the human social network as it is realized through time and space employing multiple communications media? We describe an empirically driven process for the generation of realistic over-time network data across multiple communications media. First, we describe the basic procedure for generating realistic, at-scale synthetic dynamic networks. The networks we generate are synthetic representations of a population of social agents with demographics selected to be representative of various cities. We describe out algorithms how they have been optimized to allow the generation of populations consisting of millions of social agents. The nodes in these networks are “agents” each of which represents an individual human of a specific age, gender, and race. We then describe how these networks evolve over time and how we model who communicates with whom, when, and by what media. The media we consider include: face-to-face communication, e-mail communication, text messages, and Twitter messages. Communications among these agents depend not just on the social network but also on the communications the media used, and on the age, gender and race of the agents, the time of day, the day of week, etc. Next, we describe the procedure for refining the generative algorithm so that the resultant networks match known empirical findings from real world communications networks. The use of empirical data to enable improved the fidelity of the synthetic networks is considered in detail. Illustrative results showing the realism of the generated networks, and their variance over time are presented. Two key areas where these realistic synthetic networks are of value are as testing data for new big-data network algorithms, and as input data for simulation systems and war games that require realistic synthetic data as a baseline.

Drazen Cepic
International Development Department, University of Birmingham

Personal Networks and Fisheries Co-Management on Lake Victoria, East Africa

The methodological approaches related to social network analysis have gained a growing prominence in the field of natural resource management, where it has become an important tool for understanding how natural resources and ecosystems are embedded in social relations. Yet, while most cases of SNA studies explored complete networks, personal network analysis has rarely been reported on in the literature. Ego-networks, however, entail important advantages over complete networks: they are a less time-consuming and costly form of data collection, produce richer data, as well as lead to easier generalization from the observation in the sample to larger populations. This paper reports on a novel application of SNA to the personal relations of fisheries stakeholders on Lake Victoria, East Africa, to investigate which relations may influence how people behave within fisheries and how these relations affect fisheries co-management. Co-management of natural resources is viewed by many as a network of personal relations, yet co-management literature is vague about what these relations are, which matter and how they can be utilised in co-management approaches. Co-management was introduced on Lake Victoria in the early 2000s, with the process involving the formation of community-based organisations to enable fisherfolk to participate in fisheries management. Evidence to date shows that the introduction of co-management has had mixed success and so the research investigates how co-management could be strengthened through a better understanding of social relations. The research involves investigation of advice on fishing techniques which fishermen receive from their peers and colleagues (horizontal flow of information) and, secondly, the imposition of fishing gear types by the agents/traders and boat owners onto the crew (vertical, hierarchical communication). The paper reports on the design of the research approach and how fieldwork is being undertaken in the three countries bordering Lake Victoria (Kenya, Tanzania and Uganda), with interviews underway with beach-level actors (boat owners, crew, processors, traders and fish agents) and with government officers, using EgoNet software for the quantitative part of the interview. While the research carried out thus far on Lake Victoria mostly studied small number of cases (one to two fishing villages), and most often focused on a single country, the personal network approach will allow us to give a more systematic overview of trends in Lake Victoria fisheries.

Nina Cesare
Redrawing the “Color Line”: Examining Racial Segregation in Associative Networks on Twitter

Online social spaces such as Twitter are becoming increasingly salient social contexts for associative tie formation. However, we still know little about the racial composition of associative networks within these spaces. In this paper, we use Twitter data to examine racial segregation patterns in online associative networks and to determine whether these patterns mirror those seen offline. Acknowledging past work on the role that social structure and agency play in influencing the racial composition of individuals’ networks, we argue that Twitter blurs the roles of these forces as users actively create and are influenced by their own “structure.” This may result in networks that are more or less diverse than what is seen offline. Using data representing the social networks of purposively sampled Twitter users, we examine the racial characteristics of the user’s social ties in order to determine whether these networks are more or less racially diverse than would be expected if friendships were chosen at random. We also compare levels of online associative network segregation to racial associative network segregation reported offline. In addition to contributing to existing literature regarding the role of race within friendship networks, this paper explores a number of methodological issues associated with the use of Twitter for network research, including how to effectively sample users and how to define friendship within this space.

Social networks and diffusion in mass drug administration in Uganda

Centrality in social networks has been positively associated with behavioural change, new product diffusion, and new technology adoption. Yet, the influence of social network topology on reinforcing behaviours has been poorly explored. This outstanding issue must be addressed, as many real world interventions do allow the free selection of the most central network ‘injection points’ to begin diffusion of a product. We examined how large-scale drug administration diffuses through villages in Uganda. This research was conducted in the context of routine mass drug administration for human helminth infections. Over one billion individuals in developing countries worldwide require treatment through mass drug administration. Uganda has been conducting mass drug administration since the year 2003. Mass drug administration entails single, free treatments to all eligible individuals. Repeated biannual or yearly treatments are necessary due to reinfection. For community-based distribution, local villagers select amongst themselves two individuals who volunteer (not paid) to distribute drugs. These two distributors must inform other villagers that the drugs are available and approach or be approached by households to correctly administer treatment. In routine mass drug administration, there exists variation between villages in the proportion of eligible people treated or households approached by the drug distributors for treatment. To our knowledge, we study the most complete social networks ever collected in a developing country. In Uganda, we collected information on 16,357 individuals from 3,491 households in 17 villages. Household friendship networks were constructed. Centrality could not identify the best performing drug distributors. We discovered only local clustering was able to identify the drug distributors who were able to reach the greatest fraction of eligible individuals and who were the fastest distributors. These results were robust to several patterns of local links surrounding the drug distributors.
Counting patterns and positions in a large corpus of egocentred networks

When studying a (possibly large) collection of egocentred networks, classical network measures (diameter, betweenness, number of connected components, etc.) may provide indicators to draw a classification of all egos. To refine these indicators with information on the structure of the networks and the positional roles of the alters, we enumerate all possible up to 5-nodes configurations (which we call patterns), and the positions of every node inside these patterns. The small size of the patterns, with a dedicated heuristic method, enables to overcome the exponential complexity of the enumeration algorithm, while the diversity of the (31) patterns yields meaningful configurations. We use this method on a corpus of around 13,000 respondents for a survey based on a Facebook application (app.algopol.fr), part of a research project on online information curation and sociability. For each respondent, we have some socio-demographical data, and two egocentered networks: one of Facebook-friends relationships, one of discussions via ego's page. Counting patterns helps finding families of networks, matching various types of sociability to socio-demographical variables. Counting positions enables to study the relationship between the role of an alter among the networks of friends and of common discussions, or common interests.

Nathalie Chauvac
LISST-CERS Université Toulouse - Scool

Martine Azam (LISST-CERS, Université Toulouse Jean Jaurès), Laurence Cloutier (LISST-CERS, Université Toulouse Jean Jaurès, Scool)

Trajectory of Le Multiple An approach by social network analysis

This communication is about the history of The Third Place called Le Multiple. Located in Toulouse, this collective was founded in 2012 starting from two structures: a FabLab called Artilect and a project called La Serre from the social solidarity economy. The various stages of its formation show the key role played by the installation location - sometimes pretext, sometimes driving force, sometimes catalyst - on the occasion of singular events that created bifurcations and irreversibilities, engaging the different participants’ ways they had not necessarily planned. The research work is ongoing since September 2014 and is based on observations, in-depth interviews and data collection coming from the protagonists. We propose to highlight key moments of its development. We will then turn to the topic of resource mobilization through an analysis of relational chains.

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Local stakeholders understand and response to a government-financed PES program

Payment for ecosystem (PES) is increasingly popular as a way to manage ecosystem. The innovative element of PES schemes over conventional command-and-control measures is based on the argument that social negotiations and voluntary approaches perform better in terms of local acceptance which is massively considered as milestone for program effectiveness. PES programs can also been financed and derived by governments. Governments can be the financier and rule maker, and implement the program through adequate consultation with local stakeholders. As a typical government-financed PES, the Chinese afforestation program Sloping Land Conversion Program (SLCP) is typical hybrid governance that includes both voluntary and hierarchical elements (top-down). With stated principals of volunteerism and special emphasis on local engagement, government provides compensation to voluntary participants for land conversion, which is presuposes to improve the provision of ecosystem services in the future. Particularly, local participation in decision making and implementation was considered to ensure the acceptance and program’s sustainability. But do local participants understand and react as the program expected? This study examines the recognition of local stakeholders toward SLCP implementation with relevant interacting institutions. Taking two townships in Ningxia Autonomous Region as example, we use Net-map, a participatory net-work method, combining with household survey to analyze how different stakeholders understand the program and how they
influence each other. The method visualizes relationship between stakeholders. We found householders, village heads, forest officials and local administration officials have significantly different understanding to the program with regarding to involving actors, purpose, context and outcomes. The deviation undermines the innovative elements of local engagement and willingness from PES, making local governance re-dominating the program. We therefore argue that the local dynamics drive and shape the program implementation, but bottom stakeholders can only contribute to it under certain social and institutional conditions. This study suggests that active stakeholder engagement is hard to achieve under a hybrid governance regime. The local householders are poorly informed and always lacking of influence. Unlike policy designer thought, the decentralized power mostly goes to local government official rather than householders. To maximize the advantage of PES idea, the government should take into account the importance of local engagement and facilitate information exchange among different stakeholders. PES program is a complex process and particular attention should be paid to the interaction of local institutions.

Meng Chen
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A Semantic Network Analysis of Online Breast Cancer Forum

Online support forums provide platforms for information exchange and mutual support among people who are confronted with the same health vulnerabilities. This study explored online support seeking undertaken by breast cancer patients through the application of semantic network analysis. Previous studies found that breast cancer patients go online primarily seeking information about their illness for a health-related decision, learning what would come next, or pursuing social support. However, most research examined breast cancer patients’ information-seeking journey from a static perspective collecting data at only one time point. This research examined information exchanged across all four stages of breast cancer in an online support forum to map patients’ psychological trajectories through the four stages. Semantic network analyses were conducted to quantify and visualize breast cancer patients’ language use at each stage to describe their thoughts and emotions. More than 23,000 threads with more than 450,000 posts were analyzed. The results were fourfold. First, words related with breast cancer (breast, cancer), treatment (chemo, onc), and emotion (hope, love) displayed high centrality across all four stages. However, a comparison between four stages found that the centralities of disease and treatment related words (chemo, cancer, breast, onc) decreased from Stage I through Stage IV, whereas centralities of positive emotion words dramatically increased (hope, love, happy). Second, although patients increasingly mentioned pain in all stages, they manifested an empowering attitude through the increased centralities of language. Third, the results supported Kübler-Ross’s model of grief that proposes people suffering from a terminal disease experience five psychological stages: denial, anger, bargaining, depression, and acceptance. For example, the word chemo showed a dramatic increase in frequency from Stage I to Stage II, followed by a gradual decrease through Stage IV. This change may reflect patients’ psychological switch from denial to bargaining. Words such as love and family reached their frequency peak at Stage IV, showing an acceptance status. Finally, the word cancer was clustered with treatment-related words for Stage I, however in Stage IV was clustered with emotion-related words. This finding indicated that moving from Stage I to Stage IV, that breast cancer patients sought support gradually changed from informational to emotional support. These results have several implications. First, information support is prevalent in the early stages of breast cancer, whereas emotional support becomes more important in the later stages. Second, patients in the later stages empower themselves via positive language use and manifest an attitude toward of acceptance at the end of life.

ShihHsin Chen
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Networking and R&D Collaborations in the Taiwanese Biotechnology Sector
The role of networks in the study of innovation has been empirically confirmed in the existing literature (Cook and Whitmeyer 1992; Agapitova 2005; Giuliani 2011; Breschi and Malerba 2005). Previous studies have applied social network analysis to the study of individual innovation clusters (Giuliani and Bell 2005; Giuliani, 2007; Graf et al. 2009; Owen-smith & Powell, 2002; Powell et al., 2010) in various sectors in the specific regional innovation clusters. However, the literature is deficient with respect to an understanding of the structural development of networks and how these networks change over time in a complete sectoral innovation system (Malerba and Vonortas, 2009). This paper focuses on mapping the research collaboration and knowledge transfer networks involving domestic and international actors in the context of the Taiwanese biotechnology sector. The theoretical framework of this paper is based on the sectoral innovation system and network theory. Combining social network analysis (by using UCINET bundle with NetDraw) and 70 elite group interviews as well as the data collecting from the financial report of the 140 biotech firms, this paper empirically examines how actors’ interactions in the Taiwanese biotechnology sector have evolved in recent years. First, the results illustrate how knowledge transfer networks in Taiwanese biotechnology sector have developed rapidly in the last decade. Secondly, social network analysis illuminates the central role of intermediaries and the leading domestic laboratories in the business network. In summary, firms may not be the main vectors of innovation in a nascent science-based sector, such as the biotechnology sector in Taiwan. Instead, knowledge transfer networks appear to jointly evolve alongside firms and other actors in innovation activities. Ultimately, this paper aims to further explore the relationships between networking strategies, the network role and the structural position of the key actors (Gould and Fernandez 1989), and the innovation performance of firms. The additional data collection is largely completed and preliminary data analysis has been done which would be useful to map the sectoral knowledge network, its evolution between 1998 and 2013, and the implications of the changes for innovation performance and relevant policies and institutions. Next steps include performing detailed analyses and further developing both the conceptual framework and the insights for policy.

Wenhong Chen
UT Austin

Cuihua Shen (UC Davis), Gejun Huang (UT Austin)

In Game We Trust? Coplay and Generalized Trust in and beyond a Chinese MMOG World

Although an emerging literature has demonstrated social and civic potentials of Massively Multiplayer Online Games (MMOGs), few studies have assessed their implications for generalized trust. Drawing on a large sample of Chevaliers’ Romance III (CR3) players, this research examines how gamers’ motivational, behavioral, and relational factors are related to generalized trust in China. Adopting a coplaying-centered approach, results show that trust is enabled and constrained by how the game is played. Competition motivation, competency preference in teammates, and having more weak-tie confidants as coplayers are positively associated with generalized trust, while social motivation, homophily preference, and having more strong-tie confidants as coplayers are negatively associated. This research highlights the importance of contextualizing gaming implications in specific social and institutional contexts.

Guilherme Kenji Chihaya
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Anna Baranowska-Rataj (Umeå University)

Number of Siblings and Sociability in the Classroom: Friendship, Bullying, and Cooperation Networks

The literature on sociability stresses that contact with siblings may endow children with the competences needed for interacting with peers. In this paper we examine the effect of the number of siblings at home on several sociability outcomes at school. We use data from the first wave of the Children of Immigrants Longitudinal Survey in Four European Countries, which targeted 18,716 pupils aged 15 years old in 480 secondary schools over England, Sweden, Germany, and the Netherlands. We employ multilevel P2 models to explore the effect of having siblings on being nominated as a friend, on collaborating with homework, on being nominated as a bully, and on being nominated as someone children do not want to sit together with. Both sender and receiver effects of number of siblings were
studied. The models control for socio-economic status of the family, family composition, student obesity, sex, and foreign background, as well as individual and classroom level random effects for density and reciprocity. Models for outcomes other than friendship also control for friendship ties between the students. Our preliminary results show that having at least one sibling is positively related with receiving friendship nominations as well as with collaborating with homework. At the same time, having at least one sibling is negatively associated with being nominated as a bully and with being nominated as someone whom students do not want to sit together with. Lastly, having siblings is negatively related with nominating others as a friend. These results suggest that having siblings at home improves a child’s sociability outcomes at school: children with siblings seem to be more likely to attract positive nominations (friendship, homework) and to be less likely to attract negative nominations (as a bully or as someone one does not want to sit by). Additionally, the negative sender effect of having siblings also suggests that children with siblings find friendship at home, and thus are less in need for nominating friends at school.

Dimitris Christopoulos
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Governance, Agency, Structure: Research Design in Policy Analysis

Relations between agents act as conduits to their political power. And power is channeled to the attainment of governance outcomes. Traditional social science makes the simplifying assumption that actor interdependence can be captured as an actor attribute. By comparison the analysis of networks makes actor interdependence the point of departure. In that respect actors impact outcomes not only due to their own discrete actions, but also mediated by the pattern of interaction among others. Governance as the product of political exchange is therefore affected by the quality of the interaction between political agents, what Jones et al. (1997) and Robins et al. (2011) have termed governance embeddedness. For instance, the degree to which political agents reciprocate relations, whether there is transitivity, and whether relations are predominantly hierarchical. Governance as a process is affected by the pattern of exchange between political actors. For instance, the degree to which there is a strong core-periphery, the multiplicity of clusters, prevalence of brokers or the skewness in the distribution of ties all can affect the way politics happens. Political governance research designs should aim at the multiple dimensions of political agency, with a contingent capture of its micro, meso and macro manifestations. I demonstrate how governance process and governance outcomes are affected by the networks of political agents, often in ways that can only be comprehended by analyzing the pattern of their relations and linking the multiple levels of their agency in multi-mode analysis. The literature of political entrepreneurship, political brokerage and leadership provide a theoretical context to our examination of agency.

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Semantic Network Analysis of GMO News on WeChat in China

Genetically Modified Organism (GMO) controversies have been hot button issues in China, one of the largest GMO consumption countries, and have gained extensive attention from the public in recent years. Public perception and opinion about GMO technology are shaped by media to a certain degree. Overall use of social media for news consumption shows continuous growth with wide penetration of new communication technologies, for instance WeChat, which is the social media giant in China. This paper explores what people are talking and caring about GMO on WeChat. 824 GMO-related articles were crawled and collected from WeChat Official Account Admin Platform. Semantic network analysis was applied to analyzing the whole text corpus and based on cluster analysis, issues about GMO were extracted from the 300 nodes whose weighted degree is higher than 17. We found four main clusters: biotechnology, food safety, labeling and distinction of GMO are receiving more attention than other aspects. Results indicate that biotechnology is a frontier field in both the science research and the agriculture development in recent China, so biotechnology is highly discussed and accounts 34% of the whole semantic network. The issues of food safety, labeling and distinction give hints that people are
pursuing food quality nowadays and the system of science popularization and labeling policy are not well established in China. According to the whole semantic network, environmental issues, social ethics or public uncertainty are absent and not discussed. This work illustrated public opinion about GMO on WeChat and explores the issues of GMO from WeChat as a whole. In the future we want to explore the difference among various media in reporting GMO and whether they have a tendency in reporting specific issue of GMO.

Kar-Hai Chu
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Dr. Thomas W. Valente, PhD (University of Southern California)

Marketing of electronic cigarettes across multiple social networking sites

Social networking sites (SNS) offer an attractive opportunity for companies to promote their brands and products online at a relatively low cost. With social networks inherently built into each platform, the sites also provide potential for any advertisement or campaign to quickly reach a large audience. Marketers can take advantage of functionalities such as retweeting in Twitter and sharing in Facebook, which are designed to promote rapid diffusion of information. This study examines the marketing strategies of two electronic cigarette (e-cigarette) brands, Blu and V2. E-cigarettes, almost completely unknown 10 years ago, are a product that has quickly become globally recognized. Fledgling and mature e-cigarette brands alike have capitalized on the marketing capacity of SNS’s, and many actively promote their products in various online platforms. We focus on the presence of each e-cigarette brand on four popular SNS’s: Facebook, Twitter, Google+, and Instagram. Each site has unique tools that afford users different types of interactions with their respective networks. We use content analysis to study marketing strategies by Blu and V2, identify how these brands are utilizing tools in each online setting for different purposes, taking advantage of available affordances. Furthermore, social network analysis shows how messages can potentially cross the boundaries between media platforms, through the networks of both individuals and brand representatives.

Vincent Chua
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Occupational-specific Social Capital

OCCUPATIONAL-SPECIFIC SOCIAL CAPITAL In this paper, I analyze the sources of social capital in terms of access to specific occupations. Studies of social capital tend to adopt a single-factor solution such as: extensity, resource heterogeneity, and/or reachability, or a combination of all three. Instead, I argue that we can learn something from examining access to specific occupations without combining them into a single-solution measure. Thus, this paper examines the distribution of access to lawyers, teachers, cab drivers, etc. analyzing how gender and ethnic groups have unequal access to them as specific occupations. I offer several explanations for the observed patterns of network inequality, thus uncovering the categorical dynamics of gender and ethnicity. The data is from Singapore, collected in 2013. This is the first network survey in Singapore that uses a position generator. The sample size is 3,000.

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Countries’ market power in the international multi-product trade network

We endorse a multi-layer network perspective to provide a new model for measuring the competitiveness of the countries involved in the international multi-product network of trade relations. Each layer of the network corresponds to a specific product that a country can export to, or import from, other countries. In each layer, a country’s market power towards other countries can be expressed as a function of the position the country occupies in the trade network. First, for each product we model a country’s market power in terms of its ability to secure the highest local market shares in the export of that product to other countries. Second, a country’s market power becomes stronger as the dependence
of the importing countries increases. Third, a country’s dependence is modelled as a function of the number and market shares of the countries from which products are imported. Concentration of imports on few and powerful sources of supply thus contributes towards the market power and dependence of countries by affecting the degree of substitutability among potential alternative competitors. We apply our measures of market power and dependence to the trade relations extracted from the BACI data set. To this end, we constructed a multi-layer network with 5212 layers, each corresponding to a specific product category. The nodes of the network are the 221 countries. For each layer, a directed link is established from one country to another when the former exports the corresponding product to the latter. The weight of each link is based on the nominal export value of the corresponding trade, converted to US dollars in the year 2010. Results suggest that adjusting a country’s market power through the dependence of the importing countries can unmask relevant information that would otherwise remain undetected, both in the aggregate network and at the level of a specific layer. Our measure of market power does not simply reflect an exporter’s relative market share held in the destination countries, but also tries to capture the actual competitive advantage of the exporter with respect to alternative sources of supply competing in the same markets. Findings indeed indicate that the ranking of countries obtained with our measure of market power does not trivially replicate the ranking obtained with more traditional measures of exporters’ market shares in the destination markets.

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Degree correlations in signed social networks

Research seems to converge on the idea that a variety of social networks (e.g., online social networks and scientific collaboration networks) share a distinctive empirical regularity: the degrees of neighboring nodes tend to be correlated. By contrast, other types of networks (e.g., technological and biological ones) are characterized by the opposite correlation pattern. The tendency of nodes with (dis)similar degrees to connect with each other is often referred to as “(dis)assortative mixing by degree”. Assortativity has been regarded as resulting from transitivity or from the underlying community structure of the network. Despite the ubiquity and salience of degree correlations in many networks, the detection of assortativity patterns has been confined primarily to unsigned networks or networks in which the sign of all connections is assumed to be positive. Relatively little attention has been devoted to the emergence of degree correlations in signed network, and in particular in negative social networks, where individuals are connected through links with a negative connotation, such as distrust, enmity, and competition. Whether negative ties tend to be forged between nodes characterized by similar or dissimilar degrees still remains largely unexplored. This paper is an attempt to address this shortcoming. We analyzed two online social networks, in which links between individuals can be either positive (trust or friendship) or negative (distrust or enmity). We detect degree correlations by using two measures: the average degree of the first neighbors of nodes with same degree; and the Pearson correlation coefficient evaluated between the degrees of connected nodes. Findings indicate that, when the sign of links is ignored, both networks are assortative. To study the impact of the sign of links on degree correlations, from both networks we extract the positive and negative subnetworks composed only by links of the same sign. The positive subnetworks are assortative, the negative ones are disassortative: high-degree nodes are preferentially connected with low degree ones, and vice versa. Results seem to indicate that the sign of links has some bearing on the degree correlations observed in social networks. To shed light on this hypothesis, we construct networks with power-law degree distributions. We then assign each node to one of two mutually exclusive groups, and associate a positive sign to connections between nodes of the same group and a negative sign to connections between nodes of different groups. Simulations show that, while the positive subnetwork displays an assortative trend, the negative subnetwork shows a disassortative trend that varies as a function of the difference in size between the two groups. Results indicate that the mixing patterns of the positive and negative subnetworks diverge only when: the corresponding global unsigned network is assortative, the two groups of nodes are of unequal size, and the signed global network is structurally balanced. We investigate the role of each of these conditions, and different combinations of them and extend our
analysis by studying the case in which the global unsigned network is disassortative and nodes can be allocated to three or more mutually exclusive groups.

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Marta Varanda (ISEG), Pedro Neves (ISEG)

The corporate elite and the policy-planning network in France and in Portugal

In capitalist countries, large companies and business elites concentrate a considerable share of political power. Studying interlocking directorates has been used as soon as the early twentieth century to assess this concentration of power. However the cohesion of business elites is insufficient to explain their political influence. Given that policy-planning agencies are identified as locations of political power, we turn to these organizations to evaluate their linkages with large corporations. We aim to explore the ideological orientation of these relational investments. More precisely, we wonder if there is a strategy to promote a neoliberal ideology. We run a comparison between France and Portugal. In both countries, the development of policy-planning agencies is more recent and the dependencies towards the state more pronounced than in the US and in the UK. Policy-planning agencies are usually defined as non-profit organisations (allegedly) independent from political parties, state bureaucracy and companies, which perform studies and advocacy concerning topics such as social issues, economics or international strategy in order to influence the political agenda. The methodology is based on two bipartite networks. In France, the first network is composed of the 100 main companies and their directors, and the second of the 40 main policy-planning agencies and their trustees and counsellors. In Portugal, it is 125 and 34 respectively. We first analyze the relational proximity among policy-planning organizations according to their ideological proximity in France and in Portugal. We then turn to the role played by the directors of large companies in this network. We finally evaluate to what extent large companies are likely to privilege liberal and conservative agencies, given the appointments of their directors in these organizations. In both countries, the main feature of the policy-planning network resides in its core-periphery structure. In France, the core is polarized according to a left wing / right wing cleavage, while this cleavage is less clear in Portugal. However, in France, interlocks between large corporations and major policy-planning agencies often transcend these divisions. Moreover, in both countries, we observe the prevalence of non-partisan organizations.

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Relational Agency: Developing the Social Side of Teacher Leadership in a Teacher Education Program

[Part of the set of 5 papers of the Organized Session 'My link to Learning: Approaches to Longitudinal Ego Network Analysis in Higher Education'] Abstract Key to the success of teachers leading change efforts is their social capacity to create meaningful relationships with their colleagues; to seek them out for advice and collaboration to jointly improve school practice. This capacity of teachers can be described as their ‘relational agency’. This study explored the way teachers enrolled in an in-service master’s program in the United States were supported in seeking out colleagues for advice and collaboration to improve their school practice. We used social network and interview analysis to investigate changes in size and composition of personal networks of teachers that were enrolled in this program. For this purpose change and stability ratios were developed to deepen understanding of temporal changes in ego network composition. Overall, program elements were found that contributed to the growth of teachers’ personal advice and collaboration networks, but the program did not have a major influence on the composition of these personal networks. Results revealed that not all master’s students benefited from the program in the same way or extent.
Alberto Cottica  
University of Alicante

Guy Melançon (University of Bordeaux), Benjamin Renoust (National Institute of Informatics)

**Online community management as social network design: testing for the signature of management activities in online communities**

Online communities are used across several fields of human activities, as environments for large-scale collaboration. Most successful ones employ professionals, sometimes called “community managers” or “moderators”, for a variety of tasks including onboarding new participants, mediating conflict, and policing unwanted behaviour. Network scientists routinely model interaction across participants in online communities as social networks. We interpret the activity of community managers as network design: they take action oriented at shaping the network of interactions in a way conducive to their community’s goals. It follows that, if such action is successful, we should be able to detect its signature in the network itself. Growing networks where links are allocated by a preferential attachment mechanism are known to converge to networks displaying a power law degree distribution. Growth and preferential attachment are both reasonable first-approximation assumptions to describe interaction networks in online communities. Our main hypothesis is that managed online communities are characterized by degree distributions that deviate from the power law form; such deviation constitutes the signature of successful community management. If true, this hypothesis would give us with a simple test for the effectiveness of community management practices. Our secondary hypothesis is that said deviation happens in a predictable way, once community management practices are accounted for. We proceed as follows. First, we examine empirical data on three online communities, two of which are known to be managed with the same goals and practices, whereas the third is known not to be. We run statistical tests of the null hypothesis that their degree distribution was generated by a power function; the test strongly rejects the null for the two managed communities, and does not reject it for the unmanaged one. This result is in agreement with our main hypothesis. Next, we investigate the impact of community management practices on the interaction network of online communities by simulation techniques. We build a model of interaction in an online community on which community management practices are enacted. We explore its evolution under the assumptions of growth, preferential attachment and presence of some of the most widespread online community management practices. We then discuss the effect of the model’s specification on the degree distribution of the simulated interaction network.

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Michelle Meyer (Louisiana State University)

**Knowledge Networks and Innovation: How Facilitation Shapes Interaction, Network Structure, and Innovation Outcomes**

Research on knowledge networks has demonstrated that tie strength, nodal properties, and network structure have distinct influences on knowledge creation, transfer and innovative outcomes. However, few studies have examined the interactional processes that create diverse networks with the density and ties required to produce innovative outcomes. How does facilitation of diverse teams influence interaction within the team, tie strength, network structure, and ultimately innovation and knowledge creation? This mixed methods study examined the building design networks for 12 buildings seeking LEED certification. Data collection included: in-depth individual interviews, focus group interviews, observations of building occupants, meeting minutes, network surveys, analysis of meeting minutes, and post-occupancy questionnaires. Research participants comprised over 150 individuals, including design team members, building occupants and users, owner representatives, contractors, and outside consultants. Social network data was collected from meeting minutes and network surveys. The results of this study show that the rules of engagement (how network members are expected to interact during meetings) and facilitation strategies (specific activities directed by a group facilitator) had diverse impacts on the relationships in the network including: tie strength, communication patterns, trust, willingness to learn, and willingness to share. In addition, differences in team facilitation and rules of engagement produced widely varying network structures from highly decentralized and sparse networks to diverse core/periphery structures with very dense cores (.74). In addition, we found that the rules of engagement produced ties and social expectations in the group that were able to overcome
known barriers to knowledge transfer, such as nodal properties (e.g. low absorptive capacity) and relational properties (e.g. nodal proximity). Finally, this study found that facilitation strategies influenced the structure of the network as well as trust and willingness to share, which collectively predicted the innovation outcomes of the teams. Those teams with core/periphery structures or distributed networks produced better buildings for lower costs than design teams with a decentralized structure. The strength of this study is the combination of rich qualitative data, participant descriptions of the design process, with social network data from 12 projects diverse in scale and focus. Previous studies on knowledge networks have not attended to the processes through which knowledge networks are created and maintained. This study reveals that the expectations for interaction and specific facilitation techniques in team projects influence both the quality of relationships in the network as well as the structure of the network. In addition, this research revealed that network structure alone did not predict outcomes of the group but that social expectations and rules of engagement can overcome both nodal and structural barriers to innovation.

Nick Crossley
University of Manchester

Good Evening Glastonbury: Using Dual Projection Blockmodelling to Identify and Analyse 'Music Worlds' Within a Network of Music Festivals and Artists

This paper builds upon a number of recent publications which use social network analysis to analyse 'music worlds' (e.g. the formative London punk world of 1975-1976). These publications tend to focus upon single worlds and have explored: 1) constraints and opportunities generated by cohesion and their role in the formation of worlds; 2) dynamics and mechanisms of network formation and transformation; 3) divisions within worlds and their impact. I expand this agenda here by focusing upon a number of music worlds simultaneously, all embedded within a two-mode network of music festivals-artists, and asking whether they can be distinguished by way of network patterns. I am interested in the ways in which different worlds can be distinguished within a network and the way in which network clusters map on to the self-classifications which festivals commonly mobilise. Network analysts often confront 'the boundary problem' but in some cases, I suggest, SNA might be the solution to a boundary problem. In addition I am interested in the ties between worlds and thus the structure of the UK's musical 'universe'. The presentation draws upon data involving 106 UK-based music festivals and all of the artists who played at two or more of them over the period 2011-2013 (inclusive). Clustering is analysed using the dual projection approach to blockmodelling outlined in recent work by Everett and Borgatti, and the advantages of this approach are also discussed.

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Online Social Network as Platforms for Developing and Maintaining Crowd Tasking Communities

Online social networks (OSNs) such as Twitter or Facebook are widely viewed as a key data resource to analyse individual and group-level social behavior. Previous empirical studies have primarily focused on the mining of archival OSN data, with access to data, processing of data and a focus on theory testing emerging as key research constraints. However a growing body of research has taken an alternative approach, viewing OSNs not as data repositories but as a flexible tool for crowd sourcing and crowd tasking of users. Such an approach allows researchers to harness the user base, recruitment and communication features of OSNs without being constrained by the requirements of the OSN provider. In comparison to OSN data mining, crowd-sourced experimentation has a number of benefits for OSN users and researchers. First, the OSN user rather than the provider grants data access. Second, researchers can interact with users in real-time, enhancing the scope of data collection. Finally, as the researcher controls what data is collected they can vary experimental conditions to support theory development and refinement. In this paper we review existing work in the area of crowd-sourced experimentation and introduce OSN-x a work in progress, social experimentation language suitable for novice programmers. OSN-x offers a flexible approach to creating real-time, interactive, crowd-tasking
experiments. We demonstrate the feasibility of OSN-x with an original study, which tests the impact of monetary payment on users' willingness to join and participate in crowd-tasking applications. Crowd-tasking applications rely upon a community of users to contribute resources such as text, audio, and images. The success or failure of crowd-tasking applications is dependent on the ability to recruit users who actively participate by providing the required data or content to the application within the time constraints specified. However, prior work has paid little attention to the factors influencing user recruitment and participation in crowd-tasking applications. The relationship between payment and participation is complex. On one hand, payment may enhance recruitment but reduce participation as payment may decrease intrinsic motivation. On the other hand, research involving Amazon's Mechanical Turk has shown that higher rates of payment can increase the quantity of work completed but not the quality of work. As such, there is a clear need for research on the effect of payment and different rates of payment on user recruitment and participation in crowd-tasking applications. This paper makes three important contributions to the research on online social networks. Firstly, we highlight the need for OSN researchers to go beyond data mining and focus on the potential of OSNs to act as a valuable platform for original, researcher-led, active experimentation. Second, we introduce OSN-x, a minimalistic programming language suitable for novice programmers, particularly those from a social science background, to create real-time, interactive crowd-tasking experiments. Finally, we demonstrate the feasibility of OSN-x and report the results of an original study examining the impact of monetary payment on user recruitment and participation in crowd-tasking applications.

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De Montfort University

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Mapping the Primitive Methodist Connexion

The Primitive Methodist Connexion was an offshoot from Wesleyan Methodism and existed separately from 1807-1932. It had a largely working-class membership in the UK and colonies and the USA. For much of the 19th century it had c. 200,000 members and was arguably the longest lasting working-class movement of this size in the UK. Its members included many pioneers of the labour movement. The organisation had a structure of circuits based on groups of chapels, organised in districts and federated under the leadership of an annual conference. The church called itself a Connexion, reflecting an organisation different from traditional ecclesiastical hierarchies. While individual chapels were under lay control, there was a professional ministry. Ministers were usually stationed for 4 years and their movement between stations sustained the Connexion. The Connexion is well documented. The stations of all Ministers for the whole history of the connexion are known (Leary, 1990). Focusing on one geographical region and considering the Ministers as ties between stations, we explore the temporal and spatial embedding of the network. The movements of the ministers had the potential of both serving as conduits of change as well as of control – the ties on one hand being engineered but also contingent on the Ministers. We seek to answer how the structure of the network was related to changes in the constitution. We will suggest hypotheses about the existence of different types of circuits – for example central/peripheral, prestigious or not – as a basis for future analysis of the Connexion’s records.

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Stability of co-authorship networks in time

Recently, many studies have been performed on scientific collaboration, which is usually operationalised through co-authorship and studied by methods of social network analysis. The starting point of the presented analyses is the work of Kronegger et al. (2011) who confirmed the hypothesis of the multi-core–semi-periphery–periphery structure of a co-authorship network. The presentation addresses the measurement and explanation of the stability of cores, obtained by pre-specified blockmodeling on almost all Slovenian scientific disciplines in two time periods (1991–2000 and 2001–2010). Further, the stability of the obtained cores was measured by the proposed Modified Adjusted
Rand Index 1 (MARI 1). Differences between scientific fields, controlled for some characteristics of the co-authorship network and blockmodels, were tested using linear regression.

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The network structure of an enterprise collaboration system

While public social networking sites, such as Facebook and Twitter, have garnered a lot of attention from academic researchers, private social networking sites within corporations are less well understood. Often referred to as enterprise collaboration systems, these ‘social’ tools in the workplace enable employees to set up online communities, share information and documents, and connect through wikis, instant messaging, and video conferencing. We study an enterprise collaboration system in a Fortune 500 company, and focus in particular on the network structure of online communities that employees use to collaborate with one another electronically. Analyzing HR data from 126,109 employees and system usage data from 15,535 online communities, we explore 1,462,765 community activities from October 2010 through May 2014 to study (1) how employees who use online communities differ from employees who do not and (2) who is connected to whom in the online communities on a variety of employee attributes (e.g., employee status, company tenure, geographic location, organizational unit, and hierarchical level). Analyses suggest that contractors, less experienced employees, non-managers, and non-US employees are less likely to participate in the online communities relative to full-time employees, more experienced employees, managers, and US employees. In addition, employees in the same geographic location and/or same organizational unit are most likely to be members of the same online communities, all else being equal. Thus, preliminary results suggest that employees already core to the organization (in terms of status, tenure, and hierarchy) are also core to the use of online communities, and those who are already connected in the geographic (i.e., location) and structural (i.e., unit) spheres of the “offline” organizational networks are also connected in the “online” organizational networks. We discuss the implications for organizations that want to use technology to encourage collaboration among those who are not already connected, as well as those who already are.

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Exploring social networks for climate change policy - engaging communities

Within social networks and climate change literature there is agreement that communication between all stakeholders is imperative to the uptake of climate change policy. Although research has been performed in this area, there is much to be done as currently there is little empirical evidence to demonstrate the linkages between science, communities and policy makers when it comes to the uptake of climate adaptation policy. This paper fills a gap by assessing the potential of active social networks for engaging communities in climate adaptation policy, drawing on case studies located in the Shoalhaven and Bega regions of Australia. In each region, both knowledge acquisition and dissemination networks were mapped with social network analysis. At the local level, key nodes were identified within each community. In each site, participants were recruited using a purposive snowball sampling technique (N=24 and N=31 respectively). Through semi-structured interviews, participants were asked where they sought climate adaptation information, and with whom and what by what methods they shared this information. Findings demonstrated that knowledge acquisition and dissemination networks had similar attributes in both sites, however each had particularities discrete to the local social, cultural, historical and geographical contexts. The significant overlap was in the importance of key nodes acting as boundary spanners. The attributes of boundary spanners having multiplex ties across a cross-section of each community correlated in both cases. The findings of this research reiterate that although every community is unique and every social network is dynamic offering a snapshot in time, there may be attributes of boundary spanners within climate adaptation knowledge
networks situated in each local that share similar attributes. These key nodes or boundary spanners may act as climate change policy champions in the region.

Dominika Czerniawska
University of Warsaw

Wojciech Fenrich (University of Warsaw), Dominika Czerniawska (University of Warsaw), Michał Bojanowski (University of Warsaw)

The story behind the graph: a mixed method study of scholarly collaboration networks in Poland

The scholarly collaboration phenomena is relatively well described on macro level, thanks to network analyses based on large bibliographic datasets. Nevertheless, qualitative in depth knowledge about the nature of scholarly collaboration networks going beyond publication matters is scarce. Also the innate, ideational aspects of the phenomena in question remain invisible from this wider perspective. Based on the 30 individual in-depth interviews with Polish scholars we were able to sketch 30 ego-centered networks representing his or her immediate collaborations. Respondents were asked questions like: “Who would you indicate as your collaborator?”, “Do you collaborate with people from other institutions/academic centers/countries?” “How did your collaboration start?” and had an opportunity to freely describe their professional environment. As a result, we were able to outline values, norms and roles standing behind particular networks. Collaborations are mostly in-house, and occur within small research teams supported by relatively few outsiders: students, PhD candidates, visiting scholars, or researchers from outside the institution. We can indicate some factors influencing the structure and dynamics of collaboration networks like the propensity to limit the area of research interests. The sequential design of the research project enables utilization of its initial part to direct future quantitative analyses and improved qualitative studies.

Valentin Danchev
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Mason A. Porter (University of Oxford)

Global and Local Connectivity in a Multilayer Spatial Network of World Migration

The current landscape of global migration involves multiple interacting movements of people at various geographic scales, posing significant challenges to the dyadic-independence assumption built in standard migration models. To capture the emerging patterns of migration interactions, we represent international migration as a spatial network. The nodes in the network are countries located in geographic space, and the edges represent the number of migrants from an origin country A who live in a destination country B during a particular decade for the period 1960–2000. One can represent the resulting temporal World Migration Network (WMN) as a multilayer network in which each decade is a (time-ordered) layer. We characterize the large-scale structure of the WMN by algorithmically detecting migration communities (i.e., sets of countries that are densely connected via migration). To do this, we adopt a method that generalizes the modularity function for community detection to multilayer networks (Mucha et al. 2010). Rather than reducing temporal networks to a sequence of static snapshots, the method incorporates a temporal parameter that couples layers across time. Drawing on Expert et al. (2011), we also account for geographic constraints in the WMN by incorporating a spatial null model in the modularity function. Using a novel approach for characterising the local (intracommunity) and global (intercommunity) cohesion in the WMN, we find sufficient support neither for the hypothesis that movements converge into a global interconnected network nor for the hypothesis that movements reflect local geographic boundaries as drawn on the world map. Instead, we identify heterogeneous types of community structures in the WMN that reveal distinct forms of interplay between local and global (‘glocal’) connectivity. We examine a set of mechanisms—relational, homophily, and spatial antecedents—that are likely to contribute to the emerging macro-level patterns of ‘glocal’ connectivity in contemporary world migration.

Tom Davidson
Cornell University
Blockmodeling caste and religious divisions in interaction networks in rural India

The social structure of contemporary India remains defined by caste and religious differences. These categories intersect with social class, and to a large extent, determine the social mobility and exclusion of particular groups. We can understand caste and religion as a set of rules that govern social interactions, the formation and maintenance of relationships, and as a set of norms that delimit behaviour. This study uses blockmodeling in combination with statistical tests of association to investigate the salience of these categories in structuring social relations in rural India. It finds that the villages studied remain deeply divided along religious and caste lines. I use data collected in the state of Karnataka by Abhijit Banerjee and colleagues in collaboration with the National Science Foundation and the Abdul Latif Jameel Poverty Action Lab. I have chosen ten villages in the dataset in order to carry out this study. Each village has twelve adjacency matrices mapping the social relations between inhabitants across a number of different dimensions. The combination of analysis of these adjacency matrices with rich attribute data allows us to make meaningful inferences about the social structure of these villages. The majority of inhabitants of each village cluster into relatively structurally equivalent groups defined by religion, caste, and subcaste: where there is a large religious minority present there is clear and statistically significant social division by religion and in all cases the villages are stratified along caste and subcaste lines. The blockmodeling image matrices show that rural India remains intensely stratified; between-group ties are extremely sparse and most social ties are within-group ties based on dense kinship groups defined by caste and religion. The strength of the social segregation existing between these groups can help us to understand the potency of the politics of communalism in contemporary India.

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Utrecht University

G.W. Mollenhorst (Utrecht University, Stockholm University), V.A.J.M. Schutjens (Utrecht University, University of Amsterdam)


In many western countries, numerous entrepreneurs choose to work from (or in close proximity to) their own home to save costs and to be flexible in combining work and private activities. Research on this specific type of entrepreneur is relevant as this group is substantially increasing in size and as such makes important contributions to the local economy. For many of these entrepreneurs, a large part of their daily lives is centred in or around the residential neighbourhood, because they both work and live here. To date, there has been little academic research on the social networks and network change of these neighbourhood entrepreneurs. In this paper we explore the social networks of entrepreneurs located in Dutch residential neighbourhoods. We relate network change to characteristics of the entrepreneurs and their firms; examine whether (changed) social networks reflect their alleged close relationship with the neighborhood; and explore whether these networks impact on several performance indicators. We adopt a longitudinal research design and use data from The Survey on the Social Networks of Entrepreneurs, collected in 2008 and 2013 in the Netherlands. This dataset includes information on the ego-networks of about 200 entrepreneurs, including both their private and professional contacts. We analyse network dynamics in terms of changes in network size and composition. Three dimensions of this network composition are explored: 1) family versus non-family network members; 2) local versus non-local network members; 3) overlap in contacts used for business and private purposes. The results show significant changes in network size over time. Also, local network members are found to become more important over time, whereas the number of family contacts does not change significantly. We also found evidence of role overlap. By taking into account several characteristics of the individual entrepreneur (e.g. gender, age and educational level) differences in network dynamics and network effects are discussed and explained.

Kayla de la Haye
University of Southern California

Sarah-Jeanne Salvy (University of Southern California)
Health Support Networks for Preventing Childhood Obesity in Home Visitation Programs

In 2015, two promising childhood obesity initiatives were introduced in Antelope Valley; a large, diverse, and under-resourced neighborhood in Los Angeles County where 20% of children are obese. One initiative translates key components from family-based obesity interventions into a Home Visitation Program (HVP) curriculum. HVPs serve at-risk families with new infants, but this is the first attempt to utilize the HVP infrastructure to target families’ health behaviors and health resources to prevent the onset of obesity in children from birth. The second initiative is a community-wide program promoting connections between residents and organizations that are committed to promoting health and reducing obesity (e.g., health care providers, food vendors). A central strategy for promoting healthy eating and activity in both initiatives is to foster social and organizational connections that increase access to resources and social capital, and remove barriers to adopting healthy behaviors. By intervening at multiple points in this community system, these initiatives are likely to transform the presumably impoverished “health support networks” of under-resourced families with young children in this community. This paper evaluates multidimensional features of the health support networks of low-income families with infants (< 6 mo.) who are enrolled in a HVP in this community. First, we analyzed mothers’ personal networks and health-related connections to community organizations, and dimensions of support, resource flow, and barriers within these relationships. Second, we tested if characteristics of these networks were associated with childhood obesity risk factors; including mother body mass index and weight gain during pregnancy, mothers and children’s food intake and activity, and breastfeeding. Preliminary findings indicate that mothers report few social connections outside of their family; their personal networks were comprised largely of family members living in the same household. A small proportion of network members were friends (M = 14%), and just half of participants (46%) nominated a spouse/boyfriend. Most network members provided mothers with health information (M = 70%) or encouragement (M = 66%), although mothers co-engaged in health behaviors with a much smaller proportion of network members. The most central organizations providing health support to mothers were the community organization delivering the HVP; the Women, Infants and Children (WIC) program; the hospital; and health clinics. Characteristics of these health support networks were also related to risk factors for childhood obesity. For example, greater weight gain during pregnancy was associated with having a larger proportion of network members who were female or who were perceived as “health barriers”, and a smaller proportion that were friends or that provided health support. Increased intake of sugar sweetened beverages in both mothers and infants was also associated with a greater proportion of network members who were female or that provided health support, and a smaller proportion that were friends. Extant obesity initiatives have had a little impact among underserved, low-income families. Identifying and addressing barriers in these families’ health support networks may increase the effectiveness and sustainability of obesity prevention efforts among children with the greatest risk.

Wouter de Nooy
University of Amsterdam

Settings in dynamic models of interaction

In this paper I explore the options that multilevel regression models offer for analysing social relations defined as relational expectations that are generated by past interactions while structuring future interactions. Interactions require a shared medium or setting, so the setting defines who can interact at what time. One could regard a formal organization, for example, as a series of settings regulating who can and should interact at what times. In this perspective, setting (or context, social focus) effects are not opposed to network effects; settings are a prerequisite for network effects. Access to and presence of actors within a setting depend on previous interactions, usually within a different setting or within an umbrella setting. Models for interactions within a setting are conditional on the presence of actors in the setting but presence itself may depend on past interactions within this setting and other settings. These processes are interwoven but they may operate at different time scales. Which multilevel regression models can capture these interwoven processes?

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Modelling infection transmission in primate networks to predict centrality-based risk

Social structure can theoretically regulate disease risk by mediating exposure to pathogens via social contact or spatial proximity. Investigating the role of central individuals within a network may help to predict infectious agent transmission as well as to implement disease control strategies, but little is known about such dynamics in real primate networks. We combined social network analysis and a modelling approach to better understand transmission of a theoretical infectious agent in wild Japanese macaques living on the islands of Koshima and Yakushima, Japan. Individual identities as well as grooming networks were included in a Markov graph-based simulation. In this model, the probability that an individual will transmit an infectious agent depends on the strength of its relationships with other group members. We correlated (i) the mean latency to complete transmission, (ii) the percentage of subjects infected during a latency-constrained epidemic, (iii) the probability that an individual is infected first among all group members and (iv) each individual's mean rank in the chain of transmission with individual network centralities. Our results show that more central individuals transmit infections in a shorter amount of time and to more subjects but also become infected more quickly than less central individuals, indicating that social network properties can mediate pathogen flow and illustrates how network analysis and modelling can help in predicting epidemics in divergent primate populations.

Personal Sources of Social Capital: A Meta-Analytic Examination of the Role of Personality in Network Size, Strength, Brokerage, and Diversity

Individuals’ network position has been shown to influence a long list of valuable outcomes. As a consequence, a lot of the theoretical debates have focused on identifying those aspects of network position that matter most. These debates have helped frame a set of concepts – brokerage, tie strength, diversity – and an accompanying view that the outcomes of the individual depend largely on social context, rather than personal characteristics. As network research has tended to deal with “under-psychologized” actors (Kilduff et al. 2006), there is only limited knowledge on why some tend to occupy better network positions than others. Making the “primacy of relations” (Kilduff et al. 2006) a key premise to any network research has overshadowed the question of the extent to which individuals contribute to their own network position. This issue, usually referred to as the “question of agency” (Kilduff & Brass 2010), has been taken into account only sporadically and by assuming that nodes in the network deliberately attempt to develop ties or exploit opportunities in their social environment (Burt 1992). This approach seems to ignore notable features of individual behavior. Notably, individuals differ in both (1) their proclivity for, and (2) adeptness at social interaction. Traits like extraversion and agreeableness affect individuals’ innate desire for social interaction – would this not shape network size? Individuals high on openness to new experience seek out novel experiences and seek out different-minded others – would this not, in part, shape the diversity of one’s network? Individuals’ variety on core motives for developing social relationships might lead to considerable differences in terms of the network position they tend to occupy. Beyond their proclivities, individuals also differ in their adeptness at social interaction. Two like motivated individuals might differ notably in their ability to build and maintain social relations. If a social context is subject to strategic actions by nodes in the network, the process of designing and performing such action is necessarily idiosyncratic. Hence, the understanding of what brings actors to certain network positions requires examining how they differ in their ability to be accurate in perceiving social relationships as well as to manage social interactions. To explore this important question, we conducted an extensive meta-analysis of 63 studies reporting effect sizes linking human traits to their occupancy of network positions. We then coded individual differences and network
position. Traits included: extroversion, openness, conscientiousness, agreeableness, and neuroticism (the "big five" personality traits), self-esteem, self-monitoring, and trait positive affectivity. Network position was coded for size, strength, brokerage, and diversity. We find different traits predict different aspects of network position. Individuals who are conscientious, extraverted, have high self-esteem, and exhibit high trait positive affect tend to have large networks. Agreeable and high trait positive affect individuals tend to have strong networks. High self-monitors and also neurotics occupy brokerage positions. And the emotionally stable and open to new experience tend to have diverse networks.

Amy Degnan
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Social networks of African Caribbean and Black African people with psychosis

African Caribbeans (AC) and Black Africans (BA) have the highest rates of psychosis when compared to other ethnic groups in the UK (Fearon et al., 2006). They are also less likely to seek help from or engage with services and, as a result, more likely to access mental health care through the police or compulsory admissions than other ethnic groups (Bhui et al., 2003; Morgan, Mallett, Hutchinson, & Leff, 2004). These negative experiences can lead to non-engagement with services and delay help-seeking when symptoms get worse, leading to more negative routes into care and poorer outcomes, such as longer hospital stays and higher rates of readmission (Keating, Robertson, McCulloch, & Francis, 2002). It is therefore important to understand factors that influence help-seeking and engagement of AC and BA people with psychosis to improve their pathways to and relationships with mental health services. Response to illness has been conceptualised as a dynamic social process influenced by contacts in the social network who offer advice, information, support, beliefs and expectations (Pescosolido & Boyer, 1999). Ethnic variations in help-seeking are postulated to be a result of interacting social and cultural factors located within a particular social context or network of social ties, including stigma, beliefs about mental illness and perceptions of treatment (Morgan et al., 2004). Recent theories suggest that the fragmented structure of social networks and social isolation (within families and the community) contribute to higher incidence of psychosis and inferior outcomes among AC and BA people (e.g. Bhugra & Bhui, 2001; Pinto, Ashworth, & Jones, 2008). Following the onset of psychosis, their social networks are likely to be more vulnerable to deterioration as a consequence of family burden and relationship breakdown associated with longer periods of untreated illness and greater use of inpatient services (Bhui et al., 2003b; The Sainsbury Centre for Mental Health, 2002; 2006). The main aim of this research will be to examine the social network characteristics of AC and BA people with psychosis and determine their influence on help-seeking attitudes and engagement with services. This PhD research will comprise two main studies. The first study will carry out a secondary analysis of data to examine the ego-network characteristics (i.e. size, density, homophily, composition, closeness, frequency of contact) of 19 Black people and a matched sample of 19 White people living with severe mental illness (SMI). The main aim is to explore whether there is anything distinctive about the social networks of Black people (African Caribbean, Black African, Black mixed/other) with SMI when compared to their White British counterparts. The second study will examine the ego-network characteristics of 50 AC and BA people with psychosis using network-mapping interviews. The aim will be to test whether these characteristics predict help-seeking attitudes and engagement with services and to determine whether the relationships are moderated by perceived stigma and beliefs about illness. Qualitative interviews will be conducted one month later to explore the influence of social networks, illness beliefs, and perceived stigma and discrimination on help-seeking from the service user perspective.

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Context, Network, & Performance: Contingencies of Successful Collaboration Networks

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Scholars have long debated the benefits of constraint in networks – the extent to which an actor's alters are connected to each other. However, optimal network structures remain debated (Burt, 2005; Coleman, 1988; Granovetter, 1985). In an attempt to shed light on this puzzle, some studies have suggested that specific network structures provide benefits depending on the context of the networks (Battilana & Casciaro, 2012; Burt 2000). For example, networks that are low in constraint facilitate performance in completing non-complex, less knowledge intensive tasks (Hansen, 1999; Krackhardt, 1992). Inversely, high constraint in networks has been shown to be most effective for completing complex knowledge tasks (Cummings & Cross, 2003; Reagans & McEvily, 2003). These dense networks facilitate performance through increased identification in a group (Borgatti et al., 2009), and trust (Borgatti & Cross, 2003). In an attempt to further elucidate the role of context in influencing network structures and subsequent outcomes, we consider the following: which organizational policies influence networks such that individual performance improves? We specifically examine networks through the lens of knowledge-intensive collaborations among science researchers. In science, publication success plays an important role in career defining events such as promotion for tenure and grant acquisition. These successes, typically measured through citations (Wouter, 1999) are a recognition of quality and influence in any scientific field. Increasingly, this knowledge is produced in teams (Wuchty et al., 2007) as observed through the prevalence of increasing numbers of co-authors on academic publications (Greene, 2007); thus publication success cannot be attributed to individual factors alone. A researcher's relationships in scientific networks garner access to different information and expertise. Researchers may have greater publication success given the structure of their individual scientific collaboration network. Given this perceived benefit of collaboration (Hudson, 1996), scientific organizations, academic institutions and policymakers are seeking ways to facilitate and encourage collaboration through team science (Falk-Krzesinski et al., 2010), as well as through formal research initiatives (Defazio et al., 2009). In this paper, we aim to evaluate this aim and investigate the effect of organizational policies for collaboration on individual outcomes. With this in mind, we define context through the identification of specific policies that work to potentially stipulate the conditions of outputs such as a contractual stipulation on achieving tenure. We suggest an interaction between individual network structure and formal organizational, contextual effects on performance. Using a combination of longitudinal bibliometric publication data and survey data, we analyze the scientific collaborations of 193 Dutch Computer Science researchers. We show that in such a knowledge intensive environment, adopting policies that steer outputs enhances the success of scientific collaboration in high constraint networks. These results contribute to scholarly knowledge about the effect of context on the success of networks with different levels of constraint; where constraint in knowledge intensive environments is enhanced by rules of the organization.

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Iroquoian Social Network Change in Southern Ontario, A.D. 1350-1650

Social network analysis (SNA) of pottery collar decoration similarity values from 114 sites distributed across northern Iroquoia (New York, Ontario, St. Lawrence River valley), indicated that historical ethnic territories were not a major determinant of social interactions. In the present analysis we use Brainerd-Robinson (BR) similarity values calculated from 39,367 rims from 100 Iroquoian village sites located in southern Ontario dating from ~A.D. 1350 to 1650. Each village site is assigned to one of six 50-year time periods and one of ten geographical subdivisions. SNA is use to elucidate interactions among villages within each time period and assess changes in interactions through time as local populations 1) coalesced into larger villages and 2) as regional populations ultimately consolidated into a more restricted geographical range corresponding to the historically documented Huron and Neutral confederacies. In particular, we can track changes in network topology over time intervals based on different network statistics including but not restricted to density, clustering coefficient and path length. These quantities, together with centrality measures, are then used to formulate hypotheses about the evolution of populations and the pattern of interactions. Statistical tests are used to determine the significance of the temporal trends that we find among these structural quantities. Moreover, in order to determine if physical distance is a primary determinant of interactions, we combine SNA and GIS to test the degree to which spatial distance correlates with social relationships.
Brokering for M&E use: information exchange networks in water services in two Tanzanian villages

It has been argued that monitoring and evaluation (M&E) plays a key role in improving social service delivery. Different types of M&E arrangement exist, differentiating between horizontal M&E arrangements (between actors that are positioned at same level in the M&E chain) or vertical M&E arrangements (among actors that are positioned in different levels). The former has been found to be crucial (e.g. information exchange between civil society and local level government) for local level service performance. Based on social network data collected through semi structured interviews with 33 actors in two Tanzanian villages, this study maps information exchange networks between local level policy makers (parish-village-district), civil society organisations, water user associations and service providers. More specifically, the study shows who is central in the exchange of water-related information and which actors are crucial in brokering information exchange between different groups (local government vs. civil society/user committees/service providers). Moreover the study examines why certain information is used to improve water services and other isn’t and to what extent the actor providing the information, his position within the network and the type of tie with the receiving actor (kinship, informal, friends, hierarchical) influences the use of the information for the improvement of local level water services in Tanzania.

Plotting historical data, transnational networks of social reformers

On the Sunbelt Conference of the international network for social network analysis I wish to present a tangible application of SNA techniques to historical data. Recent studies in the field of social reform have argued that over the nineteenth century, reformers in and across national borders shared mutual influences and exchanges. Moreover, the rise of international congresses on social reform created a transnational place where experts exchanged knowledge in the wider field of social reform (Leonards C. and Randeraad N., 2010). A social network of intellectuals hereby took shape. Art and literature was one of the subfields of social reform. It was heterogeneously framed in international reformer discussions, both as object and instrument of reform. My research project deals with the appeal of art and literature in social reform discussions for Dutch and Belgian actors frequently visiting international congresses. My presentation will show a longitudinal data visualisation of mutual congress visits. I will clarify the process from data collecting to network plotting. The SNA visualisations in my project result from a gradual plotting-approach. First a two mode network (reformers and congresses) is inserted in the Gephi software. Second, the Jaroslav Kuchar’s plugin is used to convert the two mode to a one mode network and hierarchically cluster the actors in the network. Historians use SNA techniques such as the hierarchical clustering technique of block modelling in order to visualize latent patterns. Block modelling is an accepted technique to re-evaluated an entire network and group actors together who share similar positions with the regard to the totality of positions in the network (Giuffre K. 1999). That is why first of all, due to the plotting of mutual congress visits through time, I will reveal shared patterns of intellectual migration. Second, the intellectual career of individual reformers within a network becomes traceable, which enables me to tackle problems dealing core-periphery relations. Actors who are centrally plotted share a strong involvement in the knowledge transfer network, those on the side are seen as dilettantes and occasional visitors. SNA techniques can be successfully applied by historians to structurally make so called big data more manageable on the one hand and simultaneously draw attention to interesting and deviating patterns on the other hand. Besides an audience interested in the evolving network structure of nineteenth century intellectuals appealed by art and literature, my presentation will draw the attention from historians interested in the overall process from source to network visualisation.
Personal networks influence timing of hospital arrival after stroke

A problem in stroke care is patients’ slow arrival to the hospital after stroke symptoms. Late arrival excludes patients from beneficial therapies that improve outcomes. Traditional risk factors of delay include living alone, not using emergency medical services, minor symptoms, black race, and older age. Using Burt’s structural holes framework, we examined the relationship of stroke patients’ personal network characteristics and hospital arrival time. In a sample of 40 mild to moderate stroke patients, we assessed personal network structure (e.g., size, constraint, effective size) and composition (e.g., proportion kin) using a traditional egocentric network survey during their hospitalization. The primary outcome was binary: arrival before or after 6 hours. After controlling for age and stroke severity, personal network structural variables were significantly associated with arrival time. Network composition variables were not associated with arrival time. Stroke patients with personal networks that were small and with higher constraint were more likely to arrive late. These findings suggest that personal network structure is a novel risk factor for prehospital delay, and should be considered in stroke education campaigns.

Modes of coordination in civic fields: A comparative perspective on South Africa and UK

Comparative analysis of social networks is remarkably rare. In this paper we profile civil society networks in three quite different contexts (Cape Town, Glasgow, and Bristol) and try to get some steps towards laying out some criteria (in the form of basic network parameters) that may guide a comparison of political networks. We focus on the structure of civil society conceived as the pattern of ties that link organizations acting on collective and/or public issues. After presenting some basic parameters of network structure, we engage in a comparison of relational structures in the three cities focusing on the concept of mode of coordination, namely, on the different relational patterns through which practical and symbolic resources are exchanged in civil society fields. For the purpose of this paper we look in particular at the variable combinations of ties which imply some kind of resource allocation, and ties (a section of the former) that imply a stronger connection, as reflected in the ties created by core individuals’ multiple memberships or friendship links to other groups’ members (in our language, social bonds).

Evaluation and Contextualization of Networks Extracted from Text Data

Relation extraction is a set of techniques that allows for identifying representations of social agents - among other types of entities - and their relationships from unstructured, natural language text data. This is particularly useful for identifying the structure of covert and hard-to-access networks, networks on which only archival records exist, e.g. bankrupts companies or groups that have ceased to exist, and networks that primarily interact through communication of which digitized accounts exist. One methodological key issue with relation extraction is the validation of the extracted relational data. The classic assessment question to ask here is: How do we know if the extracted network data represent the true network structure? Prior research provides partial answers to this question. Another take on validation is to ask: “Are the observed structures different from connections among these actors in other contexts”? A baseline strategy to answer this question is to develop an ERGM (Exponential Random Graph Model) to test if the extracted network differs in a significant and network theoretically meaningful
way from a network of the same size and properties. We propose an alternative approach, which consists of keeping the set of identified social agents fixed and identifying their connections – including to other sets of agents - in other contexts or domains. With classic network data collection approaches, e.g. surveys, questionnaires and observations, this is hard to do as this procedure represents the difference between collecting one-mode versus multi-mode network data. However, text mining enables a more efficient solution to this problem since automated relation extraction techniques can be applied to multiple text corpora. We believe that this strategy has benefits beyond enabling the comparison and contextualization of networks extracted from text data as it allows for contrasting relationships between actors in one domain to their potential connections in other domains, e.g. for the case of interlocking directorates. There, one interesting question that typically doesn’t get asked is: Through what other ties are a given set of board members connected in the real world as based on evidence from open source text data archives? Practically speaking, we solve this task by conducting syntactically disambiguated entity extraction on a set of text documents and identifying which social agents are connected through what type of interactions. We detect typed and categorized relationships; overcoming the arbitrariness of co-occurrence based networks. We then query public data, such as collections of news documents and legal documents, for new documents on the identifying agents in another content domain, applying the same network construction techniques, and comparing the resulting. We use the ConText toolkit for this work. We provide two case studies for the feasibility and results of this process: First, the networks of institutions associated with the causing and mandated prevention of the savings and loan crisis. Second, networks of social agents who take a position on the question of a relationship between economic inequality and climate issues.

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Awakening Dormant Ties: Overcoming Challenges in Cognitive Network Activation

While the topic of dormant ties (contacts with whom the individual has not interacted with for an extensive period of time) remains largely unexplored in social network research, recent studies point to the advantages of utilizing these connections (Kwon & Adler, 2014; Vissa, 2011). Although dormant ties are inactive from the perspective of the individual, they continue to form new connections and gather information and experiences. Thus, reconnecting with dormant ties has been shown to provide access to novel and useful information (Levin, Walter, & Murnighan, 2011). However, research on memory and social recall suggests that bringing such ties to our mind is a challenging task (e.g. Hedberg & Higgins, 2011; Pachur, Schooler, & Stevens, 2014). The reason lies in what has been called the “recency effect” (Murdock, 1962): temporally proximate ties are more salient in our minds, and this saliency decreases starkly with temporal distance. As dormant ties are characterized by very high temporal distance, individuals exhibit a strong tendency not to make use of dormant ties, irrespective of their potential value. In this study, we link research on memory and social recall with that on cognitive network activation (bringing network contacts to mind) (Smith, Menon, & Thompson, 2012). In doing so, we empirically demonstrate how the “recency effect” hinders our ability to make use of dormant ties. However, we also show that individuals who are able to cognitively organize their networks based on resources, as opposed to temporal proximity, are more apt at cognitively activating dormant ties. We use a diverse online sample (n=202) of individuals residing within the United States, collecting data on various aspects of their personality, as well as their performance on a battery of interrelated cognitive tasks. These tasks have been designed to investigate different aspects of cognitive network activation. The results of our empirical analyses provide two key insights. First, we find that the “recency effect” is not only ubiquitous, but also aids cognitive network activation by making the process faster and less effortful. This is likely to be an advantage when searching for abundant resources, but an impediment when seeking novelty. Second, we find that, when searching for novel information, individuals characterized by high Self-Monitoring (Snyder, 1974) activate a higher proportion of dormant ties. In sum, we argue that individuals’ mental representations of their social networks can have important implications for their ability to make use of the social capital of dormant ties.

Dino Dittrich
Tilburg University
Bayesian Analysis of the Network Autocorrelation Model

The Network Autocorrelation Model (NAM) has been extensively used by researchers interested in the effects of social network ties in diverse areas, such as political science, criminology and organizational studies. The most common inferential method in the model has been classical maximum likelihood (ML) estimation. This approach however has known problems such as negative bias of the network autocorrelation parameter (Mizruchi & Neuman, 2008; Neuman & Mizruchi, 2010) and poor coverage of confidence intervals. To address the issues of the classical ML approach we develop new Bayesian techniques for the NAM. A key ingredient of a Bayesian approach is the choice of the prior distribution. The prior reflects the information we have about the model parameters before observing data. First, we derive two versions of Jeffreys prior, the Jeffreys-rule and Independence Jeffreys priors, which has not yet been developed for the NAM. This prior can be used for Bayesian analysis of the NAM when prior information is weak or completely unavailable. Second, we propose an informative prior for the network autocorrelation parameter based on an extensive literature review on the NAM. Moreover, new computational techniques are proposed to efficiently get posterior estimates and credibility intervals (the Bayesian equivalence of a classical confidence interval). Simulation results suggest that our Bayesian approaches are favorable to maximum likelihood ones with respect to bias and coverage of the network autocorrelation parameter.

Tomáš Diviák
Department of Sociology, Charles University in Prague

Core-periphery structures in corruption networks

In June of 2013, the Czech Republic was shaken by a political corruption scandal of previously unseen proportions and consequences. It involved the prime minister, deputies, military espionage agents, high officials as well as criminal entrepreneurs and led to a fall of the government. My research dealt with exploratory analysis of network of actors investigated in this case. Using proxy data, first I analysed cohesion, centralization, centrality measures and cliques in the network. Then I used conventional blockmodeling to search for roles and positions within the network. My results suggest that the network is dense and centralized with overlapping cliques contrary to other covert networks possibly accounting for its eventual disruption by police. Positional analysis using different methods such as CONCOR or different types of cluster analysis revealed a structure resembling the core-periphery model, which is then supported by measuring coreness and finding a good fit of this model to the data. In the end, I discuss potential pitfalls of use of proxy data and possibilities for further research.

Félicien Kengoum Djiegni
Center for International Forestry Research (CIFOR)

Actors, Institutions, Governance and change in REDD+ policy networks in Cameroon

Several categories of actors drive the policy process for reduced emissions from deforestation and forest degradation (REDD+) mechanism in Cameroon (Kengoum et al. 2012; Dkamela et al. 2014). These actors evolve in different belief systems at different levels of the governance structure. They are vested with different patterns of interest and different levels of access to political resources. Actors in policy networks bargain cooperate and disagree with the aim of influencing the policy process’ outcome (Fisher 2013; Dkamela et al. 2014). There are many specific policy objectives and sometimes many belief systems in the policy process (Bergeron et al. 1998). This explains why all actors in the policy network do not necessarily participate in all negotiations (Klijn E-H et al. 1995). Policy networks may change or remain stable over time, depending on the shifts observed in interests, belief systems, access to resources and patterns of resource exchange. Change in actor’s coalitions may be the consequence of conscious actors’ strategy, or simply a shift in the perception of the power relation, specifically when an actor controls an uncertainty on which depends another actor (Dahl, 1957). Understanding resource exchange and coalition building in national policy processes is important as reforms in national policies are prerequisites for improved stewardship of the global environment. A first analysis of REDD+ policy networks done in 2012 was aimed at providing answers to: who are the most influential actors in the REDD+ policy arena?, what are the resources exchange patterns among actors? And what are the
existing coalitions? (Kengoum et al. 2012; Dkamela et al. 2014). We used social network analysis to generate evidences on how power structures embedded in interactions among eight actor groups contributed to shape the development of the REDD+ process, with the Readiness Preparation Proposal (R-PP) as main output. The REDD+ policy process have evolved and we want to understand what underlies coalition building and coalition changes around REDD+ in Cameroon, with a particular focus on the role of domestic actors in this change process. For the next phase of the study, data are still to be collected. However we will base on longitudinal analysis, and use social network analysis (SNA) to investigate changes within REDD+ policy networks structures over time. This study is based on the argument that social networks are dynamic by nature (Snijders et al. 2009); to hypothesize that change will be observed in policy networks structures. However the following questions need to be answered: - What significant changes can be expected in REDD+ policy network structures? - How might ongoing institutional capacity and governance conditions influence changes in REDD+ policy networks structures? To address the first question we use the Advocacy coalition framework (ACF) theories on "belief system" and change in a "policy subsystem" to formulate our hypothesis (Sabatier and Jenkins-Smith 1993). To tackle the second question we base our hypothesis on two theories respectively "cognitive and non-cognitive events" theories (Sabatier and Jenkins-Smith 1993) and policy change, and "resource distribution" theory and policy change (Sabatier and Weible 2007).

Fiona Dobbie
University of Stirling

Professor Gerda Reith (University of Glasgow), Susan McConville (Scottish Centre for Social Research)

Using qualitative social network research to explore problem gambling

Social network research has grown in popularity in recent years, used in a variety of contexts, across several academic disciplines. However, advances in its application have focused mainly on quantitative approaches (e.g. statistics, simulation models, and measuring specific aspects of network structure). This has led to calls for more qualitative social network research, which can explain and unpack the meaning and influence of network structure and characteristics. One approach is to explore how social network research can enhance qualitative research methodology, analysis and participant recruitment. Using a longitudinal, qualitative dataset of problem gamblers this presentation will demonstrate three ways social network research can assist qualitative research. First: by offering additional leverage to unpack complex experiences, and/or behaviour; second facilitate recruitment, especially in hard to reach groups and; third aid analysis and interpretation. Name generation, using concentric circles created personal ego maps for 15 gamblers. Maps were then used as an interactive tool where the impact of the ego’s gambling on their alters was explored via colours dots. Maps helped structure the interview and explore the role of alters as both facilitators of problem gambling and conduits to recovery from problem gambling. Maps also identified alters for interview using respondent driven sampling, where gambler’s narratives of the perceived impact of their gambling (on their alters) could be compared with the lived experience from the alters themselves. The presentation will also offer some reflections on using this approach to explore problem gambling: e.g. the length of time it takes to create the ego network maps; the importance of an appropriate name generate question and offering clear guidance to participants creating the maps; reflections on the process from participants who created the maps; and lastly the ethical challenges of using respondent driven recruitment via the ego network maps.

Gabi Dodoiu
Tilburg University

Roger T.A.J. Leenders (Tilburg University), Leon A.G. Oerlemans (Tilburg University)

Risky decisions in groups- A multitheoretical, multilevel evaluation of mechanisms during group decision process

Risk taking is not per se good, nor bad; high risk taking in business decisions does not relate directly to high performance, as neither do low risk taking- rather, balanced levels of risk may be preferable for long-term performance. When teams have to make decisions, individual members with different preferences communicate and interact in order to reach a common preferred choice. While group risk taking has been shown to differ from individual risk taking (Isenberg, 1986), it is not clear how groups
reach agreement on preferred risk levels. In the current study we aim at providing an answer to this question, by capturing (dynamically) the network patterns of interaction between the members of a group that develop during the decision making process. By modelling the network patterns of communication on arriving at a decision, we can put to test the relational mechanisms that drive the final decision concerning acceptable risk levels. We aim at looking at three levels that are meaningful for studying the exchanges that occur during discussion: individual specific, dyad specific, and global specific characteristics. Such a multilevel approach provides more depth (Contractor, Wasserman, & Faust, 2006) into the exchanges that occur during discussion. Three main theories that have been used to explain risk taking in team settings will be used to inform the models: diffusion of responsibility, persuasive arguments, and social comparison. The study will consist of decision task(s) and will allow communication between group members through a chat-like platform. Two manipulations will be included, first whether the accountability (i.e., obligation to accept responsibility for the decision’s output, and therefore experience its consequences) belongs to individuals, or to a group (illustrative for the diffusion of responsibility), and second, the distribution of different arguments, favoring the risky, or the cautious option (relevant for the persuasive arguments mechanism). The influence (i.e., contagion) between members will be illustrative for the social comparison mechanism. The end goal is therefore to evaluate whether the structure and dynamics of the interactions between group members in the decision making process can explain how team members, given their individual preferences, make group choices in risky decisions.

Malte Doehne
Munich Center for Mathematical Philosophy, LMU Munich

The Diffusion of Scientific Theories: Network Topologies and the Role of the Translator

How do scientific theories become adopted and how do they spread across scientific communities? This paper addresses these questions by applying network analysis to a historical case of theory adoption and diffusion in Cold War social- and behavioral sciences. Our study is the early adoption and spread of the Theory of Games developed prominently by John von Neumann and Oskar Morgenstern in 1944. Departing from the observation that the adoption of game theory took off only from the 1970s onwards, we trace its initial adoption in economics, and its subsequent spread across the behavioral and social sciences at large. Drawing on a dataset of more than 4,000 publications, we construct a co-citation network of seminal works published in the period of 1945-1970 that contributed to the early dissemination of game theory. We show that game theory was collaboratively adopted and further modified between the 1940s and the 1960s by a small group of outstanding scholars from distinct disciplines whom we identify as translators before it gained extraordinary prominence and spread not only across the American social and behavioral sciences, but was also adopted amongst philosophers, mathematicians and statisticians, computer scientists, and operations researchers. We identify these translators using an innovative brokerage algorithm. Our analysis of the co-citation network thereby sheds new light on how theories are developed, adopted, and further modified within and across scientific communities, a question that is not only of historical interest in the case of game theory, but also relevant for the history of science more generally. We thereby show how network analysis can make fruitful contributions when applied in the history of science.

Sofia Dokuka
Center for Institutional Studies, HSE

Diliara Valeeva (Center for Institutional Studies, HSE), Maria Yudkevich (Center for Institutional Studies, HSE)

Complexity in the classroom: the joint evolution of friendship, advice and academic performance in student social network

Student achievements can be influenced by different types of relationship, e.g. friendship and advice. These relationships within the university environment are closely intertwined. On one hand, asking for advice can lead to closer relationship and transform into friendship. On the other hand, seeking for advice may potentially lead to the loss of social status and transform friendship ties. Thus, advice relationships have an impact on the emergence and decay of friendship ties and vice versa. Such kind of complex social system with coevolving multiplex networks of friendship and advice and academic performance was not analyzed in details yet on the samples of students. The purpose of our research
is to contribute to the analysis of multiplex student networks and behavior and explain the underlying social mechanisms that participate in their coevolution. We collected data about friendship and advice student networks in one of the selective Russian universities. Information about student networks and their socioeconomic characteristics was gathered in three waves during their first academic year. To investigate the joint evolution of friendship and advice networks and academic achievements, stochastic actor-oriented models with specification for multiplex networks were applied. On the one hand, we look for the social selection and/or social influence based on academic performance within the student environment. On the other hand, we investigate the coevolution of friendship and advice relationships between students. Friendship network shows the presence of social influence process: in course of time students assimilate the level of academic achievement of their friends. However, there is no social selection process: students do not choose their friends based on their grades. In contrast, in advice network we find social selection process but do not fix social influence. In other words, students tend to address for advice their peers with similar academic achievements but do not tend to assimilate academic performance of each other. In case of multiplex network coevolution we reveal that friendship and advice networks are positively related at the dyadic and triadic levels but negatively related at the actor level. We associate the results with the tendency of students to balance their friendship and advice network ties. Students tend to create friendly social environment and optimize their social capital.

Evgenia Dolgova  
Tilburg University

Michaëla Schippers (Rotterdam School of Management Erasmus University)

The co-evolution of perceptions of competence and friendship: The effect of self-monitoring personality

Which factors affect network dynamics? The current paper investigates how cognitive networks (perceptions of competence) and self-monitoring personality affect social tie formation in teams. We suggest that perceptions of competence co-evolve with friendship: team members initiate and maintain friendship to people whom they perceive to be competent, and attribute higher competence to their friends. We also propose that self-monitoring impacts this loop: high self-monitors initially undertake more effort in creating and maintaining friendship, and project a competent image of themselves, which the others choose to follow upon. Using longitudinal friendship data obtained from 650 individuals working in 130 project teams, we apply stochastic actor based modeling of network dynamics (RSiena) to unravel how self-monitoring influences co-evolution between perceptions of competence and friendship. Our results suggest that there is a self-reinforcing loop between perceptions of competence and friendship: perceiving others as competent helps to create and maintain friendship relations, and being friends helps to establish and sustain the competent image of others. We find that self-monitors leverage on this process by conveying a competent image of themselves. High self-monitors initially also create and maintain friendship ties more. Our findings extend existing research on antecedents of network formation by emphasizing the role of perceptions and personality in social tie formation. Our results imply that team members co-create the social network positions: high self-monitors convey a competent image that others choose to follow upon in establishing friendships.

Linda Dominguez Alvarez  
Tilburg University

Linda Dominguez Alvarez (Tilburg University), Rob J.G. Jansen (Tilburg University), Marius T.H. Meeus (Tilburg University), Leon A.G. Oerlemans (Tilburg University)

The effect of withholding knowledge at the dyadic level on trust and quality of a decision making task

In their search for complementary expertise organizations forge knowledge exchange relations with other organizations. Trust is a necessary condition for establishing and maintaining productive knowledge exchange relations as they feel less need to protect the knowledge from partners’ possible opportunistic behavior. Besides trust, interacting partners have expectations about the amount and quality of knowledge that will be exchanged. Based on the non-excludable nature of knowledge, this research looks into the potentially trust violation effects on withholding knowledge. Given the importance of trust for collaborations, the occurrence of a trust violation can have severe consequences for the
quality and outcomes of the knowledge exchange relation. More precisely, we hypothesize that withholding information can trigger a trust violation mechanism, which subsequently could negatively impact on the quality of a decision making task made within a network. We use a longitudinal experimental design, with four rounds divided over two days, to examine whether the manipulation ‘withholding knowledge’ actually induces the trust violation mechanism at the dyadic level which is predicted to hamper the quality of decision making within networks. Additionally, we hypothesize the negative effect of withholding knowledge on the quality of a decision making task to be stronger for individuals actually experiencing a trust violation within the network at the dyadic level, compared to individuals who do not. This longitudinal design provides a repeated measurement for the trust violation and the quality of the decision making task. The experiment is a between-design in terms of two levels, having the manipulation 'withholding knowledge' or being the control group. Moreover, the experiment is a within-design in terms of the measurement of the trust violation at the dyadic level and the quality of the decision making task. Students are recruited to participate in this experiment. The experiment focuses on challenges in decision making pertaining to cooperation within a firm.

Patrick Doreian

Andrej Mrvar

Relaxed structural balance over time among nations in a signed network of the world system

Tracking the level of balance (or imbalance) in a signed network over time is crucial for assessing change regarding structural balance. We present ways of doing this for an evolving signed network where the units are nations in the world system. Hitherto, applications of balance theory has used small data sets where ties appeared to be constructed from whole cloth. The data used here come from the Correlates of War project for 1946 through 1999 with 51 time points and well defined positive and negative ties. The number of nations varies between 64 and 155 through the inclusion of new nations and the breakup of earlier units. Both blockmodeling (using balance and relaxed balanced) and counting signed triples are used as ways of measuring imbalance over time. In fitting blockmodels, the use of pre-specification is required because inductive uses of both signed blockmodeling and community detection are inadequate. Without surprise, there are great changes in balance over time in balance. More importantly, these changes can be coupled to global events, local events and locally global events. However, the basic blockmodel structure is remarkably stable.

Dr Christopher Downey

University of Southampton

Christian Bokhove (University of Southampton)

The impact of change in the support networks of trainee secondary school teachers of mathematics and science

This study examines the development of the support networks of trainee teachers during the course of an intensive one year postgraduate programme for mathematics and science graduates wanting to teach their subject specialist in secondary schools. Longitudinal ego network data has been gathered from a cohort of consisting of more than 75 trainees. As well as the two subject areas the trainee teachers were also enrolled on two different programmes of study: a traditional university led programme, and a new school led programme introduced the previous year as part of a change to public policy on initial teacher education in England. Analysis of the first round of data collected one month into the programme demonstrates that both the size and make up (in terms of groups of alters such as peers, family, friends, colleagues) of the support ego networks varies appreciably between trainees. Changes to the size and composition of each trainee’s ego network for different aspects of support (with academics, classroom practice, subject knowledge development, practical and social or emotional support) will be combined with other covariates such as programme type, demographics, interpersonal trust, attitudes to support and whole network metrics from bounded peer-group support networks in a growth analysis, within a multivariate-multilevel regression modelling framework, to examine the impact of changes in trainees' support networks on their developing competence as teachers as assessed in lesson observations by course mentors and tutors, and via trainee self-
assessments. The findings will help us understand the role that support networks play in enabling trainee teachers to develop professional competence and classroom practice and will also help tutors on initial teacher education programmes to appreciate whether explicit guidance on developing support networks might be of value to trainees.

Marten Düring  
CVCE Luxembourg

Jörg Raab (University of Tilburg)

The emergence of trust in covert social networks: The case of support networks for persecuted Jews during the Holocaust

Trust is often seen as essential to the formation and functioning of social networks. It is particularly important for covert networks in which actors face personal persecution and need to operate in secret. In this paper we examine trust in support networks for persecuted Jews during the Holocaust in Berlin. We will explore (1) how trust emerged between individuals, (2) within clusters of people and (3) within highly volatile covert network structures. The analysis is based on the careful extraction of relational data from heterogeneous sources. We therefore needed to account for a high degree of fragmentation, biases inherent in the respective sources and distortions in the memories of those who produced them. Trusted ties between helpers often have their roots in the mid 1930s or earlier, when individuals began to counter the social segregation of Jewish citizens. The emergence of support networks crucially depended on the creation of trusted ties between strangers. Trust was created through recommendations and multi-layered relationships which were often characterized by good will as much as financial gains and other rewards. Trusted ties between individuals often grew into long chains held together by small-scale trusted ties. These often short-lived chains of trust merged with others and enabled strangers to effectively exchange over available resources. This covert and highly volatile infrastructure lead to the emergence of trust in specific, well-known helpers and was often followed by the unwanted rapid growth and quick detection of their support networks. The paper concludes by discussing the implications for dark networks in general.

Stephanie R. Dyal  
University of Southern California

Thomas W. Valente (University of Southern California)

Loneliness as a moderator of the influence of peer cigarette use on smoking behaviour

Many studies have identified the effects of peer influence on behavior, but less research has focused on identifying factors which may interact with peer influence to affect behavior. One potential factor of interest is loneliness. Loneliness is an aversive negative affective state resulting from the perception of oneself as socially isolated. People’s perceptions of what an adequate social environment is may differ due to individual differences in quantity and quality of social stimuli considered to be ideal and fulfilling, and research suggests that loneliness is not synonymous with social network measures. Laboratory studies have found that lonely and socially excluded people are more likely to express agreement with majority opinion in comparison to non-lonely peers. This study intends to assess the interacting effects of peer influence and loneliness on smoking behavior and intentions in a sample of adolescents. Four aims will be assessed in this study. We will assess the associations of loneliness and social network characteristics with accuracy of perception of friends’ smoking behaviors. We hypothesize that lonely and central adolescents will have more accurate perceptions of their peers’ behaviors in comparison to non-lonely and isolated adolescents. We will assess the associations of loneliness and social network characteristics with the proportion of smoking peers. We expect that lonely and less connected adolescents will be exposed to a higher proportion of peers who smoke. Last, we will assess loneliness, social network characteristics, and number of peers one nominates who smoke as predictors of adolescents’ smoking behaviors. We will assess interactions between loneliness and all other predictors in this model. We expect that loneliness and number of peers one has who smoke will interact as predictors of smoking. Previously collected data from 1279 adolescents in five schools in California, USA will be used to address the study aims. Mixed effects linear and logistic regression models
including a random effect for school will be computed for each study aim. Ethnicity, gender, socioeconomic status, and age will be controlled for in all models. Results are expected to indicate that peer influence is moderated by loneliness in a model predicting smoking behavior. Furthermore, accuracy of perceptions of peer influence may be affected by loneliness and network characteristics. Findings may be generalizable to other behaviors and populations. This study will further understanding of how peer influence operates and what individual-level factors may moderate effects of the social environment.

Joris Ebbers  
University of Amsterdam

Nachoem M. Wijnberg (University of Amsterdam)

The co-evolution of selection system orientations and friendship networks among film school students

In this paper we study the value that students at a prestigious film school attach to the future opinions of different types of evaluators in the film industry once they graduate. This actor characteristic is called a selection system orientation (Bhansing, Leenders and Wijnberg, 2012) and denotes the relative importance an individual attaches to the evaluations of three different types of selectors: market, expert, and peer. In the context of the film industry these are respectively moviegoers, independent film critics, and fellow filmmakers. We collected three annual waves of data from a cohort of students at the Dutch Film Academy, which we analyzed using SIENA. We found that students with a higher market orientation nominate more fellow students as friends, while at the same time receive less friendship nominations. In addition, we found that influence effects are stronger than selection effects for all three types of selection system orientations. Finally, we found that influence effects the strongest for market, intermediate for peer, and weakest for expert orientation. Our study has two main contributions. First, we extend selection system orientation theory (Bhansing, Leenders and Wijnberg, 2012) by studying how it is affected by network structure and vice versa. Second, by studying selection system orientations, which is an indicator of future aspiration instead of current behavior, we extend previous applications of SIENA focusing on non-observable actor characteristics (eg. Steglich et al., 2006).

Kate Eddens  
University of Kentucky College of Public Health

Jesse Fagan (University of Kentucky Gatton College of Business and Economics), Tom Collins (University of Kentucky Rural Cancer Prevention Center)

Feasibility of network data collection and visualization approaches for health communication interventions in a geographically isolated and socioeconomically disadvantaged population.

In Appalachian communities, social networks are powerful community ties. However, there are few studies that examine how these network ties might be used to communicate information and norms about cancer screening and prevention behaviors. Similarly, there is a great need in the literature to explore the diffusion of innovations through networks, and the self-collected vaginal swab (SCVS) for HPV testing is an innovative screening methodology in this population. Few, if any, applications providing visual network feedback have been used in an Appalachian population. This study explored peer word-of-mouth communication networks in rural Appalachian women who have used SCVS for HPV testing, to investigate how best to activate networks to disseminate cancer prevention and screening information, specifically innovative screening methodologies, in rural Appalachia. Network interviews were conducted with 50 women in the Appalachian Kentucky River Health District who have not had a Pap test in three or more years, and who participated in an effectiveness study of SCVS testing. Network interviewers used tablet-based network data collection and visualization software (OpenEddi) to obtain information about participant’s egocentric social support and communication networks, study referral activity, and characteristics of the others in the participant’s networks and their relationships. The goal is to identify with whom participants are communicating about health behaviors, SCVS and HPV testing, and other social information as well as to understand what type of network characteristics distinguish women who refer others to SCVS testing, and whom they refer. Results may help determine how to disseminate SCVS interventions and other innovative screening methodologies through peer networks in low-income, marginalized populations such as rural Appalachian women. As
a component of the data collection process participants are able to visualize their networks, giving them the opportunity to correct absent or incorrect ties and react to characteristics of their networks. While this was not an intervention study, we report on the feasibility and utility of using tablet-based network data collection and visualization software in field collection of data in Appalachian Kentucky – a geographically isolated population. We report qualitative data on using the software from both network interviewers (nurses and nurse practitioners in Appalachian Kentucky) and from participants. Our goal is to demonstrate the feasibility and benefit of using this software and a network visualization approach for future health communication interventions in a geographically isolated, socioeconomically disadvantaged population.

Rhiannon Edge
Lancaster University

Thomas Keegan (Lancaster University), Rachel Isba (Lancaster University)

Seasonal influenza vaccination uptake in junior doctors – an investigation using social network analysis.

Influenza remains a major source of morbidity and mortality worldwide. Despite England’s Chief Medical Officer recommending that all frontline healthcare workers have a seasonal influenza vaccination, only 55% do. There is ongoing debate and much confusion surrounding this – for example, two recent meta-analyses produced conflicting results on whether or not a high coverage of vaccination in healthcare workers had a protective effect on the patients in their care. We intend to add to this debate using a novel social network analysis approach. Social network analysis is a well-established research approach that looks at individuals in the context of their social connections. Individuals who behave in a similar way have been found to group together – this leads to the formation of clusters in a social network. Previous work has suggested that this phenomena could apply to vaccination behaviour. If individuals who choose not to vaccinate form friendships with others who do not vaccinate – this may form clusters in the population with a much lower vaccination prevalence than that of the average. This so-called “vaccination homophily” is thought to affect the dynamics of infectious disease spread within populations. For example, vaccination homophily could increase vulnerability to infectious disease transmission throughout the network due to the availability of reservoirs for disease. Previously we have analysed influenza vaccine uptake by medical students from a social network perspective. The early work showed no vaccination homophily within the medical student population of a small medical school in the North West of England. We also found little difference in the degree distribution of vaccinated and non-vaccinated individuals. Here we intend to investigate the influenza vaccine uptake in a population of junior doctors working at an NHS trust. We used a paper-based questionnaire to collect influenza vaccination and relational data from 200 junior doctors working for a single NHS organization in England. WE were able to achieve a response rate of 70%. By assuming reciprocal ties we will be able to produce a good representation of the junior doctor’s social network. R statistical software will be used to analyse the vaccination homophily within the junior doctor population. The junior doctor network will be used to examine patterns in the uptake of the seasonal influenza vaccine – for example, examining the degree distribution of vaccinated and non-vaccinated individuals. This approach is a novel way of investigating the uptake of the seasonal influenza vaccination in HCWs.

Santi Effendi
The Norwegian School of Economics

Professor Arent Greve (The Norwegian School of Economics)

The Professional Networks of University Scientists in Technology Transfer

Resistance to university technology transfers indicates that the determinants encouraging scientists’ commercialization engagement and ensuring project success are uncertain. Following institutional theory, we study scientists’ professional networks. Scientists and Technology Transfer Office (TTO) managers operate under diverse rules. Science and commercialization take place in different organizational fields each requiring specific expertise and connections. Networks bridging these fields may enable commercialization and increase the likelihood of success. We interviewed 70 scientists and
35 TTO managers in 3 cities in Norway. Secondary data include over 3000 commercialization attempts and approaches (i.e., disclosures of innovation with commercial potential). The duality perspective in the literature splits scientists into two polar types, yet most scientists lie in between. We establish a typology of university scientists rigorously by employing a multi-perspective. We map (1) scientific collaboration networks using co-authorships, (2) commercialization collaboration network using commercialization attempts and approaches and self-reported contacts, (3) information networks and (4) advice networks using self-reported contacts. Preliminary results show that networks outweigh other factors in encouraging scientists’ commercialization engagement and ensuring project success.

Nina Eggert
University of Antwerp

Katia Pilati (University of Trento)

Organizational networks in the field of immigration

The objective of this paper is to analyze the formation and structure of organizational networks in the field of immigration in a comparative perspective. More specifically, we will test hypotheses of the impact of specific opportunities in the field of immigration on migrants’ organizational networks by analyzing different types of resource exchanges among migrant organizations and the prevailing logics of interaction. Our main argument is that the way the political context of migrants’ city of residence defines boundaries affects the way migrant organizations exchange with other migrant organizations active in the field. To test our hypotheses we will use a unique data set of an organizational survey of migrant organizations in four European cities: Lyon, Madrid, Milan and Zurich and analyze the networks of the total population of migrant organizations in each city. Using ERGMs our findings support our expectations and suggest that different logics of interaction are at work in different contexts.

David L Elliott
University of Missouri

Toward Stance Networks: Using Corpus Linguistic Tools in Applying Harrison White’s Social Network Theory to Written Academic Discourse

I propose a new method of network text analysis that focuses on linguistic stancetaking, reporting on an initial phase of empirical work on this method using one article from a bioethics journal and another from a journal in its immediate citation environment. This exploratory analysis is part of a larger project that studies the early major period, circa 1971-1979, in bioethics through a corpus of articles from two journals during this period. My approach is inspired by Harrison White’s social network theory, which was influenced to a significant degree by sociolinguistics, systemic functional linguistics, and the pragmatics of language in interaction (e.g., White 2008, Fontdevila and White 2013, Godart and White 2010). The literature on linguistic stancetaking, while not explicitly cited by White in his discussions of language, relates directly to the core of his theory of identities emerging as they seek footing through control efforts in the face of uncertainty. Du Bois’s (2007) concept of a stance triangle is analogous to Heider’s balance theory triads and to McLean’s (2007) triads and chains of relations in recommendation letters. In the case of a stance triad, an author (node a) takes a stance toward a stance object (node x) (a proposition or set of propositions) and thereby positions himself or herself toward that object. At the same time, the author attributes a stance toward the object by a dialogic partner(s) (node o) (varying in specificity from a cited author to, for instance, a school of thought and responding to past stances or anticipating future ones) and thereby positions the partner(s) toward the object (node x). In the process, the author aligns (or disaligns) himself or herself with the dialogic partner(s). I use the lexico-grammatical methodological approach of corpus linguists Biber and Hunston and colleagues (e.g., Gray and Biber, 2015, Hunston 2011) in which a variety of lexical markers of stance meaning and their stance objects (i.e., the propositions to which they indicate a stance) are identified within a body of text. This identifies the author (node a), the stance object (node x), and the relation between them. I proceed further to identify the remaining elements of a stance triad, namely the dialogic partner(s) (node o), the attributed stance relation between node o and the stance object (node x), and the alignment relation between the author (node a) and his or her dialogic partner(s) (node o). A working assumption and guiding principle of my method is that the identification of stance triads will allow the further identification
of the cultural formations in White's theory including rhetorics, styles, narratives, stories, story-sets, storylines, and plots. Furthermore, the identification of these cultural formations and their analogous social formations in the academic realm of study provide the context for apprehending the indexical meanings of stance triads. Therefore, the coding must be iterative, including the bottom-up analysis of stance triads and the top-down analysis of cultural and social formations using the corpus linguistic methods of register, genre, and style analyses (e.g., Biber and Conrad, 2009).

Joshua D. Embree
UCLA

Mark S. Handcock (UCLA)

Spatial Temporal Exponential-Family Point Processes for the Evolution of Social Systems

Realistic stochastic models for the co-evolution of social relations and individual behavior over time have broad applicability in social science. The stochastic actor oriented model and temporal exponential-family random graph model have proven useful in modeling longitudinal social networks with nodal covariates while latent space approaches to network analysis offer unique insights into social phenomena. We borrow ideas from these frameworks to construct a spatial temporal exponential-family of point processes (STEPP) to jointly model the co-evolution of social relations and individual behavior in discrete time. We develop likelihood-based inference of STEPP parameters for spatial temporal data as well as latent space inference for longitudinal social networks. We utilize the general STEPP framework to construct a virtual laboratory for simulating social systems and interventions. This virtual laboratory provides a novel simulation tool for developing and assessing potential strategies for influencing behavior in particular communities. We apply these methods to a study of risky behavior in adolescent friendship networks to model and simulate social processes associated with drug and alcohol use in middle school students.

Sakin Erin

Diffusion of Islam in America

Conversion is one of the ways in which religion diffuses in society. Different than other diffusions such as adopting a new technology or a fad, religious adoption can be riskier since it entails a life changing transition thereby making it a complex contagion. Why do people convert to a new religion, especially to Islam, which is the religion of the ultimate other in the Western context, despite the fact that it is risky behavior? To what extent are social actors influenced by their social ties in making such a life transition change? I investigate whether Islam diffuses through weak ties or strong ties. By comparing conversion cases in Michigan, where there is a larger Muslim community, and Kentucky, where there is less tangible Muslim community, I argue Islam is more likely to diffuse through recessive or dominant weak ties in Michigan, whereas it is more likely to diffuse through strong ties in Kentucky. Having investigated a set of egocentric conversion networks from both Michigan and Kentucky, I argue that the existence of a Muslim community and how it is perceived by mainstream society is an ultimate factor in determining the strength of a tie to other Muslims. Thus, Islam is more likely to diffuse through weak ties where there is a Muslim community, but it is more likely to diffuse through strong ties where there is no such a community.

Gunes Ertan
Koc University

Michael D. Siciliano (University of Illinois in Chicago), Deniz Yenigun (Bilgi University)

Changes in Perception Accuracy Over Time: Do Network Position and Personality Traits Matter?

Understanding the determinants of perception accuracy has been one of the key questions in Cognitive Social Structures (CSS) studies. So far we know that various factors such as power, network centrality, personality traits, need for closure and homophily matter in explaining why some individual’s have more accurate cognition of their networks in comparison to others. However, how perceptions change over
time, and the factors associated with the magnitude and direction of cognitive changes remain to be examined further. We aim at extending that particular line of research by utilizing a novel friendship based CSS data set that is collected at three different time points among 26 MBA students during their first two semester of the program. We specifically aim at answering the following questions: (1) How do network positions in t1 relate to changes in perception over time? Do particular network traits such as brokerage and high indegree centrality associated with increased accuracy performance? (2) Do personality characteristics measured by the Big Five personality traits affect changes in perception accuracy? Our preliminary findings suggest that both network positions and personality characteristics matter to a certain extent in explaining variation in perception accuracy over time.

Modesto Escobar
Universidad de Salamanca

Photography, identity and social networks

This presentation focuses on the expression of identity through photography. It is based on the assumption that it is possible to reconstruct the social network of important people in their span life through their photo albums. A comparative study of four iconic collections belonging to Spanish eminent figures in the earlier twentieth century was conducted to assert it. In particular, an analysis has been executed to describe photographic collections of the Basque teacher, philosopher and writer Miguel de Unamuno (1864-1936), the Catalan architect Rafael Masó (1880-1935), the composer and musician Joaquin Turina (1882-1949), and the dancer Antonia Mercé (1890-1936), stage name “The Argentinian”. With a technique based on network analysis, called coincidence analysis, it is highlighted the importance of studying the coincidences of the characters in photographic collections to reveal the social component of the identity of famous people. The first element to observe in a photograph is the presence of the people who have been portrayed. However, an examination of this element would be incomplete if it does not take into account also the set of relationships present in the images. In consequence, photographs in which more than one person appears are of great importance to the extent that allow to investigate the social referents of the characters contains an iconic collection. Besides the "who and with whom", the "what, how and where" can be studied in the image, not only as regards the distinction between the public and the private spheres, but also in relation to the different areas (or themes) of interest for those who collect pictures. Moreover, it is considered that coincidence analysis, that uses symmetrical adjusted residuals to discover connected people or topics, is a suitable technique for the study of the relationships between the characters and characteristics portrayed, and is able to distinguish different "social worlds" in a photo collection.

Thorsten Euler
University of Bremen

Resource exchange networks between environmental organizations - results from a regional survey in South Africa

This presentation follows a previous conceptual concept presented at Sunbelt 2013. It is embedded in a currently running Ph.D.-project on the environmental movement in South Africa. Based on data collected in winter/spring 2015 the paper examines asymmetric relations concerning the exchange of resources between environmental organisations in KwaZulu-Natal/South Africa. Following the Resource Mobilization Theory for social movements by McCarthy & Zald, six different possibilities of resource exchange (financial, personnel, legal, facilities/equipment, information, and logistics/transport) are taken into account and reflect the optional multiplexity of resource exchange relations. Additionally mutual participation in events and common activities is retrieved. The paper examines the current state of resource exchange in the KZN environmental movement network and carves out environmental “champions” as decisive brokers within the network and between clusters. Dyadic covariates of organizational relations which are important in the South African context (e.g. ethnic member composition, rural-urban-distinction, socio-economic class, topical homophily) are included in the analysis of inter-organizational relation patterns. A special focus will be laid upon middle-class conservationists (“conservancies”) using their brokerage to promote inclusion or exclusion of other organizations.
Martin Everett
Manchester University

Tom Valente

**A simplified bridging measure for social networks**

Valente and Fujimoto (2010) proposed a measure of bridging in networks based on Granovetter’s classic work on the strength of weak ties. They claim that the measure they propose is different from other bridging (and centrality) measures and demonstrate their measure on a variety of hypothetical and empirical datasets. In this paper we review their method and show how the idea can be modified so that it can use betweenness centrality; and we provide normalizations for the modified method. This new approach has two advantages, first it provides a more robust means to normalize the measure to control for network size, and second, the modified measure is computationally less demanding and so is scalable to large networks.

Robert Eyre
Centre for Complexity Science, University of Warwick

Thomas House (School of Mathematics, University of Manchester), Edward Hill (Centre for Complexity Science, University of Warwick), Frances Griffiths (Warwick Medical School, University of Warwick)

**Social contagion over adolescent friendship networks.**

In modern times a large part of the global disease burden is formed from illnesses strongly related to emotion and behaviour, rather than purely physiological phenomena. Previous work suggests that, similarly to the way in which viral and bacterial disease spread through physical contagion, these behaviour-based illnesses can spread across social networks by a kind of social contagion. However, much of this work, such as that of Christakis and Fowler, has come under criticism for being susceptible to confounding. We present a new method designed to be robust against standard examples of confounding. We use a discrete time Markov chain model looking at direct changes in the state of individuals conditioned on the states of their friends. By fitting to social network and health datasets, we look for evidence of individuals in the network changing to be more like their neighbours over time. We do this for two illnesses of great global importance: depression and obesity. Depression affects more than 350 million people worldwide, and at its worst can lead to suicide. Obesity affects about 13% of the world’s adult population, and increases the risk of many noncommunicable diseases such as various cardiovascular diseases and cancers. The onset of these illnesses often happens early in life, and is affecting increasing amounts of adolescents. We aim to find evidence of mood and weight changes spreading over US adolescent friendship networks using our improved method. We use health data of 12-19 year old US adolescents from the Add Health dataset. For mood, we do this for individual depressive symptoms, as well as mood as a whole, having more friends with worse symptoms makes it more likely for an individual to worsen in mood, and less likely to improve, and vice versa for better off friends. This suggests that whether having more friends will make you emotionally healthier is dependent on the emotional state of the friends. For weight, we use the Body Mass Index Z-scores (BMIz) of 2161 young people. We find here that having more friends with lower BMIz has less effect, causing only a small decrease in the likelihood of an individual increasing in BMIz, and having no effect at all on the individual decreasing in BMIz. These results provide evidence to support the idea that social contact amongst adolescent friends has an impact on an individual’s BMI and depression symptoms.

Lucia Falzon
Defence, Science & Technology Organisation, & University of Melbourne, Australia

**Propagating misinformation over social media: Sources and promulgators**
The ever-increasing use of the internet for sharing text, images and videos means that information can be disseminated to a very wide audience faster than ever before. The fact that the transmission is over electronic media does not make it any more or less accurate but the rate at which misleading information and hoax messages can be spread is of concern, particularly when the news is liable to cause panic and hysteria. Every item of information is generated by one or more sources and sent to one or more receivers who are able to retransmit to other potential re-transmitters: at each transmission point there is a potential for the information to be distorted, whether intentionally or not. The propagators involved can be human communicators or bots using artificially generated or hacked legitimate accounts (Mezzour & Carley, 2014). In this paper we explore the mechanisms involved in the dissemination of false information through the interconnected networks accessed via social media, both as a result of deliberate deception and as a result of unintentional misinformation (Karlova & Fisher, 2012). For each of these two cases, we examine the nature of misinformation, describe the characteristics of successful propagators and explore the feasibility of using time-ordered network analysis methods (Kontoleon, Falzon & Pattison, 2013) for tracing dissemination paths and determining the rate and extent of information contagion. Using Twitter as a case study we will discuss the tactics used by for spreading rumours and false information and discuss methods for developing counter measures.

Leandra Fatorelli
University of Leeds

Monica Di Gregorio (University of Leeds)

Comparing climate change adaptation and mitigation networks in the land use sector in Brazil: enabling factors for policy integration

We investigate the two sub-domains of climate change policy networks in forest and other land uses sectors in Brazil through a comparative analysis of mitigation and adaptation networks structures. The analysis contributes to the understanding of the role of power, and values and beliefs, in explaining climate change policy structures in Brazil. Climate change is a multidimensional problem and solutions require the involvement of different policy actors that are part of varied interdependent networks in distinct arenas (van Bueren, Klijn and Koppenjan 2003). In the global context, policy actions and arguments to respond to climate change developed in two sub-domains – mitigation and adaptation – each of which followed a distinct trajectory relative to time, space, and organizations and institutions involved (Swart and Raes 2007, Biesbroek, Swart and van der Knaap 2009, Moser 2012). This split is often replicated at the national level and resulted in policy actors discussing and proposing actions to cope with mitigation and adaptation largely separately. More recently, the advantages of combining and or integrating these two strategies are increasingly discussed (Locatelli 2011, Duguma, Minang, and van Noordwijk 2014). An integrated response regarding availability and allocation of resources, acknowledgment and distribution of risks and trade-offs, and efforts to exploit synergies can foster social learning and capacity building across mitigation and adaptation responses (Tompkins and Adger 2005). Climate change policy processes can be understood as multiple networks that interact with each other and affect policy agendas, policy outcomes and the network structure itself (Marsh and Smith 2000). Sustained mitigation and adaptation policies depend of multi-level and multi-scale interactions between policy actors (Biesbroek, Swart and van der Knaap 2009, Rodima-Taylor, Olwig and Chhetri 2012), but little is known about the extent to which both domains overlap. We map the interactions – information exchanges and collaboration - between policy actors relevant to the climate policy domain in Brazil, in order to explore to which extent mitigation and adaptation networks are integrated. More specifically we aim to understand the differences in the network structures of these multi-relational networks by: i) analysing network characteristics of these overlapping networks; ii) investigating the role of different coalitions of actors in facilitation or hindering policy integration iii) assessing the role of specific actors that already provide a bridge between these networks or are in the best position to provide such a role in the future. The degree of overlap of the networks is investigated through the comparison of network level measures. Coalitions are identified through clustering analysis by combining networks and qualitative data (e.g. beliefs). The actors’ level analysis focuses on centrality and brokers’ roles of single policy actors that can facilitate information flow and collaboration across policy actors, across coalitions and across mitigation and adaptation policy domains in forest and agriculture. We combine the network structure analysis with actors’ characteristics and institutional context analysis in the two climate change sub-domains in order to explain which factors favour and obstruct policy integration. Keywords: policy networks, policy integration, multi-relational networks; climate change; mitigation; adaptation; forest; agriculture, Brazil
Roles and relationships among 'providers' and 'users' of evidence

Existing studies of evidence-based policy focus mainly on the uptake by policymakers of research evidence, and the barriers to and facilitators of this uptake (Oliver et al 2014). However, there is less analysis of the roles and relationships between the people on either and both 'sides' of these boundaries. This paper uses the case of a global policy network for international development aid to exemplify the tensions in the model and also those that arise from the relational practices between the 'providers' and 'users' of evidence. The paper opens by elucidating the four roles that Owens (2012) identifies for those who 'provide' evidence for policy play to those that 'use' this evidence: rational analysts; handmaidens of the dominant; facilitators of learning; and boundary workers. This boundary work can be interpreted as boundaries between 'facts' and 'values' and between research and policy domains. Findings are discussed in the context of competing views of what may constitute 'productive' relationships for evidence-based policy.

Comparing Structural Properties of Animal Social Networks

We are often concerned with determining whether or not social networks from different populations exhibit similar structural tendencies – for example whether they show substantial tendencies toward or away from reciprocity, transitivity, triadic closure, or degree centralization. It is well known that raw graph level indices should not be naively compared between networks of different sizes and lower order graph features. However, the effects of different data collection protocols and relational coding schemes on graph level comparisons are less well understood. Comparison of network data from heterogeneous sources arises in the study of animal social networks, where comparisons are made between different species or between networks representing different forms of social relations. This heterogeneity results in networks that can be valued or dichotomous; directed or non-directed; time varying or static. This paper uses a collection of 300 social networks measured on a variety of animal species and representing a wide range of social relations and data collection protocols to examine how differences in network measurement protocols and data coding schemes affect graph level comparisons.

Spatial Excitation: Testing a Network Activation Theory of Disaster-related Rumoring Activity

Individuals predominantly exchange information with one another through informal channels. During disasters and other disrupted settings, information spread through informal channels regularly outpaces official information provided by officials and the press. The network activation theory of rumor posits that during periods of disruption, individuals spread and receive information from those with whom they regularly interact. Instead of forging new ties for disseminating rumors, individuals rely on the most convenient and proximate of their existing ties. While social scientists have long recognized that interpersonal networks play an important role in this information propagation, studying rumoring in disrupted settings has posed numerous methodological challenges. Measuring features of informal communication—timing, content, location—with any degree of precision has historically been extremely challenging in small studies and infeasible at large scales. We address this challenge by using online, informal communication from a popular microblogging website and for which we have precise spatial and temporal metadata. We test network activation theory by determining if the spatial distribution of primary and/or secondary excitation in response to disaster follows expected tie volumes from the population at the event epicenter to the rest of the United States' population. We simulate tie volumes at the county level and relate those tie volumes among counties to nationwide, county-level rumoring activity in the aftermath of tornado events. Additionally, we use county-level demographics and tornado-
event-related measures to determine if salience drives rumoring activity. The results provide insight into the mechanisms of rumoring behavior with spatial precision and scale that had long been infeasible.

**Theresa Floyd**  
University of Kentucky

Chris Hopkins (Charles River Analytics), Chris Hogan (Charles River Analytics), Dan Halgin (University of Kentucky), Steve Borgatti (University of Kentucky)

**Validating the Renato Tool for Collecting and Analyzing Perceived Relational Data**

RENATO is a suite of tools that allows a researcher to collect and analyze perceived relations among entities. These relations could be anything from social relations among children to perceived similarities between emotions. The data are collected via an app on any Android tablet, and synched with a cloud-based database. Then a desktop client enables the researcher to visualize the data and run a number of analyses appropriate for relational data. In this paper, we report results of a validation study in which we compare the results from collecting the data via tablets with the results obtained from more traditional methods. In particular, we select the domain of networking behaviors in organizational settings (e.g., "builds ties with people in other organizations") and study how people perceive the relationships among these different kinds of networking behaviors. On the tablet, respondents move icons representing the behaviors around the screen to represent relationships spatially. Separately, a matched sample of respondents move physical cards around a table to accomplish the same thing. We show that the overall structure of similarities among domain items is very similar for tablet and cards, but also that the tablet results are finer-grained, with more nuanced distinction. In this study we also recorded personality variables as well ego-centric network data, and related these psychometric and sociometric variables to individuals’ perceptions of networking behaviors.

**Jens A. Forkel**  
HS Neubrandenburg

Prof. Thomas Elkeles (HS Neubrandenburg), Maureen Grimm (HS Neubrandenburg)

**Quality of Life and Remembrance in Rural Communities in North-East Germany (LETHE)**

The demographic change of rural areas in the member states of the EU is widely perceived as a crisis affecting the inner infrastructures of modern federal societies. Germany as one of the economically strongest states is nevertheless affected by this crisis too. Although the most effective agricultural industries developed in the North-East of Germany, the process accelerated in the past 20 years, which is characterized by an increasing thinning and centralization of nearly all public services, overageing, a poor work-life-balance by the means of unemployment, educational chances and the need to commute great distances. Since the focus of the Rural-Health-Study (University Neubrandenburg/ DFG 2008-2010) was dedicated to the health issues of rural living conditions, the additional qualitative research results – biographical interviews – pointed to the individual strategies of coping. This qualitative studies offered insights into various ways and means of dealing with these problems and their consequences for health, illness and satisfaction with life. Cases were found in which, despite unfavorable conditions (e.g. unemployment, poverty, long-distance commuting), coherence and satisfaction with life could be developed or maintained through recourse to local possibilities for assistance, integration and social support in the rural community. The recent project **Quality of Life and Remembrance in Rural Communities - LETHE** (University Neubrandenburg/ BMBF, 2013-2016) takes these results into account for the further research on the spatial and social conditions in the villages by the means of the infrastructure but first and foremost the historical remembrance within the community. A multi method design was established to reach the several theoretical and empirical goals. First the local conditions had to be depicted both by quantitative and qualitative sources. Based upon a developed ‘micro spatial typing’ (Forkel/ Fischer 2014) a randomized sampling takes 3 communities out of 3 types of distribution of resources for the representative sample of n=9 out of 72 ( 12%) communities <500 inhabitants, County Mecklenburgische Seenplatte, Mecklenburg-Vorpommern. Relying on the advantages of stratified sampling, which includes empirical and observational data and gives a first detailed insight in the nature of the living conditions in the county, an ethnographic/ qualitative approach ensures a emic perspective of the further research on the local level. 62 narrative biographical interviews with inhabitants aged 60+ were hold in the villages. Accordingly to the analysis of the regional history and
the memories of elderly people LTEH initiated ‘history labs’ in the villages. Therefor the participants were encouraged to present and discuss the biographical interpretation of the village, relate to old practices and structures with the chosen degree of privacy in the public of the village. This is recommended because in small villages not only the social network can be more intense but also the social control and restriction. Our lecture will present the results of the network research in the villages and focus on the structures of social coherence by the means of improving the social support among elderly inhabitants in small villages.

Dawn M. Foster
University of Greenwich

Guido Conaldf (University of Greenwich), Riccardo De Vitaf (University of Greenwich)

The operationalisation of collaboration: in search of a definition and its consequences on analysis

Collaboration has been defined in numerous ways. Researchers interested in collaboration at the individual or organizational level need to pay special attention to the adoption of a specific definition, as this is likely to have major implications for the research design and outcomes. With respect to collaboration within open source software projects, this presentation has two objectives. Firstly, this presentation will investigate a wide variety of definitions of collaboration from the existing literature. Secondly, the presentation will look at theoretically informed selection of a definition. Throughout the presentation, specific emphasis will be put on the implications of adoption of several definitions of collaboration for the application of Social Network Analysis to the study of open source software, particularly considering data collection and analysis. Open source software is developed in the open where anyone can view the source code and anyone with the knowledge to do so can contribute to the project. Because people from around the world work on these projects together using online tools, it is a relevant setting for studying collaboration. An interesting aspect of open source collaboration is that private resources from individuals and organizations are used to develop software that is released as a public good. Social Network Analysis can be used to understand the network relationships between the individuals who develop this software. Given the interest in collaboration from researchers from different backgrounds and disciplines, similar research is likely to produce considerations to stimulate further thoughts about definitions of collaboration in several domains and research settings.

Kenneth Frank
Michigan State

Tingqiao Chen (Michigan State)

Diffusion and Transformation of Knowledge about Climate Change Through Social Networks in the Great Lakes Region

We will present three phases of analyses of social networks as they relate to the diffusion of knowledge and policy orientated behavior in the Great Lakes region. Phase I (data from 1997-2009): We identify a network based on who co-authored policy documents about climate change in the Great Lakes region, finding that those who bridged between clusters in the network were more likely to engage in policy oriented behaviors. Phase II (data from 2009-2013): We define a network based on participation in events (e.g., conference calls, miniconferences) about climate change in the Great Lakes region. We find that location in the social space of this network is related to beliefs about the future of lake levels, but not freeze-thaw cycles, in the Great Lakes. Phase III (data from 2013): We identify networks of close colleagues (from survey responses) among stakeholders and affiliates of the Alliance for the Great Lakes who focus on ravine management. We then interpret the diffusion of practices associated with ravine management relative to the close colleague network, finding that one of the actors in Phase II plays a key role in the diffusion of information about climate change among the stakeholders in Phase III. Thus this set of analyses offers the potential to track the diffusion of knowledge about climate change beginning with interactions among regional scientists and policy-makers through intermediaries and then to stakeholders whose exposure to knowledge may change their day to day actions.

Vincenz Frey
Reputation Cascades

Reputation systems are celebrated for their effectiveness in fostering trust between strangers. This paper problematizes an overlooked side-effect: The production of reputational differentiation between equally trustworthy individuals. This arbitrary inequality is caused by feedback effects in the reputation-building process. "Reputation cascades" can make entry difficult for newcomers who are deserving of good repute, while allowing established parties to perpetuate their dominance. Results from a laboratory experiment support the theory. We conclude that while global reputation systems enabled by modern technology facilitate large volumes of otherwise unviable transactions, they also set in motion reputational snowballs that generate wholly unfounded inequities.

Thomas N. Friemel
University of Bremen

Matthias Bixler (University of Bremen)

Factors influencing biases in cognitive social structures

An important assumption of the stochastic actor-based models for network dynamics (Snijders, van de Bunt, and Steglich 2010) is that actors are aware of the entire network specification. This includes both the attributes of all nodes as well as their relations. This assumption can be regarded as plausible in small networks and with respect to attributes that are visible. However, in larger networks this assumption can be questioned and might reduce the model fit. Latest developments of SIENA address this issue by applying a settings model (Snijders 2015). This allows differentiating between the network dynamics within a primary setting of distance two and more distant actors. Given these new methodological possibilities it becomes of interest whether distance among actors can be regarded as the primary factor which influences network cognition. Research on cognitive social networks have found several systematic bias in the perception of social networks. Among other, people overestimate their own centrality (Brewer 2011) and perceive to have more reciprocated ties as well as transitive triples then they actually do (Kumbasar, Romney, and Batchelder 1994). Most interestingly, the perception of balanced relations follows a curvilinear distribution indicating that people are more likely to perceive close and distant relations as being balanced compared to relations of intermediate distance (Krackhardt and Kilduff 1999). Furthermore, it has been found that the network position and personality traits (Casciaro 1998) as well as positive affectivity (Casciaro, Carley, Krackhardt 1999) influence the accuracy of the perceived social network. Most of the above-cited studies collect information on the entire cognitive social network. This approach is rather time consuming and complexity increases exponentially with increasing network size. Due to this reason, most studies include only one subject and networks of limited size. To our knowledge studies comparing various subjects among the same group of people and networks of larger size are not yet available. Therefore we were interested in the difference between perceived and effective social networks across various subjects (friendship, advice, TV-related conversations, and YouTube-related conversations) as well as communication channels (face to face vs. online). Data were collected in five German schools. In total 353 pupils participated in the survey and provided information regarding their personal network in the school class as well as the entire grade level (grades 8 to 11). Furthermore, they were asked to indicate which out of four typical network structures comes closest to the entire network structure: 1) center-periphery, 2) cliques, 3) dense network, or 4) a lose network. Hence, our focus did no lie on individual positions and specific dyadic or triadic structures but rather on the perception of the overall structure. Results show that the subject and the communication channel has an influence on the accuracy of the perceived network structure. For example friendship networks are more likely to be perceived with a bias towards clique structures meanwhile advice networks are regarded to be denser than they are. Based on these findings implications for model development with SIENA are discussed.

Dominik E. Froehlich
Maastricht University
Simon Beusaert (Maastricht University, Université catholique de Louvain), Mien Segers (Maastricht University)

Learning to Stay Employable: The Role of Employees' Feedback Seeking Network and the Dangers of Homophily

Seeking feedback from others has been proposed to be essential to remain employable in today's competitive and rapidly changing markets. However, previous research hardly considered the features of feedback seeking networks and what they mean to the outcomes of feedback seeking. We posit that homophily, i.e. the tendency of people to connect to similar others, may be an important organizing principle of such networks. At the same time, we hypothesize that this may have detrimental effects on the effectiveness of feedback seeking and its outcomes. We conducted social network analyses (107 nodes, 1,948 ties) in six samples in Austria, India, and the Netherlands in both for-profit and not-for-profit organizations to investigate the effect of homophily on feedback seeking behavior. In a second step, we checked for effects of homogeneous networks in the relationship between feedback seeking frequency and usefulness on employability. We found supportive evidence for all hypothesized relationships. The results point at a fundamental organizing principle of social networks that has received little attention within HRD research: homophily. Furthermore, practical interventions may be derived from the results – after all, the "natural" structure of feedback seeking networks may not be the most effective one in terms of employability (and potentially other outcomes).

Jiangtao Fu
Waseda University

Daichi Shimamoto (Waseda University), Yasuyuki Todo (Waseda University)

Can Firms with Political Ties Borrow More Than Those without?: Evidence from Firm-Level Data for Indonesia

Using firm-level data in 5 manufacturing sectors across 17 cities in Indonesia collected by the authors in 2014, we examine how political and economic ties of firms affect their financial activities. Our data are unique in that they include comprehensive information on formal and informal political ties, supplier-customer networks, and corporate finance of both small- and medium-sized and large firms. We identify political ties of a particular firm by whether the government owns its shares, whether politicians are in its board of directors, whether its highly-ranked manager knows any politician personally. We find that although there is no strong evidence that such political ties are associated with a higher probability of receiving credits from formal banks, the political ties are negatively associated with the probability of being financially constrained (i.e., the firm cannot borrow as much as they want). The financial benefit from political ties is more prominent for SMEs than for large firms. Further, the benefit mostly comes from personal ties with politicians, rather than more formal ties measured by the government ownership or politicians in the board of directors. These results contribute to the literature by examining effects of personal ties with politicians on firms' financial constraints, in addition to effects of formal political ties examined in existing studies. Moreover, our study adds to the recent discussions about heterogeneous effects of political ties on firms depending on firm size. Our results suggest that, comparing to large firms, SMEs in emerging economies rely more on political ties for their credits and growth.

Jiawei Sophia Fu
Northwestern University

The Evolution of Representational Communication Networks on Twitter

Representational communication is the strategic communication of a symbolic affiliation to the third party or the general publics (Lusher & Ackland, 2011; McPhee & Zaug, 2000; Shumate & Contractor, 2013; Shumate & Lipp, 2008). While research on representational communication has proliferated in recent years, prior scholarship is largely limited to the study of interorganizational hyperlink networks and name mentions on organizations'. However, representational communication is not limited to hyperlinks and name mentions. As individuals and organizations increasingly rely on social media as the primary online communication and relationship-building channel, academic researchers have paid
scant attention to the representational communication choices more broadly. Further, while social media use among organizations is pervasive, few studies have attempted to examine virtual interorganizational relationships on social media. Responding to this research gap, the current research investigates the follow networks, defined as who follows whom on social media, as dynamic systems of representational communication. Although the representational communication literature has relatively long-established traditions investigating organizational attributes and structural signatures that characterize representational communication networks, research has yet to focus on the dynamic nature of representational communication and address one important question: How do interorganizational representational communication networks evolve over time? The answer to this question is important to understand the dynamics of organizations’ social networks and how they integrate new technologies (e.g., Twitter) “to form new social connections and maintain existing ones” (Gruzd, Wellman, & Takhteyev, 2011, p.1313). In addition, this research question furthers researchers’ understanding of the underlying mechanisms of representational communication choices, organizations’ impression management at the micro-level, and their collective actions at the macro-level. Using actor-based modeling using RSiena package in R to investigate the networking patterns on the follow networks of 201 environmental nongovernmental organizations (NGOs) over a year, the purpose of this research is to ascertain the factors that influence the evolution of representational communication networks more broadly. This study finds that different factors are related to the variation, selection, and retention of follow relations of NGOs on Twitter. More specifically, the following patterns and organizational social media longevity are related to the variation in changing ties. The posting pattern, number of followers, indegree popularity, and mass media visibility are related to the selection of follow relations. Finally, these factors are related to the dissolution of the follow relations. This research makes three contributions to the study of representational communication and virtual interorganizational networks. First, the current study is the first of its kind to conceptualize follow networks on Twitter as a type of representational communication choices. As such, it opens up a new line of research on communication networks. Second, this research demonstrates that different factors are related to the three socioevolutionary processes, variation, selection, and retention, in unique ways. Thus, this research contributes to the scant literature in the evolution of representational communication networks and the dynamics of virtual interorganizational networks. Finally, this research demonstrates that organizational public presence across different media platforms are related to the evolution of representational communication networks.

Yang-chih Fu
Academia Sinica, Taiwan

Ming-Yi Chang (Academia Sinica, Taiwan), Jen-Hsiang Chuang (Centers for Disease Control, Taiwan), Da-Wei Wang (Academia Sinica, Taiwan)

Multilevel Determinants of Receiving the Pandemic (H1N1) 2009 Vaccine: Contact Patterns and Household Structures

Although receiving an influenza vaccination is often linked to one’s health, demographic, and socioeconomic status, other circumstances may also pose higher risks and increase the likelihood that an individual will get a flu shot. This study examines how two such circumstantial factors, contact patterns and household structures, are associated with whether people received the pandemic (H1N1) 2009 vaccine. We use multilevel data from a representative face-to-face questionnaire survey and the accompanying 24-hour contact diaries in Taiwan (N=1,943, level 2). The survey, conducted in 2000, tracked how people responded to the 2009 H1N1 pandemic, including whether they had influenza-like symptoms and received the H1N1 vaccine; respondents also reported their household compositions and whether each of the household members (N=6, 176, level 1) had influenza-like symptoms and received the H1N1 vaccine. Respondents were more likely to have received an H1N1 shot if they had more daily contacts, if the people with whom they contacted knew one another well, if the household heads were better educated, and if they lived in a household with three or more generations. Multilevel analyses also show that such contact patterns and household structures help explain why some household members are more likely to receive the vaccine than others.

Nestor Serrano Fuentes
Plymouth NHS Hospitals, United Kingdom
The use of bicycle by health workers in Vitoria-Gasteiz, Spain: how to spread this practice of healthy city using social networks.

The determinants of health have become the main line of public health performance in last years. Following this approach, the use of bicycle in the city is important because it is a healthy lifestyle and helps create healthy environments being research priorities of Horizon 2020 project of the European Commission. Understanding this use as a concept of healthy city and based on an innovative case of Vitoria-Gasteiz (Spain), it is suggested a model of diffusion of this practice using social networks. To do this, a qualitative study of narrative literature review is performed. Vitoria-Gasteiz, as a healthy city, has some projects in order to improve the health of its citizens. Some of them promote the use of bicycle, a mean of transport that has numerous benefits for both individual and collective health. An innovative action in this way is the use of bicycle at work among health professionals for care home. Despite being an innovative case, if we want to consider it as an example to spread, we need to take into account that it is an imperfect model because we don’t know the perceptions of users, so it requires the use of interviews for a theoretical abstraction and create a suitable theoretical model for any city. To extend this improved model, in this paper it is proposed the theoretical framework of the “diffusion of innovations in social networks”, arguing how the figure of the opinion leader could help spread the innovation in a faster and more effective way. This theoretical proposal opens a new line of research with actions to promote healthy practices led by health care professionals using social networks for its diffusion.

Jan Fuhse
Humboldt University of Berlin

Methods for Studying Relations in Discourse

I present and discuss methods that discern relational aspects in the course of communication. These methods focus on the meaning realized in communicative events insofar as it is relevant for the relations between the actors involved. Conceptually, I start from diverse research traditions like relational sociology around Harrison White, Erving Goffman’s sociology of interaction, and the theory of communication by Watzlawick, Luhmann, and others. I use both quantitative and qualitative methods. On the qualitative side, I build on conversation analysis and on interactional sociolinguistics to understand the meaning of particular communicative events, both for the alignments between actors, and in relation to other events (e.g. in adjacency pairs). As one instance, I present “accounts of action” that one actor produces about another in order to cast their identities in a particular light. Such “relational events” can then be typified by the similarity in their relational aspects. This allows for their counting, and for the quantitative analysis of both their network pattern, and their sequence. Here I focus on interruptions, and on their relation to accounts of action in a televised electoral campaign. The methods presented can be used to study both small-scale face-to-face interaction and large-scale discourse.

Kayo Fujimoto
University of Texas Health Science Center at Houston

Tom A. B. Snijders (Oxford University), Thomas W. Valente (University of Southern California)

Status-driven Disliking Relationships in Relation to Adolescent Drinking, Smoking, and Facebook Use

This study investigated how “disliking” relationships interact with peer status (prestige); and how these affect adolescent substance and social media use, while simultaneously considering the dynamics of their friendship relations. The data came from a longitudinal sample of 238 adolescents from the 11th and 12th grades of one Southern California high school. This study employed an actor-oriented stochastic network model to estimate the multiplex dynamics of “dislike” networks and friendship networks to identify the social mechanisms that drive the generation and maintenance of “dislike” networks. Results indicate that more prestigious adolescents tend to become or stay disliked by others. This tendency is moderated by alcohol use level such that more prestigious adolescents are less likely
to become or stay disliked if they drink more alcohol through time. The negative side of peer relations in relation to peer status should be considered for designing and implementing adolescent substance use interventions along with friendships.

Hideki FUJIYAMA  
Dokkyo University

Co-evolution of Conversation and Advice Networks in a Japanese University Student Class

This paper examines the co-evolution of conversation and advice networks in a Japanese university student class. The networks were analyzed in the spring and fall semesters in 2013 and 2014, in which there were 36, 25, 24, and 21 students, respectively. There were four pairs (conversation and advice) of networks. Each network consisted of three waves at intervals of around two months within a semester. The effects of an advice network on a conversation network are based on the “Self-Determination Theory” (Deci and Ryan 2002). Advice ties relate to “competence” and “relatedness,” and these concepts enhance activities (conversations) in the class. The effects of a conversation network on an advice network are based on the “Social Capital Theory”. Conversation ties are interpreted as social resources because students can obtain useful information through such ties. If a student has a lot of useful information, then he or she tends to be sought by others for advice. For a theoretical and empirical method, the stochastic actor-oriented model (Snijders 2001, Snijders, Lomi and Torlo 2013) was used. The advantages of this method are as follows: (1) real field data can be used, (2) concrete microprocesses can be examined, and (3) the co-evolution of networks can be examined directly. In this study, the following hypotheses related to microprocesses were tested empirically. (H1: competence effect) If a student is sought by others for advice, then his or her conversation activity is enhanced. (H2: relatedness effect [passive]) If a student receives positive approaches by others in some situations, then the receiver’s activity is enhanced in other situations. (H3: relatedness effect [active]) If a student makes a positive approach to others in some situations, then this positive attitude influences his or her own other activities. (H4: social capital effect) If a student has many conversation ties, then he or she tends to be sought for advice. Note that all the hypotheses are related to the co-evolution of conversation and advice networks. The following results were obtained. (H3) was supported by the data in all the semesters. (H2) was supported partially, i.e., in only the two spring semesters. (H1) and (H4) were not supported. In terms of practical implications, the existence of co-evolution effects (H2, H3) indicates that active students become more active and less active students become less active. Consequently, the gap between more active and less active students increases. In order to bridge this gap, treatments that consider the above-mentioned microprocesses are required. Statistical analysis was conducted using RSienna. Each hypothesis corresponds to an independent variable in an estimation model. Therefore, the test for a hypothesis is equivalent to a statistical test for the corresponding variable. Of course, in this estimation, other required diagnoses were carried out (i.e., data requirements (Snijders, van de Bunt and Steglich 2010), convergence t-ratio, and testing time heterogeneity in parameters).

Devin Gaffney  
Northeastern

Brooke Foucault Welles (Northeastern)

Modeling Opinion Diffusion in Online Activism Networks

Online social networks provide rich observational opportunities to explore how individuals adopt and reify opinions within social movements, and how individual behavior and broader network topologies may inform the processes of adoption and reification. Nowhere is that potential more apparent than within the emerging body of research on “hashtag activism,” or the use of the microblogging platform Twitter to advocate for social change. Sometimes maligned as “slacktivism” in the press, emerging research suggests that Twitter and similar platforms have the capacity to transform the public sphere as opinions originating within activist communities influence mainstream opinions. Observational research, however, carries methodological issues surrounding the context of any particular social movement, leaving questions about the underlying mechanics of these social movements and the generalizability of their strategies. Moving away specific observations, in this presentation, we will discuss an experimental model that simulates online activism in order to understand the ramifications
of nodal role and network structure on the diffusion of opinions about an issue within a group. Briefly, the model assumes the presence of a network where nodes are imagined as individuals who follow and are followed by other individuals in an online space. Each individual is seeded with a default “norm value”, or an initial position on a particular topic. Through a series of iterations, individuals assert new norm values for the topic, which may influence other proximate individuals to either converge upon or diverge from this new norm value. This presentation seeks to explore how controlling for different aspects of these variables (network structure, initial norm value distribution, new norm value deviation, and the dynamics controlling norm convergence and divergence) inform subsequent shifts in norm distributions after many iterations of this process. Transcending questions about the politics and peculiarities of a given social movement, the contextual motivations specific to an online protest, or similar issues, this experimental design allows for an open exploration into how network structure and nodal characteristics may intersect to impact the diffusion and dynamics of norm changes in online social networks. By exploring how each facet of the model impacts norm distribution, our goal is to unpack which characteristics of individual opinions in the context of network topologies are responsible for the both the largest and smallest shifts in the overall shift in norms. By experimentally examining this question, divorced from the contextual complexities of observational research, we aim to identify the underlying structures that catalyze online social change, as well as important nodal and network signatures for future observational research.

Amit Gal
Open university of Israel

Revisiting (multi)Core-Periphery Network Structures – a Machine Learning Approach

Social network structures are consequential to society and affect the functioning of groups and other social entities. Specifically, social network theorists have paid attention to the emergence of subgroups in networks, because such subgroups signify or coincide with important social processes such as cohesion, or help identify advantageous roles, such as the case of structural holes. However, finding such subgroups is not a mere partitioning of the network into subsets because social groups tend to become organized in a core-periphery structure – a dense central subgroup with a some peripheral members that are connected to the central group but relatively disconnected from each other. Finding such structure poses both a methodological and theoretical questions. A few measures have been proposed for identifying such structures, each with a slightly different nuanced interpretation of the definition of the periphery and its relation to the core. For example, in their seminal paper, Everett & Borgatti (2000), first define the periphery as having relation with the core, and not among themselves, but later, for technical reasons, their measure, which still dominates the field, abandons that requirement and focuses on the correlation between actual network structure and an “ideal” core-periphery structure. A related issue is that in large social networks more than one core emerges. Multi-core issues, while being addressed sociologically, have not yet received ample methodological attention and to date there are no widely used methods for identifying multi-core and periphery structures. In this paper I approach the issue of core-periphery structures from a machine learning perspective. Machine learning (ML) is a domain in computer science that addresses general problems of identifying patterns and rules in data. Two such are clustering and classification of data, both concerned with partitioning entities into subsets based on proximity or common features. If we identify entities with network nodes, and edges as a source for identifying features, these two classes of problems seem to fit the notion of finding subgroups in social networks. In a core-periphery structure it is expected that peripheral nodes will remain “unclassified”. Most ML algorithms, however, are “forced” to classify all entities. In this paper I present two ways to overcome this limitation. One is an adaptation of the DBSCAN algorithm, that allows finding “borderline” entities, and the other actively searches entities that if left out, improve overall clustering power. These two approaches offer a contribution both to ML domain and to social network analysis. Specifically, within the SNA perspective, I compare the results of these algorithms to common core-periphery identification methods, and show that these algorithms’ analysis is more robust and captures better some key features of the core-periphery distinctions found in the literature. Another advantage of these algorithms that they extend easily to identify find multi-core structures. These algorithms depart from the “correlational” nature of existing measures, and are therefore somewhat less directly interpretable. However, I demonstrate how they shed light not only on methodological aspects of core-periphery identification, but also on our theoretical understanding of these structures. I conclude by discussing potential developments of these algorithms, their limitations and applications in which they might be useful.
Colin Gallagher (Melbourne)  
University of Melbourne

Dean Lusher (Swinburne University), Sean Gorman (Curtin University), Caitlyn MacKenzie (Swinburne), Garry Robins (Melbourne)

Homophily as consensus: Attitudes on gender and race attitudes in a professional sports team

Issues of homophily in social attitudes have long been of core interest within social network research. Yet, just as SNA generally understands social ties as components of a larger structure, network methods which address homophily in attitudes might likewise benefit from situating one individual’s attitude among the wider consensus which may exist among a group. In this vein, exponential random graph models (ERGMs) have readily incorporated various means by which to consider the impact of attitudes on social selection. However, conventionally, these models generally only consider how pairwise differences in social attitudes predict the presence or absence of a social tie. Conversely, few studies have considered the placement of individuals’ respective social attitudes within the normative make-up of a community of social actors. The current study considers the case of gender and race-related attitudes among members of a North American professional sports team, integrating consensus analysis methods within an ERGM framework to examine homophily in terms of convergence with and divergence from a local cultural norm. Results focus on homophily as differential adoption of the consensus view, and whether deviation from a norm predicts social ties, even in situations where deviation from the norm may still reflect disparate attitudes.

Juan Carlos López García  
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Academic Networks in Mexico: between the Mathew Effect and the “Gatopardismo” in Higher Education System

This work constitutes the first moment of an ongoing investigation whose purpose is to show the effects of a government program implemented in the higher education system in Mexico. This program is called “Programa del Mejoramiento del Profesorado” (PROMEP) (Teacher Improvement Program), and has the characteristic of providing extraordinary economic resources to academic staff based on the logic of merit pay. The PROMEP has had three phases: individual, group and networks. At first, the PROMEP has recognized and rewarded those academics whose profile coincided with the "desirable profile" defined by the same program. In the second phase, the academic staff was grouped into a few entities called “Cuerpos Académicos” (CA) (Academic Bodies), but only within their institutions of affiliation. In the third phase, the PROMEP has driven the creation of networks between these CA throughout the higher education system, but also with some international institutions. This last phase raises important questions for Social Network Analysis. For example: what are the possible academic networks given the structure of the higher education system in Mexico? To address this question I will establish a starting point that allows to observe what the structure of the higher education system before the introduction of the PROMEP in the nineties. To do this I will draw a first set of networks which show that historically the higher education system has generated a core of six central institutions, almost always the same, and a belt of peripheral and semi-peripheral institutions. These networks have been generated by an “artifice” that takes you from the attributes of institutions to relations between them. The “artifice” is based on differences in the funding of higher education institutions, but once these numerical differences are introduced into a matrix and are admitted to Pajek become relational data and therefore can set the distance between the institutions. The second set consists of affiliation networks that show the institutional affiliation of CA and networks established by them, also showing which are the central institutions. Given the structure of the networks, I argue that the implementation of PROMEP has reinforced the hierarchy of the system of higher education, and even in his phase aimed to networking PROMEP has disconnected some peripheral institutions. From this perspective a first analysis of PROMEP raises an interesting meeting point between the “Matthew effect”, established by Robert Merton almost 50 years ago, and the "gatopardismo", named after the memorable novel by Giuseppe Tomasi di Lampedusa. After all, the historical fact that in Higher Education System “the rich get richer at a rate that makes the poor become relatively poorer” is not in contradiction with another
fact, a conjunctural fact, in which government policies and programs seek to change the entire system. Indeed, as can be read in the novel: Sometimes you have to change everything so that nothing changes.

Jemin George
U.S. Army Research Lab

Aaron Schecter (Northwestern University) Noshir Contractor (Northwestern University)

Modified Self-Exciting Point Process Models of Communication Events

We propose an approach to model the communication patterns within a multi-team system (MTS) which accounts for the frequency of interaction event patterns. The proposed model builds on the Hawkes process, whose intensity function depends on the entire past history, is self-exciting and has the clustering property. Such point process models are widely used in seismology, neurophysiology, epidemiology, and in reliability analysis. The central idea of self-exciting point process models is that any aggregation of discrete events can be divided into background events and foreground events, where the background events constitute the statistically independent events and the foreground events account for the events that have significant temporal dependencies. Since the background events are statistically independent of one another, they neither increase nor decrease the chance of another background event occurring in the future. On the other hand, foreground events are statistically dependent on prior occurrences and thus they increase the chance of future event occurrences. Therefore, the intensity of the self-exciting point process consists of two terms, one accounting for the background rate and the other corresponding to the self-exciting rate or the foreground event rate. Self-exciting point processes are typically used in analyzing a single event type. On the contrary, here we use the self-exciting point process to model the occurrences of multiple event types. In doing so, we capture the self-excitation as well as the inter-event excitation phenomena, where the occurrence of ‘event A’ may trigger the occurrence of ‘event B’ in a future time. More specifically, we utilize the modified self-exciting point process to model the communication patterns within a MTS setting, where each component team consists of a single leader and several followers. Within such a multi-team setup, there are five different communication events that can occur: (i) inter-team leader-leader interaction, (ii) inter-team leader-follower interaction, (iii) inter-team follower-follower interaction, (iv) intra-team leader-follower interaction, and (v) intra-team follower-follower interaction. While the occurrence of a particular communication event could result in future occurrences of same event, it could also result in an episode of any of the remaining four interactions. Thus, we modified the traditional self-exciting point process to account for both the self-excitation as well as the inter-event excitation phenomena.

Alexandra Gerbasi
Grenoble Ecole de Management

Virginie Lopez-Kidwell (University of Texas-Dallas), Giuseppe Labianca (University of Kentucky)

POLITICAL INDEPENDENCE’S ROLE IN REDUCING OR BOOSTING EMPLOYEE TURNOVER

Occupying strategic informal social positions in the workplace social network can serve as a shield or a boost to an employee’s risk of turnover. This study addresses the question of whether employees’ political independence affects their likelihood to turnover regardless of their performance? Political independence captures an employees’ level of power based on how that person is embedded in the web of ties within a politically charged social network (i.e., a workplace network containing both positive and negative ties). We thus investigate the effects of employees’ political independence index (PII) scores on turnover in two studies using positive and negative social network data. Study 1 was conducted in a health service organization and we estimated a series of binary logistic regressions to predict whether employees exited the firm during the study period. We found that employees’ PII had a negative and significant effect on turnover while controlling for supervisor-rated performance. Study 2, conducted in an IT division of a multinational engineering firm, probes further by investigating the effects of PII on both involuntary and voluntary turnover, once again controlling for supervisor-rated performance. We estimated a series of multinomial logistic regression models, and found that PII has a negative and significant relationship with involuntary turnover, but a positive significant relationship with voluntary turnover. This helps shed further light onto the findings from Study 1. In Study 1, no
individuals were officially involuntarily terminated during the study period, but the significant negative correlation between average performance appraisals in that time span and official voluntary termination ($r = -0.27^*$) suggests that a number of these individuals might have been in poor political situations that made leaving more desirable compared to staying. This suggests that Study 1 general turnover is likely to represent a significant level of quasi-involuntary turnover. Because our analyses control for supervisor-rated job performance, it suggests that those who are politically independent can survive termination while also being more likely to leave their job for other opportunities, and all of this is independent of their actual job performance. Managerial implications and future research on a dependence-based perspective on understanding power in networks are discussed.

Sabina Gesell
Eric Tesdahl PhD

Assessing the impact of de novo social ties within health intervention settings

Background: Most recent work on health and social networks has focused on linkages between health outcomes and naturally occurring social relations, such as friendship or kinship. Recent developments within this field have created a new generation of health improvement programs that rely on the formation of new social relations among participants of health intervention programs. Little is known about the qualities of social relations formed within health intervention program settings - an important knowledge gap. Methods: We examined the social networks of 116 participants within the Madre Sana randomized controlled trial, an intervention designed to prevent excessive weight gain during pregnancy among Latinas, a population at elevated risk for excessive gestational weight gain. We employed exponential random graph modeling techniques to analyze supportive relationships formed between participants during the program period, to detect patterns in the unique effect of program participation on the likelihood of forming such ties. Results: Program participation had a modest but detectable positive effect on the likelihood of forming supportive social relations, characterized by the sharing of pregnancy-related health information. However, in this particular timeframe we did not detect any additional effect of such relations on the health behaviors or outcomes of interest. Conclusions: Our findings raise two critical questions: do short-term group-level programs reliably lead to the formation of new social relations among participants; and do these relations have a unique effect on health outcomes relative to standard methods of health behavior intervention?

Sara Geven
Utrecht University

Jeroen Weesie (Utrecht Univeristy), Frank van Tubergen (Utrecht University)

Friends in transition: The effect of a changing peer context across the transition to a new classroom on students’ problem behavior in school.

By means of Dutch panel data among ±3000 adolescents who transition to a new classroom in the same school, we examine how changes in adolescents’ peer context affects adolescents’ problem behavior in school (e.g. skipping class). Students’ problem behavior in school is expected to be affected by the transition to a new classroom in two different ways. First of all, based on attachment theory, we argue that students who are less related to other peers in their new classroom (i.e. a lower presence of positive ties/ higher presence of negative ties) will increase their problem behavior in school more. We expect this to be especially the case for students who are less related to their new classmates than their new classmates are related to each other. Second of all, the transition to a new classroom might imply that students will be influenced by different peer norms. Based on theories on social influence, we argue that adolescents will be influenced less by peers who leave the classroom than by peers who enter or stay in the adolescent’s classroom. Preliminary results indicate that the problem behavior of friends who join the adolescent’s classroom influence the adolescent’s problem behavior in school more than friends who leave the adolescent’s classroom.

Stefano Ghinoi
University of Bologna
Meta-managers in local innovation system: a network perspective

Interactions among firms and research organizations in Regional Innovation Systems (RIS) have a widely demonstrated relevance in the innovation process. Recent literature, also thanks to the use of Social Network Analysis, has demonstrated the importance of those organizations which coordinate the local innovation network. These factors, consistently with EU 2007-2013 policy guidelines, prompted policy makers to promote the creation of local innovation systems and to design specific governance structures, where meta-managers are identified and given the task to support the creation of local connections between firms. With specific respect to the case of the Poli di innovazione promoted by the Region Tuscany in Italy, this paper aims at contributing to a better understanding of the nature and roles of these meta-managers. Explorative discourse network analysis is performed on 17 semi-structured interviews with individuals in charge of coordinating the local innovation networks. An analysis of the activities performed and their similarities is used to cluster meta-managers in subgroups. Given the scarcity of studies focusing on the role of meta-managers in similar contexts, this paper has the potential to develop a more fine-grained typology of these organizations in Regional Innovation Systems.

Effects of Temporal Resolution Adjustments on Dynamic Sexual Contact Models

To understand the propagation of STI such as AIDS, it is important to simulate sexual contact dynamics to determine 1) cross-sectional network structure and 2) how that structure changes over time. To simulate dynamic sexual contact networks, we must make an important choice of the temporal resolution of the simulation, which has potential effects on the parameters, dynamics, etc. of the network. These effects are poorly understood due to the lack of work systematically assessing them. Here, we investigate the role of temporal resolution in SCN simulation within the STERGM and DNR TERGM frameworks. Our main objective is to examine how two different simulation strategies - duration correction and naive changing of nominal time units - affect simulated SCN properties and dynamics. We also employ a DNR TERGM fitted to mimic the STERGM behavior, to serve as a point of comparison (because the DNR model has no simultaneous dependence).

Surviving Catastrophe: Networks of social support acknowledgement in social media

Social support is critical to individual and community-level well being and happiness, and it becomes even more important in times of trauma, grief and loss. We examine social media in the aftermath of two traumatic mass casualty events, a school shooting and a multiple-vortex tornado, and construct networks reflecting tangible, emotional, informational, and symbolic support received and acknowledged by the afflicted communities. Differences in network structure and temporal properties may indicate distinctions in social processes or phenomena underlying provision and response to social support in human-induced and natural disasters.

Using Virtual Mirroring to Enhance Organizational Performance

This paper describes a novel method to increase organizational performance by measuring communication effectiveness and mirroring it back to the organization, a process we call "virtual
mirroring”. Our hypothesis is that when individuals become aware of improvements needed in their own communication patterns, organizational performance will improve. We are using a three-dimensional approach measuring communication structure, dynamics, and contents. The indicators include network centrality of individual actors, changes in their networks structure, average response time, and emotionality and complexity in their email sent to others. We illustrate our approach by comparing changes in customer satisfaction over a multi-year period of outsourcing teams exposed to virtual mirroring to a control group of outsourcing teams not using virtual mirroring. In this project, beginning in early 2013, account leaders of 26 large accounts at a global service provider were given monthly virtual mirroring sessions, where the communication characteristics of the teams working with customers under their direction were shared with them. Teams working on a single account ranged in size from a few dozen to hundreds of team members. As the dependent variable to assess success of organizational virtual mirroring we use customer satisfaction, measured as Net Promoter Score (NPS). We find an increase of 5% in customer satisfaction over time in the experimental group and a decrease in customer satisfaction of 12% in the control group. With regards to the individual communication indicators, we find that customer satisfaction is higher when outsourcing team members are more responsive, more positively engaged in their communication with customers using simpler language, are embedded in less centralized communication networks, and show more steady and less oscillating patterns of leadership.

Neha Gondal
The Ohio State University

Jan Fuhse (Humboldt University)

Locating Small Worlds through the Intersection of Social Circles

This presentation offers a new model for the small-world phenomenon and discusses some of its implications. Physicists have proposed two alternative models, both of them resting on sociologically unrealistic assumptions. Duncan Watts’s small world networks are primarily linked through social relations that randomly connect distant regions. Albert Barabasi’s scale-free networks are integrated through hubs with exponentially larger number of ties. Sociologically speaking, relations do not develop randomly, and it is highly unlikely that people have more than a few hundred friends. Our model (building on Watts et al. 2002) views the social as composed of distinct social worlds. Ala Simmel, individuals belong to multiple worlds synchronously or asynchronously (family, work, neighborhood) that connect them to each other. Two properties of social worlds are important for our model. One, ties are likely to be clustered within social worlds where the same actors meet repeatedly. The lower the degree of overlap, the more individuals meet people in one context who are different from those in another context. For example, if actors are primarily immersed in local contexts, it takes many network steps to cover geographic distance (say, from Germany to India). People who belong to social worlds that are less overlapping are likely to be more cosmopolitan in their contacts and perspective. Consequently, it will take them fewer network steps to reach socially distant people. On the other hand, if individuals belong to class and status homogeneous social circles, as is often the case, the intersection of social circles is likely to produce hierarchal rather than egalitarian degrees of separation. We use simulation techniques to investigate this conceptual apparatus. Varying multiple parameters including the number of worlds individuals belong to, the degree of overlap, and homophily in networks, we investigate the conditions under which small-worlds in networks (short path-lengths and high clustering) are produced. Preliminary results suggest that social worlds structured in the Simmelian way we have suggested (rather than random connections and hubs) do indeed produce small worlds.

Sara Gorgoni
University of Greenwich

Riccardo De Vita (University of Greenwich)

An analysis of high-tech global production networks: What role for emerging economies?

The paper contributes to the literature on the evolution of the international organization of production. The analysis focuses on the evolution in recent years of the high-tech industry. Increasing competitiveness in this sector is important for various reasons. The high-tech sector represents an
important share of advanced economies’ GDP growth and employment, and provides several positive externalities. There is also agreement among policymakers that even when the development of the financial and service sector is the main focus, this cannot flourish without a strong manufacturing base. Furthermore, for emerging economies in particular, participation in the production of high-tech products represents a catching up opportunity. In this paper network analysis is applied to international trade data for high tech parts and components to investigate: (1) How the international organisation of production in the high-tech sector has changed over time and with the participation of emerging economies; (2) Whether the role of individual countries in the high-tech production network has changed over time, and (3) to what extent emerging economies like for example China constitute a threat to traditional producers like the UK or Germany. We compute descriptive network measures and perform Core-Periphery, Positional Similarities and Brokerage role analysis. The research has the potential to contribute to the ongoing academic debate about the application of Social Network Analysis to international trade; moreover, findings are likely to support policy makers, allowing for a better understanding of international trade dynamics and in the design of industrial policies.

Cynthia Gramm
University of Alabama in Huntsville

John Schnell (University of Alabama in Huntsville), Allen Wilhite (University of Alabama in Huntsville), Eric Fong (University of Alabama in Huntsville)

Implications of Strategic Alliance Networks in Teams for Downsizing

In this paper, we model the level of agreement within a self-managing team regarding which team member to eliminate when faced with a down-sizing decision. Because future team performance and employment security are positively influenced by the team’s human capital stock, the best decision is to lay off the least productive member. However, members have incentives to form strategic alliances with other members to protect the employment security of alliance members. Thus, members of such alliances may seek to retain alliance members at the expense of overall team well-being. The strategic alliance linkages among team members can be characterized as a social network structure within the team. Most of us recognize this phenomenon and may have experienced situations where critical organizational decisions have been based on office politics rather than organizational well-being. We create an agent-based computational model to simulate a pair of teams who compete overtime; the team that loses any given competition must eliminate a member. This model is dynamic and incorporates feedback loops (decisions in one period affect subsequent periods), uncertainty (the best team doesn’t always win and resource allocation decisions can be inefficient), and allows team members to form and change strategic alliances that affect the system. Observing the aggregated results of many simulations of this model allows us to identify generate testable hypotheses regarding the effects of a team’s strategic alliance structure on the level of agreement among team members regarding who to eliminate. Specifically, when a team must downsize, we hypothesize that both the existence strategic alliance links and the structural characteristics of the network of strategic alliances within the team will have a negative effect on the level of agreement regarding the decision of who to eliminate. We test the hypotheses developed from the computational model for empirical relevance using data acquired from a natural experiment in which teams must eliminate members as a result of poor performance. These data are especially rich, as we are able to observe the formation and the dissolution of strategic alliances among team members and, when a team must downsize, the degree of agreement among the team’s members regarding who to eliminate. To our knowledge, this research is the first to examine how the strategic alliance network structure of a team influences the level of agreement within the team on a key strategic decision pertaining to team resources. While our focus is on investigating the level of agreement regarding a self-managing team decision regarding who to eliminate when it must downsize, we believe that our predictions will apply to any team (or other organizational unit) in which members have input into the performance evaluation process of fellow members, even if their input is limited to making recommendations to a superior who then makes the final decision.

Adeline Grard
Université Catholique de Louvain - Institute for health and society

Vincent Lorant, (Université Catholique de Louvain- Institute of health and society)
Adolescent girl’s gender homophily: a protective strategy for risky behaviors?

Since the 1970’s, mixing boys and girls has become the norm in all European schools, meanwhile smoking rates’ differences between males and females have narrowed (Amos et al., 2012). It is unknown whether gender diversity at school is contributing to more frequent risky health behaviors. In this paper, we looked at the role of gender heterophily (having friends of the other sex) on adolescents’ substance use. We hypothesized that homophile girls are less likely to use alcohol and tobacco than heterophile one’s. In 2013, a social network survey was carried out in six medium size European cities (Namur, Tampere, Hannover, Latina, Amersfoort, and Coimbra). In each city, schools were selected and 11,015 adolescents (aged 14-16) from 50 schools were recruited (participation rate = 79.4%). We computed the Coleman index of homophily, ranking from -1 for perfect gender heterophily to 1 for perfect gender homophily. Results showed few sex’s differences in tobacco and binge drinking rates. Yet, gender homophily was associated with lower level of regular smoking and binge drinking. For example, 17% of homophile girls were regular smokers, compared to 25% of heterophile one’s. However, the protective effect of gender homophily depended on gender distribution in schools: homophily had greater protective effect in schools with equal sex distribution. Socio-economic status of schools along with romantic interactions of adolescent may explain these situations. To conclude, homophile gender relations protect girls from both regular smoking and binge drinking, but the effect is shaped by school contexts (country, gender distribution of schools, socioeconomic status of schools).

Clarence C. Gravlee
U Florida

Raffaele Vacca (U Florida), Christopher McCarty (U Florida)

Vicarious racism, social networks, and racial inequalities in health

In the United States, the burden of sickness and early death is patterned along racial lines. The burden is especially heavy for African Americans, who suffer disproportionately from nearly every major cause of death, including heart disease and hypertension, or chronic high blood pressure. Many clinicians and biomedical researchers assume that racial inequaliites in blood pressure are largely genetic in origin, but this assumption is unwarranted and potentially harmful. By contrast, there is mounting evidence that social and cultural factors, including multiple dimensions of systemic racism, contribute to health inequalities among racially defined groups. Here we use social network analysis to assess the health effects of vicarious racism, which we define as exposure to racial discrimination experienced by members of one’s personal network. Data are from a community-based survey of 178 self-identified African Americans (age 25-65) in Tallahassee, Florida (USA). The survey protocol included measurement of blood pressure and other health-related data, standard measures of perceived discrimination and other social stressors, and personal networks. We elicited personal networks by asking respondents to name 30 people they know by sight and by name. We then asked ego to report several attributes of each alter—including race, skin color, and whether each alter had talked to ego about a specific experience of racism—and to assess all pairwise ties among alters. In this paper, we propose a set of social network measures to operationalize vicarious racism and to explore the social context of racism-related stressors that may be associated with blood pressure among African Americans. The proportion of co-ethnic alters who reported experiencing racism is a first measure of vicarious racism. This measure assumes that all alters have the same relevance to ego. We also consider whether vicarious racism may have differential impacts on ego, depending on how close ego is to the alter reporting an experience of racism or on an alter’s centrality in ego’s network. Furthermore, vicarious experiences of racism may affect ego differently if they take place in interaction with single, isolated alters, or within a large, closely-knit group of personal contacts. We discuss how social network data can take these issues into account. We show how this strategy can supplement standard measurement approaches and help us understand the role of vicarious racism as a social determinant of health inequalities.

Harold D. Green, Jr.
RAND
Defining Network Members: Analytic Sampling Strategies for Longitudinal Networks

Missing data is problematic when analyzing complete longitudinal social network data, and researchers often restrict their analyses to participants observed at most or all time points to achieve model convergence. We propose and evaluate a new, more inclusive approach to sub-setting and analyzing longitudinal network data with stochastic actor-based models, using data from a school friendship network observed at four waves (N = 694). Compared to standard practices, our approach retained more information from partially observed participants, generated a more representative analytic sample, and led to some different model results. The implications and potential applications for longitudinal network analysis are discussed.

Peter Groenewegen
VU University

Iina Hellsten (VU University), Loet Leydesdorff (University of Amsterdam)

Social Networks as a looking glass on the social networks community

Social Networks as a looking glass on the social networks community Groenewegen, Peter & Hellsten, Iina & Leydesdorff, Loet Social Networks is the core journal for research in social networks and connected to a community of scholars that regularly convenes in Sunbelt. The journal started out in 1978 with an editorial in which applications from the social sciences, mathematical methods, and cross disciplinary research was touted. Moreover the following aim was articulated: “Thus, in starting this journal we hope to contribute in an important way to the development of social networks as a coherent and cumulative approach to the study of behavior.”(Freeman, Mitchell, & Ziegler, 1978) Following the intent of the first editors, we zoom into the publications in the journal Social Networks, and analyze the way in which Social Networks has evolved from its start as this center of a coherent social network base along three lines. First we will develop a brief overview of the field highlighting major developments in content coverage and the internal consistency of the community of authors, using a combination of social network and semantic network analyses. Second we measure the degree to which Social Networks engages with different disciplines through an analysis of journals cited in Social Networks over several decades. Third we want to understand how the community of social network researchers and their interests has developed from 1978 onwards. Thus we want to understand who in what way Social Networks has come to develop which core concepts in social networks through an analysis of the network of concepts and authors as an area of expertise. In our results, we compare the outcomes of the last two measures with the qualitative descriptions of the field. Ref: Freeman, L. C., Mitchell, J. C., & Ziegler, R. (1978). Editorial. Social Networks, 1(1), 1-3.

Antti Gronow
University of Helsinki

Tuomas Ylän Anttila (University of Helsinki)

Cooptation of ENGO’s or the Treadmill of Production? Corporatism and Climate Policy Outcomes in Finland

The corporatist Nordic welfare states are often thought of as being exemplary in their environmental policies. While this mostly holds true for the other Nordic countries, Finland was labeled “a failing ecostate” by a recent study due to its regressive ecological performance, particularly in the policy domain of climate change. Why is Finland an outlier? This paper uses data from a survey of 96 organizations that belong to the Finnish climate change policy network to investigate two alternative explanations for this somewhat surprising policy outcome. First, the cooptation hypothesis (Dryzek et al.) states that actively inclusive corporatist polities, where environmental NGOs get support from and access to the state, tend to generate less than ideal policy outcomes. This is because environmentalists need to moderate their views in exchange for funding from the state and in order to get political access. Second, the treadmill of production hypothesis (Schnaiberg et al.) states that the decisive feature of Nordic corporatism with regard to environmental policy outcomes is the strong position of the tripartite
system that links together business interests, labor unions and the state in a coalition that prioritizes economic over ecological values. Our results give support to the treadmill but not the cooptation hypothesis. Guided by the Advocacy Coalition Framework, we use data on organizational collaboration and also beliefs to discern three coalitions. The ENGO coalition is the least influential, least resourceful, smallest, least linked to the others - and not particularly moderate. The treadmill coalition is the most influential, most resourceful, second largest, well linked to the state and least ecological in its core beliefs. In addition to business and labor organizations, this coalition includes the Ministry of the Economy and Employment and the three largest political parties. In the middle stands a large coalition of other ministries and research institutes. The weak policy outcome is thus the result of the dominance of the treadmill coalition, and its penetration into the state, rather than the cooptation of ENGO's.

**Jonas Grønvad**  
Department of Sociology, University of Copenhagen

**Political commissions – Between expertise and power?**

Political commissions are a political strategy where part of the political decision-making process is delegated to a group of external actors. To gain external legitimization different actors are involved delivering different forms of justification. On the one hand using scientific knowledge is important to substantiate policy preferences, but at the same time it is equally important to involve different interest groups and actors, who can make the policy political robust. Because of this the expert groups often appear as a heterogeneous group scientifically sound and politically suitable and legitimate at the same time. However we know very little about the recruitment and identity of experts - thus the creation of this specific kind of collective expertise remain quite unknown. This study will explore the logic linked to the experts - who is invited to take part of these hybrid practices, partly political and partly scientific? What criteria are involved when selecting members for the political commissions and are the members actually neutral actors in the political game? Drawing on Bourdieu this paper will take a critical perspective on the recruitment of commission members. To investigate these questions empirically I draw on data from expert commissions and groups involving external actors set up by the Danish Government in the period 2003-2014. The data consists of 170 commissions. Through a combination of network analysis and correspondence analysis I investigate the openness and composition of the expert groups. I show how the commissions are composed of different actor-groups and how much these expert commissions resemble a closed network spun by overlapping memberships. The study furthermore identifies a core of commissions characterized by a high degree of overlapping memberships. This group is investigated further though correspondence analysis to show the trajectories and the particular resources, practices and properties shared by the experts.

**MICHEL GROSSETTI**  
CNRS

**Intimate networks of young people 18 to 25 years: a French survey and a comparison with US data**

Strong ties obtained from the question on people with whom one can talk about important matters were the subject of numerous studies and controversy. In particular, network analysts have looked at whether or not we observe a decrease in the number of these links in the United States (McPherson, Smith-Lovin and Brashears against Fischer). There are few recent studies comparing the data on this type of links in different countries. The objective of this paper is to compare the recent French data with US data. This paper presents the results of a collaborative research conducted in the region of Toulouse on 2272 young people aged 15 to 25 years, including 1116 at least 18 years. Respondents were asked to list the songs they have recently enjoyed (up to four). For each of these pieces, they were asked to say whether they had been advised about this piece by someone they know or if themselves had advised someone about it. This question was used as a name generator to obtain a first list of names. This list was then supplemented by a question about people whose respondents feel close and would not appear in the original list, then two names maximum of people met online. For each name (up to 10), we asked the respondent to say whether she or he is a person with whom they can discuss important matters. The analysis focuses on these intimate ties (homophilies, kin and non kin, etc.). Despite differences in method, a comparison is attempted with data from a 2008 survey by the Pew Research Center in the United States.
Using Stata for Social Network Analysis

The field of social network analysis is one of the most rapidly growing fields of the social sciences. This poster introduces the nwcommands, a software suite with over 80 Stata commands for social network analysis, which correspond to the R-packages “network”, “sna”, “igraph”. The software includes commands for importing, exporting, loading, saving, handling, manipulating, replacing, generating, visualizing, and animating networks. It also includes commands for generating different kinds of networks, for measuring various properties of the networks and the individual nodes, for detecting network patterns and measuring the similarity of different networks, as well as advanced statistical techniques for network analysis.

Achieving social-ecological fit through collaborative natural resource management

Addressing most of the world’s most pressing environmental problems require governance arrangements that incorporate multi-actor collaboration. However, the boundary spanning nature of interconnected ecosystems requires that patterns of collaboration align well with patterns of ecological interconnectivity. We conduct an empirical investigation of this problem and assess the capacity for a large-scale collaborative conservation initiative in Australia to manage interconnected ecological units. We apply a novel network-centric modeling framework that emphasizes the theoretical importance of complex structures of actor collaborations, social-ecological interdependences, and the boundary-spanning nature of interconnected ecosystems. We use this framework to identify social-ecological network configurations that capture the hypothesised ways in which collaborative arrangements could address the management of interconnected ecological units. We combine this framework with recent advances in stochastic modeling of multilevel social networks to determine how well the observed pattern of stakeholder interactions reflect these collaborative arrangements. We find that collaboration between stakeholders is evident when they manage the same locations, but not when they manage different, yet connected, locations. This implies that the conservation initiative lacks capacity to detect the effects of management actions that could affect outcomes beyond the ecological unit to which the management action is applied. These findings are corroborated through interviews with governing participants. The information obtained provides empirical support for how collaboration approaches to governance can address the challenge of managing transboundary ecosystems. Our approach allows social-ecological interdependencies to be incorporated to evaluate the benefits and constraints afforded by collaboration, and can be used to inform the design of future collaborative arrangements.

Historical Dependence, Epistemological Autonomy: Using Social Network Analysis to investigate Management Studies Autonomisation Process

Although Management studies are recognized as a specific field of academic knowledge, it remains difficult to identify their particular epistemology. Syncretism and practical aims are often put to the fore to justify their specificity (Schön 1995, Hatchuel 2012). However, these characteristics are not specific enough to differentiate them from other academic fields such as engineering science. Given that Management Studies are still recent, we postulate that they are still in the process of autotomizing...
themselves from the epistemology of alternative academic fields. Based on Bourdieu’s conception of field (1984, 1998), we promote a structural genealogy of the various categories of thinking used in the field to study the undergoing definition of its specific epistemology. We mix Social Network Analysis as a quantitative methodology to identify the spread of reference epistemological works in Management studies, and qualitative methodology (prosopography, semi-structured interviews and linear textual analysis) to determine their evolution and their appropriation. The scope is restricted to a comparison between 3 countries of various academic traditions (USA, UK and France), in the second half of 20th century.

We propose to use Social Network Analysis, first as a way to dynamically identify the field’s boundaries, second as a proxy for the objective distribution of power within the field.

1) We have chosen books and articles’ citations as a marker of the evolution of the field’s boundaries. SNA is widely used to study such citations since the 1960s (Garfield, Sher & Torpie 1964; Price 1965). Using SNA allows to go beyond the studies of masterpieces (Charle, 2013) by locating the seemingly minor works, which modify in turn the categories of thinking provided by the masterpieces. Starting from recognized management studies’ publications, we use a survey with recursive broadenings. Such method is similar to snowball sampling (Frank & Snijders 1994). However, the final aim is not to get a sample, but to determine the perimeter of the field and to identify the reference works within this perimeter. This raises two methodological issues:

   a) a decision algorithm must be built to determine if a set of publications has to be integrated in the network, depending on its capacity to bring references to new reference works (e.g., any confidential journal which copy the position of a major journal is not to be integrated uppermost);

   b) a threshold of the number of citations has to be defined for a publication to be considered as a reference work.

2) Following de Nooy (2003), we believe that “SNA can be used to gauge the amount of social and symbolic capital”. “If Bourdieu argues that interaction is driven by the distribution of types of capital, the former can be used to measure the latter”. SNA can thus supply additional data for qualitative study. The main methodological issue is to determinate the indicators to be used to measure such capitals (prestige, influence, etc.).

We are currently addressing those methodological issues with a feasibility study onto current French Management studies (outcomes will be ready for the conference). The survey is starting with major French academic reviews in the field. It will be recursively broadened according to the primary results, serving as a test drive to create the decision algorithm and the various indicators.

Claudius Haerpfer
Goethe-University Frankfurt

The world, according to Max Weber. On the use of ego-networks for historical research

The presentation aims to discuss the value of several ego-networks which are constructed out of data that was collected during the process of editing Max Webers’ early methodological writings (1900-1907). Some of this data is delivered by Weber himself, due to used concepts, explicitly named sources, letters, and other biographical data. Other data had to be reconstructed during the editing process, and some of the used data is found in the two journals where Weber published his six important articles on the Philosophy of Science in the relevant period. Starting with text mining on the primary sources, I generate an ego-network of concepts used by Weber. This concept-network corresponds to a network of authors that Weber associated with these concepts, and another one of authors that Weber didn’t mention by himself. These networks within each single article again are embedded in the networks of two scientific journals where other people – mentioned by Weber or not – had published their articles on similar or different topics. These networks allow us to construct a multi-layer network to find key concepts, cliques of important authors, and other structural properties. These properties can be interpreted in the light of the preserved part of Webers correspondence and the wide range other biographical sources that give us further information to complete our image of him, and to understand his thoughts.

Deven T. Hamilton
Martina Morris (2. University of Washington Department of Statistics and 2. University of Washington Department of Sociology)

A dynamic transmission network simulation study of the impact of assortative mixing, concurrency, and the mitigating impact of coital dilution on the racial disparities in sexually transmitted infections in the U.S.

Introduction: There is a longstanding racial disparity in the STI epidemic in the U.S. Non-Hispanic Blacks (NHB) have consistently face a far higher burden of infection than Non-Hispanic Whites (NHW) across a range of STI including Chlamydia, Syphilis, Gonorrhea and HIV. Differences in individual-level risk factors as well as differences in socio-economic factors have not been demonstrated to account for the observed disparity. We propose that variations in the sexual network structure which can impact the dynamics of transmission may provide a mechanism for generating and maintaining the observed racial disparity. We use Chlamydia as our exemplar as it is the most common reportable STI in the U.S. We hypothesize that the intersection of racial homophily in partner selection and persistent differences in the prevalence of concurrency are sufficient drivers to generate and maintain the racial disparity in STIs that we observe in the U.S. We use a dynamic transmission network simulation to isolate the potential impact of observed concurrency prevalence and assortative mixing on the racial disparity in the prevalence of chlamydia observed in the U.S. The mitigating effects of coital dilution within concurrent partnerships are then evaluated. Data and methods: The sexual network and Chlamydia prevalence data used in this study come from the third wave of the National Longitudinal Survey of Adolescent Health (AddHealth). The dynamic networks are simulated using a Separable Transition Exponential Family Random Graph Model (STERGM) A total of 104 different scenarios were simulated based on 8 different estimates of infectivity and 13 different estimates of the duration of infection. For each of the 104 scenarios, 5 infection cycles were run through 5 different dynamic sexual network renderings for a total of 2600 initial simulations. Six different coital dilution models were run with secondary partners having 0%, 5%, 10%, 33%, 66%, and 100% of the force of infection due to decreased coital contact. Results: Of the 76 scenarios that resulted in persistent infection most 56 (74%) of the racial disparities were between 3 and 9 fold which is close to the observed disparity of 6.4 In our simulations concurrency was present during over 60% of the transmissions events and responsible for almost half of transmission events despite the fact that only 3% of NHW and 9% of NHB had concurrent partners at any point in the simulation. The presents of coital dilution reduced the prevalence of infection in all cases but did no eliminate the racial disparity at rates of dilution < 66%. It was not until the level of dilution reached 95% that the racial disparity disappeared and at that level of dilution the epidemic actually cleared entirely in most instances.

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Michael W. Spiller (Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC), Krista J. Gile (University of Massachusetts-Amherst)
Corinne M. Mar (University of Washington), Cyprian Wejnert (Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, CDC)

Evaluating Variance Estimators for Respondent-Driven Sampling

Respondent-Driven Sampling (RDS) is a method for sampling hard-to-reach populations. It samples population members via their social networks by having sample members recruit their contacts into the sample. Estimation for RDS data is challenging due to the unobserved population network, and multiple estimators are currently used. Past work has focused on point estimation, and no evaluation of all currently used variance estimators exists. This paper evaluates the performance of RDS variance estimators via simulations of RDS on synthetic networked populations. The networks and RDS sampling processes are based on 40 surveys of injection drug users from the CDC’s National HIV Behavioral Surveillance system. In these simulations, average design effects (DEs) are lower and average 95% confidence interval (CI) coverage rates are higher than suggested in previous work, with average CI coverage of 93%. However, DE and coverage vary across the 40 sets of simulations, suggesting that
the characteristics of a given study should be evaluated as assess performance. We also find that
simulation results are sensitive to parameters such as sampling with replacement.

M.J. Haring
University of Amsterdam

The development of student start-ups social network over time

By doing a longitudinal study among student start-ups, I assess the importance of strong and weak ties for their development. Assessing seventeen student startups, the article gives a good insight in the way student startups develop their social network and how they make use of advantage of the goodwill factor and the eagerness of the established entrepreneurs to help them out. It also shows that a quick success in the network by e.g. getting a big order or access to a launching customer doesn’t mean that the startup will be successful overtime. Endurance and resourcefulness are needed to build upon the first successes to gain legitimacy and to survive in a competitive market. The student start-ups that were able to develop a scalable business and were able to let their network grow internationally are still active in the marketplace. Finding the right weak ties to develop your business takes a couple of years and in some cases the use of referrals made it easier for the student startups to make the right connection. Overall I concluded that startups that want to survive and grow out to established companies need to put a lot of time and effort in developing their social network. This social network needs to be broadened and deepened in order to discover new opportunities, gain legitimacy and find the right resources. Only this way a startup will evolve in a respected business partner and become part of the business society.

Guy Harling
Harvard School of Public Health

Jukka-Pekka Onnela (Harvard School of Public Health)

Degree truncation and its impact on spreading process outcomes

Social networks determine how diseases, information and dynamic processes spread through a population. Many study designs ask respondents to list their contacts, but this approach places considerable burden on respondents. A common approach to limit respondent burden is to set a maximum on how many contacts may be nominated. But while this type of “fixed choice” design (FCD) reduces burden, it also causes out-degree truncation. Specifically, FCD can lead to missing ties between individuals who each have more than the maximum number of contacts. While the implications of FCD for network structure have been examined in detail, the impact of FCD on spreading processes on networks has not been investigated systematically. We simulated different FCDs and spreading processes for a range of empirical and synthetic networks. Empirically, we used the 75 village networks of social contacts collected in Karnataka, India (Banerjee et al. Science, 2013; 341:1236498). Synthetically, we generated networks using the configuration model, and in some cases additionally rewired the resulting networks to obtain desired network characteristics (assortativity, clustering, power-law degree distribution). We also generated synthetic weighted networks using a model that produces networks with real-world like community structure (Kumpula et al. Phys Rev Let, 2007; 99:228701). We then simulated, for each synthetic and empirical network, an FCD by truncating node degrees at different values. Finally, we ran a Susceptible-Infectious-Removed (SIR) process across the full and truncated networks, and measured time-to-infection (of the 25th percentile node) and proportion of infected individuals. In terms of network structure, truncation reduced assortativity in all networks except for the power-law networks. Truncation at twice the mean degree increased modularity in all synthetic networks, but further truncation then reduced this value. In contrast truncation had a slight positive effect on modularity on the empirical networks. In terms of spreading process outcomes, increasing levels of truncation lowered the mean and increased the variance of time-to-infection for all network types. However, these effects were negligible on synthetic networks for truncation at twice mean degree, except in networks containing community structure or possessing a power-law degree distribution. For empirical networks, truncation at twice mean degree significantly slowed time-to-infection. Synthetic networks with more pronounced rewiring were more strongly affected by FCD. The impact of truncation on final size was similar, but weaker. Notably, truncation at twice the mean degree had almost no impact on final size in either the synthetic or empirical networks, and even truncation at the mean had relatively little impact in many cases. Research into social networks is often motivated by
the idea that network structure influences the unfolding of dynamical processes on networks. While this assumption is sometimes made only implicitly, we used direct simulation of spreading processes to investigate how different types of fixed choice designs might affect conclusions about spreading process outcomes. Our finding that process outcomes are sensitive to truncation levels emphasizes the need to better understand optimal truncation points for node degrees, and highlights the important idea that such optimal points may be both network and process specific.

Jennifer Hauck
Helmholtz Centre for Environmental Research – UFZ

Ines Thronicker (Helmholtz Centre for Environmental Research – UFZ)

Using network knowledge to inspire transition town movements

Transitions to sustainable lifestyles and green economies are among the most important challenges of our time. Supporting policymakers, businesses, and citizens to make the decisions on the way towards a sustainable future can be an important task for the scientific community. Knowledge co-production, i.e. producing insights together with stakeholders to understand and find solutions for complex issues involved with sustainable development, can be one way to support decision making. Net-Map is an interview-based mapping tool that can be used to (1) visualize implicit knowledge and understand the interplay of complex formal and informal networks, power relations, and actors’ goals; (2) uncover sources of conflicts as well as potentials for cooperation; (3) facilitate knowledge exchange and learning processes; and (4) develop visions and strategies to achieve common goals. We used Net-Map in a case study analyzing and involving a transition town movement. We organized a focus group discussion using Net-Map as facilitation tool, with the goals to a) using the insights for a scientific understanding of the network shaping the initiative and at the same time b) generating network knowledge and facilitate learning between the stakeholders of the transition town movement to further develop their initiative. The focus group discussion revealed the importance of rooms and spaces (physical, virtual, media) to organize, meet, discuss and plan activities, and to express identity, and the need to diversify these spaces. A general fuzziness and ephemerality of projects within the movement, which could be an expression of an averseness for hierarchies and a strong preference for autonomy, was discussed and agreed on during the focus group. The insights generated on this more general level lead to the organization of a second Net-Mapping session for the concrete network planning of a local food production initiative.

Sebastian Haunss
University of Bremen

Using dynamic discourse networks to explain the exit from nuclear energy in Germany

About three months after Fukushima the conservative government in Germany reversed its only six month old decision to prolong the operating time for nuclear power stations and instead decided to phase out the use of nuclear energy until 2022. This dramatic policy shift cannot be explained with standard models of policy change (external shock, political parties, institutional change). Instead it should be interpreted as the result of a contentious discursive interaction among various actors in the public sphere. In my contribution I will analyze the development of the public debate by modeling it as a dynamic discourse network. My dataset consists of all statements by all actors on nuclear power policies in two German quality newspapers between March 2011 and June 2011. Using discourse network analysis I identify the emergence and development of discourse coalitions and the change of argumentative patterns dominating the discourse. Using SIENAs stochastic actor oriented model I test to which degree positional attributes of actors and claims (discourse centrality, brokerage, gate-keeping), other actor attributes (party affiliation, formal power), and general network dynamics (expectations about tie formation, triadic closure, …) can explain the development of the discourse network and thus the dramatic policy change that followed this relatively short period of intense political debate. Beyond the specific issue I demonstrate how discourse network analysis can enhance and complement existing approaches to study discursive interaction and policy change.
Network structure and information flow in organizational networks

In this paper we examine the role of social networks in online information diffusion within a large-scale online social networking platform. The focal point of our study is CA Communities, a part of CA Technologies Inc. CA technologies is one of the largest independent software corporations in the world. CA technologies offer an online platform called CA Communities, which provides a platform for CA employees and customers to share information and communicate with one another. Currently CA Communities has 106,022 registered users. The CA Communities platform enables its users to be members of different communities, each one of these communities is tied to a particular CA product or family of products. CA Communities provides a place and community to discuss different topics related to those products. CA Communities members can also form connections with their fellow users (i.e. become their friends). The CA Communities platform also enables its users to post blog entries. CA Communities administrators shared with us some of the log data of the CA Communities platform. These data enabled us to unobtrusively study the social interactions among CA Communities members, as well as aspects of information diffusion within the CA Communities platform. By relying on this log data, we were able to avoid the biases associated with self reporting methods. At the same time these real world data enabled us to obtain valid results, which have the potential to be generalizable to other similar environments. In this paper we studied the 106,022 registered CA Communities members. The data analyzed in this paper consisted of (1) List of users using the platform, and basic information about each user; (2) List of the friends of each CA Communities member; (3) List of the blog posts of each CA Communities member (and their publication dates) (total of N=168,328); and (4) List of CA Communities members that have read each blog post. In our analysis of these data we utilized the social network analysis (SNA) framework to investigate various kinds of social interactions in the CA Communities community platform. By looking at this data we were able to correlate blog post readership with the centrality and position of their author within the CA Communities platform. More specifically, our findings indicate that (1) the centrality of CA Communities members in the friendship network is a positive predictor for blog posts readership. However, (2) the CA Communities members friendship network structures (measured by their effective network size) provided a stronger predictor for blog posts readership. More specifically, we found that (3) for the CA Communities members who are more senior (joined the CA Communities platform earlier), their friendship network effective network size had a stronger effect over blog readership when compared to less senior CA Communities members. Overall our findings indicate that it is both the social structure (i.e. effective network size), as well as seniority that serves as the strongest predictors for blog post readership. This suggests that less redundant ties play a dominant role in the dissemination of information online.

Multi-Scale Centrality Measures for the Global Network of Corporate Control

Although often depicted as atomistic and individualistic market actors, corporations are tightly embedded in networks of power and control. Foundational elements of these networks are interlocking directorates, where officers of one firm serve on the board of another firm. Increasingly, these hitherto national business communities’ networks now form a new complex global system of corporate control. Centrality gives an indication of the importance of a firm within the global economy and may indicate those firms that play a larger role in economic cascades such as one that led to the financial crisis. But in a large, global network, standard centrality measures are difficult to interpret due to the multi-level network structure. In previous work we found that if a hierarchical community detection algorithm is applied to the global network of interlocking directorates (largest 1 million firms worldwide), the resulting communities have a clear regional or even national character. This indicates that the footprint of the national networks is still visible in the global network. For corporate network research, it becomes important to consider how a firm’s centrality is derived from local, national, or global connections. The key challenge is therefore how centrality measures should be compared on the various scales. For
example, when numeric centrality values are compared, adjustments based on the overall structure of the network may be necessary. Even if only the relative rank of the firm matters, a comparison between two different rankings is far from trivial, as many different techniques with different outcomes can be employed to compare rankings. This paper presents both theoretical insights in how centrality measures should be interpreted at multiple scales, as well as domain-specific results with respect to how centrality measures rank both firms and countries within the global corporate network. First, we analyze the structure of global corporate network on both a national and a global scale by using various network analysis techniques and measures. We study a network consisting of more than 1 million companies (nodes) and more than 3 million social ties (edges) between companies. Second, we look at the behavior of different centrality measures when applied to various regional subgraphs and the full global network. By comparing the centrality values of firms on a global scale to centrality values based on a certain region, we generate alternative rankings of companies based on their importance on a national, regional or global scale. Furthermore, aggregating to the country level, we can generate a ranking of how countries contribute to the connectedness on a regional or global scale based on the centrality of the firms of the considered country in the respective regional or global network. Third, we suggest new measures for comparing centrality on a regional and a global scale as part of a broader multi-scale centrality comparison framework. This allows us to gain insight in which companies within (groups of) countries contribute most to the connectedness of the global economic order.

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Shifts in Collective Attention and Stock Networks. Evidence from Standard & Poor’s 100 corporations and firm-level Google Trends data

Recent economic turmoil has underlined the need to understand modern financial markets as complex systems. Especially in times of crisis, the classical models turn out to be insufficient. One interdisciplinary challenger of the economic paradigm is often dubbed Econophysics and analyzes the structural dynamics of stock interaction networks. We combine those methods with recent research about collective attention shifts by utilizing massive social media data. Our main goal is to investigate whether changes in stock networks are connected with collective attention shifts. To examine the relationship between structural market properties and mass online behavior we merge company-level Google Trends data with stock network dynamics for all S&P 100 corporations between 2004-2014. The interplay of massive online behavior and market activities reveals that collective attention shifts precede structural changes in stock market networks and that this connection is mostly carried by companies which already dominate the development of the S&P 100.

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Correspondent Banking Relationship Networks between the United States and Yemen - Implications for Sanctions Compliance

Recent governance changes in Yemen increase the country's risk for money laundering in a region whose loose regulations facilitate terrorism financing. As a result, the probability that the United States Department of the Treasury might impose sanctions on Yemen or Yemeni financial institutions is substantial. In this light, financial relationships with foreign banks that link to Yemen represent an anti-money laundering (AML) compliance vulnerability for US financial institutions, and actions by foreign companies abroad that cause repercussions in the US are sufficient for establishing jurisdiction. Should sanctions be imposed on Yemen, U.S. financial institutions will be prohibited from conducting business with their Yemeni counterparts directly or indirectly. In the highly interconnected banking world, however, accounting for all actors in the vast network of relationships has proven to be a challenge. To address the challenge of distributed banking compliance, we use a snowball sample of correspondent banking relationships (CBRs), and attributes collected from open source venues to identify an
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Exploring the effectiveness of strategic interventions to cultivate interdisciplinary academic collaboration networks.

Background: Academic research can be seen as the result of a self-organised process of goal-oriented, interdependent actors who respond to a range of external and internal conditions. Their work is influenced by various factors, including departmental affiliation, location, history, power-dependence relationships, funding incentives, as well as individual preferences, strategic considerations and interest. The University of Sydney is in the process of establishing Strategic Priority AReas for Collaboration (SPARCs), with the goal to cultivate interdisciplinary academic collaboration networks that overcome historical divisions between groups and faculties doing research in specified areas of interest. We present the development of collaboration within one such initiative that brings together about 900 researchers from the entire university in order to collaborate in the area of “chronic diseases, especially obesity, diabetes and cardiovascular disease”. Data Collection: Data is collected from two sources: First, publications by authors affiliated with the University of Sydney that are listed in the Scopus data base for the years 2010-2015, inclusive. Second, administrative data for associated projects and their members, both internal and external to the University, that was collected for the range of Jun. 2011 to Apr. 2015. Analysis: We will organise the description of CPC activities in three stages: Member demographics, description of projects and the centre’s effect on networks of collaboration. As of Dec 2014, there are 43 active projects, grouped into four main domains of enquiry. We investigate the distribution of members and their faculty affiliation. The number of projects any one participant is positively skewed with a mean of 1.5 and a maximum of 14. Similarly the number of collaborators within projects ranges from 2 to 196, and has a mean of 25.2. The correlation between number of projects and number of collaborators is 0.74.Starting in 2011 this strategic initiative shows steady growth and increasing diversity in membership. Overall, it has facilitated 10,204 relationships in terms of joint project membership. The effects of this strategic intervention is assessed against historical collaborations as found in the co-authorship data of publication records. For the majority of project participants, all collaborative relations formed at the CPC are not preceded by a relationship of co-authorship, involvement with a CPC project created entirely novel working relationships. Discussion: We presented a description of the effects of an interdisciplinary research institute on the networks of collaboration at the University of Sydney. The centre works on the premise that interdisciplinary collaboration can help identify new approaches to chronic disease and focusses on facilitating such relationships. We showed in terms of creating new collaborative relationships, the centre has a high degree of effectiveness. We demonstrated that self-organising activities such as academic research respond to and can be effectively influenced by creating suitable surrounding conditions. This paper shows only the initial development of the CPC and we will continue to monitor its progress, refining our measures and improving our data collection methods. Our analysis constitute the baseline against which further progress of the centre will be measured.

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What is role of the injecting network in hepatitis C transmission and treatment as prevention?

Background The hepatitis C virus (HCV) epidemic is a major health issue; in more developed countries it is driven by people who inject drugs (PWID). Injecting networks powerfully influence HCV transmission. In this paper we provide an overview of 10 years of research into injecting networks and HCV, culminating in a network-based approach to provision of direct-acting antiviral therapy. We will also provide preliminary data on the HCV Treatment and Prevention (TAP) Study, a community based study involving PWID that is using a networks based approach to treating HCV with direct acting antiviral (DAA) therapy. Methods Between 2005 and 2010 we followed a cohort of 413 PWID, measuring HCV incidence, prevalence and injecting risk, including network-related factors. We developed an individual-based HCV transmission model, using it to simulate the spread of HCV through the empirical social network of PWID. In addition, we created an empirically grounded network model of injecting relationships using exponential random graph models (ERGMs), allowing simulation of realistic networks for investigating HCV treatment and intervention strategies. Our empirical work and modelling underpins the TAP study, which is examining the feasibility of community-based treatment of PWID with DAAs. The TAP study intervention consists of 12-weeks oral sofosbuvir plus ledipasvir for participants with chronic HCV, and their injecting partners recruited using a social network-based approach (a “bring your friends” strategy). Participants are randomly allocated to three groups: 1. HCV infected (n=40) and injecting partners (n=100) will be observed for 18 months prior to treatment; 2. HCV infected (n=40) will be treated immediately, with injecting partners (n=100) observed for 18 months; 3. HCV infected (n=40) and injecting partners (n=100) will receive immediate treatment (if RNA positive). Incident re-infections will be offered immediate re-treatment in this arm. Results We observed incidence rates of HCV primary infection and reinfection of 12.8 per 100 person-years (PY) (95%CI: 7.7–20.0) and 28.8 per 100 PY (95%CI: 15.0–55.4) respectively, and determined that HCV transmission clusters correlated with reported injecting relationships. Transmission modelling showed that the empirical network provided some protective effect, slowing HCV transmission compared to a fully connected, homogenous PWID population. Our ERGMs revealed that treating PWID and all their contacts was the most effective strategy and targeting treatment to infected PWID with the most contacts the least effective. TAP commenced recruitment in February 2015 and preliminary data will be available for the conference. Conclusion Networks-based approaches greatly increase understanding of HCV transmission and will inform the implementation of treatment as prevention using DAAs. The TAP study will be the first real world community cohort to explore the feasibility of new oral therapies for HCV. It will provide empirical data to support models that indicate treatment of HCV could have an added prevention benefit. Recruitment is underway and an analysis of the first 100 participants will be available in July 2015.

Kimberly Henry

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The Evolution of Social Networks among Mentors in a Youth Services Program: Implications for Job Satisfaction, Self-Efficacy, and Perceived Social Support

Campus Corps is a structured, group-based mentoring program for at-risk adolescents that takes place on the Colorado State University Campus in Fort Collins, CO. Trained undergraduate mentors are matched with at-risk youths in the County, and over the course of the semester, the matched mentor and mentee dyads spend time together one night per week. Approximately 16 to 20 mentor-mentee dyads attend Campus Corps each night. Mentors report friendship connections with the other mentors assigned to their same night at baseline, 3 weeks after program initiation, 9 weeks after program initiation, and at the completion of the program (12 weeks after program initiation). Mentors also report job satisfaction, self-efficacy and perceived social support at weeks 3, 6, and 12. In this poster, we present the evolution of friendships among mentors that develop over the course of the semester and the extent to which the development of friendship ties among mentors is associated with change in the mentor’s sense of job satisfaction, job self-efficacy, and perceived social support. We hypothesize that mentors who develop a richer set of connections over the course of the semester will report greater growth in satisfaction, self-efficacy and social support.

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**Leveraging Who, Whom, and How: A Social Networking Tool to Scale Up Health Innovation in India**

In the developing world, the day a baby is born is the most dangerous of their life. The lives of a great many mothers and their newborns could be saved not with expensive treatments and equipment, but with the adoption of basic health care practices. Simple practices like hand washing – before, during, and after childbirth – could save a great many lives. The biggest obstacle to improving health care in the developing world is not cost, it is social norms. Atul Gawande called this the problem of getting “slow ideas” to spread: "...neither penalties nor incentives achieve what we’re really after: a system and a culture where X is what people do, day in and day out, even when no one is watching... Getting to ‘X is what we do’ means establishing X as the norm. (Gawande, 2013).” This paper discusses the design, development, and deployment of a novel social networking tool designed to hasten the spread of slow ideas through social networks. We bring the power of networks and social motives together in a recommender system, the “Influence Strategy Wizard,” to aid development workers in identifying the most pivotal influencers (i.e., whom), the people they go to for advice (i.e., who), and the influence strategies most likely to activate their social motives (i.e., how) to spread slow ideas needed to improve health care. Prior research suggests that people are highly influenced by those in their immediate networks. Therefore, to better implement health innovations, it is essential to identify central individuals who are best positioned to influence a large segment of people. Complementing the influence of networks, psychological research suggests that people are influenced by messages that address universal motivations such as the desire to be accurate or affiliate with people. The current project draws on these insights to build a tool that helps health workers identify the key influencers who are best able to scale up family health innovations throughout the districts of Bihar, as well as the strategies to influence them. We interviewed 9,799 government health employees, 146 TSU personnel, and 57 development partners throughout 15 districts in Bihar, India. Respondents were asked whom they go to for advice about maternal & newborn health, improving nutrition, increasing infant immunizations, encouraging family planning, data-driven management plans, and training practices for family and health workers. Additionally, we surveyed government employees on their social motives so that targeted persuasion strategies could be built into the Wizard. From these networks, we can calculate who are the most central people in other’s advice networks for various innovations. We embed this data in the Wizard dashboard, accessible from any web-enabled device. Development workers select the type of innovation they want to implement, and who they want influence. If they are unsure of whom to influence, the Wizard recommends one. The tool then displays the network pathway and mechanism – who, whom, and how – needed to gain support for the innovation.

**Deyanira Hernández Sánchez**

**Networks Training University-Industry at High Tech Cluster in México**

It is often claimed that in our current economic environment, the ability to translate knowledge into products and services through human resources is critically important. In developing countries, such as Mexico, the productive capacities are mostly installed in transnational companies, whose added value processes are taking place in their headquarters. However, since the manufacture crisis in 2000, the high tech industry in the Guadalajara Metropolitan Area, has gradually upgraded to higher complexity processes, focused in knowledge. One of the most striking features in that such upgrading is shed light about who and through which mechanisms, those stakeholders have been involved in training programs for the job, either financing, infrastructure development, generation of pedagogical tools, etc. Definitely, those synergies have redefined the relation between work and education, as elements of personal identity and social integration within the region. This paper aims to analyze and understand the academia-industry dynamics for human resources training in the context of a high-tech cluster. A greater understanding of the trajectories of linkage models for design and management of training programs for the job at regional level can help to better design labor public policies.

**Sebastian Herrmann**

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Collective Problem Solving: How to characterize the Difficulty of Tasks by PageRank Centrality

Organizational learning has often been described as the search for an effective combination of decision variables (Levinthal 1997, Rivkin 2000). A fundamental concept to describe such processes of organizational learning is the balance of exploration and exploitation (March, 1991; Levinthal & March, 1993). Recent work on collective problem solving studies several factors influencing the balance of these mechanisms, e.g. the social network structure of systems (Lazer & Friedman, 2007; Mason & Watts, 2012) or the complexity of the task (Billinger, Stieglitz & Schumacher, 2014). Often-used tasks in these experiments are NK-landscapes (Kauffman, & Levin 1987). An NK-landscape is a canonical form of the concept of fitness landscapes (Wright, 1932). It has N binary decision variables and its complexity is tunable by a distinct parameter K, which is the number of interdependencies between the decision variables. An increase of complexity leads to a landscape that is more rugged. Even though ruggedness is related to complexity, recent literature puts both concepts on the same level without considering that there may be differences between these two. Apart from that, problem instances with inadequate difficulty may also lead to insignificant results (Mason & Watts, 2012), hence the nature of tasks plays an important role in such experiments. Consequently, tasks selected for an experiment should undergo an exhaustive pre-examination to avoid a problem-related bias of results. In our paper, we take a network perspective on tasks, resp. their fitness landscapes. We use a population of synthetic agents mimicking human myopic search behavior and show that the ruggedness has only limited significance towards the search difficulty of a task, resp. landscape. As an alternative, we introduce an approach based on network analysis to determine the difficulty of a problem: we propose to convert landscapes into networks and predict their difficulty by the PageRank centrality of the global optimum in the landscape network. Our results show that the PageRank predicts the success rate of agents with more than 90% accuracy and clearly supersedes the established measurement by ruggedness.

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Cooperation in adolescent social networks

In the field of developmental psychology, adolescence is characterised as a period of social reorientation and gradual refinement of advanced social cognitive abilities. Social network analysis provides a way to quantify features of authentic relationships that can then be tested for a relationship with experimental social cognition variables. Across two studies, we investigated age group differences in the impact of relationship strength and reciprocation on cooperation behaviour (Burnett Heyes et al., in press at Child Development). We used a social network questionnaire (Harrison, Sciberras & Christian, 2011, PLoS ONE) to characterise the strength and reciprocation of dyadic ties in established adolescent social networks (school classes). Participants completed a one-shot Dictator Game that involved dividing a pot of real or imaginary money between themselves and their classmates. We used multiple regression with quadratic assignment procedure (MRQAP) and a novel multi-group MRQAP to investigate the relationship between social tie variables and experimental investment behaviour and to test whether this varied as a function of age group. Results indicate age group differences in the extent to which reciprocation of social ties predicted resource allocation. With increasing age group, investment decisions increasingly reflected the degree to which peers reciprocated feelings of friendship. Whereas in younger (mid-adolescent) networks, investment decisions were predominantly driven by participants’ reported feelings of friendship (e.g., I like X, so I give to X), in older (late adolescent) networks, investment patterns also took into account whether these feelings were reciprocated (e.g., I like X, but X likes me less, so I give X less). We interpret this result as potentially reflecting protracted development during adolescence in social cognitive perspective-taking abilities. In adolescence, the mastery of sophisticated social strategies may be critical for navigating an increasingly complex social world. Combining social network mapping with experimental measures of social behaviour may reveal further insights into adolescent social cognitive development and its basis in the maturing brain.
Understanding Privacy Behavior of Adolescents on Facebook: The Role of Peers, Popularity and Trust

In 2015, more than a billion people are members of social networking sites (SNSs), producing terabytes of information on these platforms continuously. This information consists of textual status updates about emotions, opinions or experiences, uploaded photos, videos or music and other bytes of highly personal content, usually uploaded to the personal SNS profiles of users. Inherent to the unprecedented rise of SNSs is that, more than ever before, highly personal content is easily accessible to an increasingly expanding audience. As a consequence, an unintended byproduct of sharing such personal content has thrived. Sharing photos, hometowns, e-mail addresses, phone numbers, education and employment statuses on SNS profiles make SNSs one of the most targeted resources by hackers and makes it relatively easy to commit identity thefts. Even though most of these consequences are hard to estimate, users of SNSs must decide upon the use of tools as provided by SNS services to ensure that they are protected against such harms. Despite the large literature on online privacy generally and the potentially dramatic consequences of privacy decisions on SNSs specifically, few studies investigate SNS privacy behavior. We elaborate on this growing literature, both theoretically and empirically. First, we aim to understand why prior work consistently found that women and younger people maintain private profiles more often. We study whether higher levels of distrust among these groups provide an explanation. To fully investigate the potential role of trust further, we also consider differences in privacy settings among ethnic groups and educational level—as prior work has suggested lower levels of trust among minorities and at lower educational tracks. Furthermore, we also study peer influence processes, and elaborate on the role of social networks by considering the potential effect of popularity. The present study focuses on adolescents in school, and using sociometric information we construct peer status in class. This motivates the main question of this study: To what extent are peer influence, popularity and trust predictive for adolescents to maintain private profiles on Facebook? We use a large sample of Dutch adolescent Facebook users in 2014 and we are among the first to use large-scale survey data and link these data with observed behavioral data of privacy settings on Facebook. We find peer influence effects with regard to privacy and these effects are stronger in more connected classrooms. More popular adolescents are more likely to display public information on Facebook, possibly to maintain their status amongst peers. Well-established trust-correlates are related to Facebook privacy: women, those of non-native national origin, those in higher educational tracks and younger individuals have higher propensity to maintain a private Facebook profile. The most profound effects are those of national origin. While non-natives are in less prestigious occupations and are heavily residentially segregated, they are able to protect their privacy better than do natives.

NetCanvas: Designing a research instrument for greater reliability and user experience in personal network data capture

The capture of self-reported networks is often a tedious and complex process for both the interviewer and the interviewee. Some have responded by denying the utility of self-reported networks, opting instead for a 'realist' approach that draws primarily on trace data. Yet in many cases, self reported data is the preferred option. For example, in the case of sexual contact no single medium will be able to cover the complex landscape of how people meet and what sort of (un)safe sexual practices occur. In the case of social support, biases in one’s personal network are intertwined with ego’s decision-making processes regardless of how ‘accurate’ the network is. In both of these cases and many others, the challenge lies in providing a data collection experience that is validating, coherent and reliable. One of
Family structure and dynamics intertwine with micro/meso health behaviors and macro health inequalities. After decreasing in frequency around the mid-20th century, multigenerational families since the 1980s are again on the rise in many industrialized countries in the wake of the Great Recession. The Pew Research Center (2014) defines four types of multigenerational families: two generations (parents/in-laws and adult children/children aged 25 and over); three generations (parents, in-laws, adult children, children-in-law, grandchildren); skipped generations (grandparents and grandchildren only); over-three generations (combinations of extended family based on the first three types). Multigenerational families vary in their compositions—depending, for instance, on presence of children, their ages and minor or adult status. “Emerging adults” refers to those 18 to 25 moving toward adult responsibilities. Increasingly they are returning (boomeranging back) to their family of origin, and some return with one or more children of their own. “Sandwich” generation households consist of children of any age, their parental figures, as well as older family members. Reasons multigenerational households occur involve social, economic, medical, financial, race/ethnicity and cultural dynamics. Conversely, multigenerational family formation and interactions affect caregiving and who can give care, and affect financial, college and employment decisions that over the life course affect health behaviors, health insurance coverage, medical and health outcomes, and health inequalities. Family simulation software correspondingly here addresses multigenerational families, going beyond both our 2013 Sunbelt boomerang topic and “Leaving Home and Boomerang Decisions: A Family Simulation Protocol” (Marriage & Family Review, 2015, in press). Agent-based binary choice multimodal social influence network simulation of multigenerational families can facilitate experiential learning in graduate and undergraduate family studies classes. Our software now introduces one older adult with one or two parents/step-parents and as many as three children in a multimodal six-agent model. Six decision modes of binary (Yes/No) decisions for each agent now include a mode to encourage (or not) same-household living by the older adult and the parent(s) and children. Further Yes/No modes involve home-leaving, seeking intimacy, getting/staying married, seeking a job, and going to college. Motivation intensity values arise in 6 x 6 matrix of functions based on the life course. Race/ethnicity and major medical events affect these functions in the simulation. The six agents influence one another’s six-mode
binary decisions through a 36x36 array of network weights. The model evolves an array of 36 simulated
decisions per year in the agents’ network modes spanning 20 years. We show an automatically-
generated written report of events including major medical events in the lives of the simulated agents.
A narrative output software section composes the report based on the 36 x 20 array. A pre-stored
kinship network matrix additionally applies social networks by specifying the kinship or quasi-kinship
relationship of each agent to the other agents. The narrative output software describes the events with
fictitious names and kinship relationships representing the standpoint of a given family member agent-
counseleree or third party counselor-narrator.

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Tom Töpfer (University of Bremen)

Using Visualizations when Collecting Ego Network Data – A Comparison of Four Tools

In recent years a variety of instruments using visualization to collect ego networks were developed. A
simultaneous visual representation of network alteri can function as cognitive aid to elicit more complete
networks. However, little is known about differences between various visualizations concerning the
reactivity of the data collection instrument, the usability for interviewees and interviewers and data
validity. In our presentation we compare four different visualization instruments – the diagram of
concentric circles or so-called hierarchical mapping technique (Antonucci 1986), two modifications of
the funnel tool (Hollstein et al. 2013) and a free network drawing – and explore advantages and
disadvantages of the different tools. Targeting the potential of the four tools we conducted an empirical
study using the Thinking Aloud Method (e.g. Ericsson/Simon 1993). In order to explore cognitive
schemes and associations participants were asked to verbalize their thoughts during and after the
process of the network data collection. We conducted 72 semi-structured guided interviews (18 for each
tool) using a purposeful sampling where characteristics of the participants (gender, age and
socioeconomic status) were varied systematically. In the paper we present results of the comparison of
the four instruments regarding network size (a), preferences (b) and associations (c) of the interviewees
as well as manageability of the tools (d). Finally, we discuss the assets and drawbacks of the four visual
tools and crucial methodological aspects of the data collection process when using visual tools.

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Modelling Time-Stamped Political Relations

A key challenge in political science network research is the question how to best model dynamic
processes. Fortunately, because many political processes are public and formal, we often find more
data about the precise start and end dates of political relationships (such as cooperation, coordination,
emnity, association, support, and ownership) than those of interpersonal relationships. However,
despite the data having such precision, they are often artificially aggregated into network panel data to
allow analysis and modelling with standard software such as RSiena. We propose an actor-oriented
statistical network model for studying dynamic networks characterised by ties for which we have
complete information about their start and end. The advantage of this modelling approach is that it both
takes an actor-oriented perspective that is straightforward to interpret and makes full use of the temporal
information available to improve the precision of inference about network dependencies as well as
enable the modelling of mechanisms relating to time windows and multiple ties. We demonstrate the
value of this model using cases drawn from a novel dataset on interstate cooperation on global
environmental issues which includes comprehensive information on when cooperative agreements start
and end. We show how our model enables us to use all the information to make more precise inferences
about dependencies in the data than alternatives, which typically rely on extensive simulation to impute
the order of tie changes. Our model also enables us to ask new questions of the data too, including
when actors are influenced by historical ties or choose to reinforce existing ties instead of creating new
ones. In sum, this new model not only offers increased precision and new properties for political network
data, but also a flexible framework upon which future extensions can be built.
Renato: A Toolkit for the Collection and Analysis of Network Data

In this talk, we will discuss and demonstrate Renato (presented as a poster at Sunbelt 2014), a software package for the collection and analysis of relational data such as found in social network analysis and cultural domain analysis. The Renato system uses a central data repository and desktop interfaces to provide a variety of functions, including: 1) a data collection designer that allows the user to create collection tasks such as pilesorting, freelistng, selecting from rosters, paired comparisons, and so on, along with traditional survey methods; (2) a server that enables storing and sharing data collection designs and the results of collections; (3) Android apps that execute the data collection on handheld devices and upload the results to a Renato server; and (4) a desktop client that allows for detailed data analysis such as multi-dimensional scaling, consensus analysis, clustering, centrality measures etc. Historically, researchers have used a combination of different packages for cultural domain analysis, including Anthropac, a DOS-based cultural domain analysis program that requires a DOS emulator to run under modern Windows operating systems. Renato moves Anthropac into the modern digital age, integrating data collection design capabilities, network and cultural domain techniques, along with powerful visualization and cloud-based storage capabilities. For example, Renato facilitates collecting a set of names (e.g., a list of drug names or networking behaviors in organizational settings) and enabling a respondent to use gestures to visually indicate relationships among them. In particular, Renato allows a researcher to design a pilesort data collection task, – in which respondents sort items into piles corresponding to perceived similarity or belonging to social groups – run that data collection on an Android handheld device with any number of participants, and aggregate participant responses on a central server in both connected and disconnected environments. The aggregated data can then be downloaded to the Renato analysis application to run a suite of cultural domain analysis and social network analysis routines such as multi-dimensional scaling, consensus analysis, and property fitting and visualize the results using modern network visualizations. Renato also supports exporting to UCINET for further analysis.

Network structure and well-being: A reach centrality account of popularity

The relationship between adolescents' network structure and well-being were unknown. Friendship is the primary relationship that links adolescents. They manage their social life by making friends and strengthening their relationship. Previous research on youth and social network has been inclined to focus on behavior issue, such as substance use, aggressor and victim, but rarely discussed the unique feature of adolescents' friendship network with psychological perception. In this paper, we use social network analysis to explore three questions: firstly, what is the social structure of adolescents' friendship? Does gender, media use influence them to connect with others? Secondly, we compare different centrality index to see which is more powerful in predicting the key members in class, e.g. opinion leaders and information broadcasters. Last, we evaluate the relation between friendship network and well-being. Using the Taiwan Communication Survey of 2014, the sample data was selected by probability proportional to size with class being the basic unit. In the questionnaire, participants were asked to nominate best friends and key members of their class. The findings were that in adolescents' friendship network, the level of density was low and negatively correlated with number of students in class. Meanwhile, gender effects how adolescents choose friends as friendship became mostly sex segregated. As to influential person, reach centrality and betweeness centrality were positively correlated with opinion leader; normed in-degree, betweenness centrality, eigenvector centrality, reach centrality, bonacich power centrality were all positively correlated with broadcaster. Also, popularity was positively correlated with opinion leader and broadcaster. Popularity and opinion leader were positively correlated with well-being. Furthermore, we used stepwise multiple regression and confirmed that reach centrality is related to opinion leader as predicted. Reach centrality and
normed in-degree were found to be predictive of broadcaster. Moreover, popularity and reach centrality were related to well-being as predicted. Keywords: adolescents, network, centrality, influential, popularity.

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Kuan-Jung Chen (Department of Sociology)

Cross-border Innovation Networks: the Case of a Semiconductor Firm in China

In 2000, semiconductor industry in Taiwan faced the first-time depression, a CEO moved to Shanghai and recruited many Taiwanese engineers to build up a large semiconductor firm in China with global capitals. In 2002, the number of patents granted by Chinese government was only 33 patents and 48 inventors, and the number of patents rapidly increased to 594 and 651 inventors in 2009. Taiwanese inventors played important role in the beginning of patent inventions in 2002, the leverage of innovation capability has increased through collaborated networks between Taiwanese and Chinese inventors since then. This research is interested the following questions: how do these cross-border Taiwanese contribute to the knowledge spillover and knowledge innovation through collaborated patent inventions between Taiwanese and Chinese inventors from 2002 to 2011? What are the network mechanisms to explain the number of patent inventions? In the descriptive analyses, we found that Taiwanese inventors are located in the most central and cut-points positions which linked with multiple bi-components in the patent collaboration networks in the beginning, and then the advantageous positions has been decreasing. Later on, the overseas Chinese took over the central and cut-points positions in the collaborative patent innovation networks. Furthermore we pool all ten years data together, we use star theory and structural cohesion theory to examine the effects of network centrality, cut-points among bi-components, large components on the number of patents. Those inventors oned network indexes significantly explain the number of patents for inventors. Those who have greater degree of centrality, being the cut-points for more bi-components and belong to the largest component are more likely to have greater number of patents. In addition, the number of patents created by cross-border inventors (Taiwanese, overseas Chinese) is significantly higher than those of local Chinese after controlling all other network variables. In terms of the effects on the citation impact of patent, centrality and cut-points among number of components are more important, and also cross-border inventors (Taiwanese and overseas Chinese) have significantly greater higher impacts than those local inventors. Ray-May Hsung, Professor of Sociology, National Chengchi University Kuan-Jung Cheng, Graduate Student of Sociology, National Chengchi University

Chih-Wei Hu

A social network approach to gatekeeping of medical information on Twitter

The present study serves as an exploratory study of examining gatekeeping of medical information about Truvada on Twitter by identifying Twitter users as gatekeepers and their characteristics from a social network perspective. This paper seeks to answer following research questions: (1) At an individual level, who are the gatekeepers of Truvada-related information on Twitter, and what are their characteristics? (2) At a network-level, what does the Truvada information dissemination network look like in terms of network characteristics? (3) What is the pattern of information flow of Truvada-related information on Twitter, if any? Data were collected in April 2013 using NodeXL, an analytic solution enabling scraping social network data from social media. Findings reveal that, among actors who disseminated Truvada-related information on Twitter, the most influential ones (having higher in-degree centrality) were non-Truvada user, located in the U.S., English-speaking, and using hashtags for tweets. In terms of user type, these important actors are individuals, non-profit organizations, and commercial groups. Interestingly, news media is lacking active presence in the picture. This points out the features of "audience gatekeepers" on Twitter, who acted as a hub to spread Truvada-related information in the network. It was found that news media play a less important role in disseminating information on Twitter, while non-profit organizations and individual users (especially current Truvada users) are active gatekeepers. In addition, according to CONCOR analysis, a group of people identified as Truvada users
are important actors in the network. They are self-reflexive, having more conversations with one another within their own group, receiving nominations from other popular actors, and appeared to have greater followers. They are exactly the active social media users whom Truvada-related interventions may want to target at. By identifying and monitoring their tweets in terms of quality and accuracy, interventions can cooperate with them to deliver correct messages and dispel misinformation. Last and not least, it was found that information-dissemination on Twitter (i.e., retweet activities) is both relationship-driven through followed ties and topic-driven through hashtags. Nonetheless, Twitter appears to be not a very "social" platform. The finding is consistent with previous studies, indicating that communication on Twitter seems to be one-way and not very reciprocal. Implications for future interventions are, firstly, health professionals may want to target at drug users who are active social media users to facilitate communication about medications, wherein users’ concerns and sentiment can be gauged. Secondly, future health interventions should carefully consider appropriate social media platforms used in light of their goals as being information dissemination or facilitating social support. To sum up, results from the current study help inform later health interventions as to how to deliver quality medical information through active gatekeepers and simultaneously deal with harmful medical information on Twitter and across similar social media platforms.

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"Hidden" social networks in behavior change interventions

Purpose: Many interventions do not account for the interaction among individuals and how such interactions may affect outcome, thereby negating the influence of social networks. The purpose of this study was to explore the unintentional "hidden" networks in a complex physical activity intervention. We argue that “hidden” (or unobserved) social networks are inherent in behavior change interventions, particularly in cluster trials, and hypothesize that such networks affect the outcome of behavior change interventions. We investigated (1) whether social networks were evident in a physical activity behavior change intervention, and (2) if evident, what the characteristics and evolution of the network structure were over time. Methods: Using RFID (radio frequency identification) technology embedded in swipe cards which participants scanned at sensors placed around the environment when undertaking physical activity, social connections were inferred based on spatio-temporal co-occurrences involving card scans: (1) on the same day; (2) at the same sensor location (at least at 3 or more co-occurrences); and, (3) timestamps within 30 seconds. We calculated the network density (proportion of ties in the network), degree centrality (number of ties in a node), triadic census (structure involving 3 people), total number of social ties (number of co-occurrences of card swipes between at least 2 participants), and the Jaccard index, a measure of network stability (proportion of stable ties to ties at each time point) to describe the network structure using UCINet 6 and Netdraw. Results: Of the 406 participants, 225 engaged in physical activity involving social connections with at least one other individual, with 5,578 social connections inferred over the 12-week intervention with 282 distinct pairings of participants, demonstrating clear evidence of unintentional "hidden" networks within the behaviour change intervention. Dyadic and triadic structures are evident at each point in time, illustrating a sustained pattern of participants walking with the same participants. The Jaccard index showed an increase in stability from a range of 8%---11% in weeks 1 and 2 to a range of 36%---45% in the last 4 weeks of the intervention, suggesting that walking "buddies," once established, remained stable. Results suggest that those engaged in physical activity with others maintained higher activity levels (i.e., 150 min/week) throughout the intervention, which is reflected by the larger node size. Conclusions: Results showed evidence of unobserved social networks in the intervention and illustrated how the network evolved over short periods and affected behaviour. Behaviour change interventions should account for the interaction among participants (i.e., social networks) and how such interactions affect intervention outcome. To our knowledge, this is the first study to provide explicit evidence of social networks inherent in behavior change interventions. We argue that these hidden social networks have typically been overlooked, unobserved, and subsequently underused in behavior change interventions.

Anthony Iacono
Network Dynamics of Ultimate Frisbee Pickup Games

As with any sport, it is interesting to consider what makes for a strong player in Ultimate Frisbee. Analyzing players in this sport presents a few unique complications. Participants in Ultimate Frisbee do not hold particular positions on the field, and the pickup game format allows players to switch teams between games, thereby bridging disparate networks. In addition, the demographic diversity of this study's participants, the free-form style of play, and the emphasis on the "Spirit of the Game", which places the responsibility of fair play and settlement of disputes on the players themselves, make this sport a unique challenge to study. Study participants are part of an Ultimate Frisbee pickup game group that has met weekly with few interruptions since its establishment in Monterey, California in 1990. A survey is used to collect attributes of the game participants, who are subsequently observed over a series of games in a single day. Edge lists are coded according to completed passes between players, and data from individual games as well as entire series are analyzed as discrete units. Using an actor-oriented model (SIENA) to analyze game data longitudinally, we compare player interactions over the series of games, using players' self-assessed abilities in throwing, catching, and embodiment of the spirit of the game, as well as structural effects as predictors.

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Creation of participants motivational structure of energy sector technological platform

Technological platform (TP) is one of the network tools of innovation infrastructure development. In energy sector TP helps to grow cooperation between different companies. As a result, organizations involved in this activity find partners and increase the number of mutual projects, create and affirm new standards, develop strategic directions of energy sector development etc. Despite the fact that TP is a widely used and successfully incorporated technique, it does not bring substantial benefits in Russian energy sector [Report on “Activity of innovation structure elements: assessment of Analytical Center at Russian Government state support efficiency”, 2014; Project of technological platform “Intellectual power system of Russia” implementation, 2012]. The companies do not intend to collaborate and develop mutual network. They usually co-work with those companies, which are confidential partners already and avoid new contacts. A question arises: why companies do not want to cooperate? What is the reason of any dynamics absence in a TP network? The purpose of the paper is to answer this question, by revealing the factors of joining to TP in energy sector. Most of the approaches to classification of factors, which spurn companies from networking are presented in two large groups – resource-based [Stuckey J.A., 1983; Harrigan K.R., 1985; Teece D.J., 1987; Burt R.S., 1992; Uzzi B., 1997; Borgatti S. P. & Foster P.C., 2003; Mahmood I.P et al, 2011; Schiavone F. & Simoni M., 2011] and relation-based [Coleman J.S. & Bourdieu P., 1991; Baum Joel AC & Oliver C., 1991;Burt R.S., 1992; Walker G. et al,1997; Stuart T.E. et al,1999] approaches. But Russian practice is not observed there. It complicates application of European or US methodologies into TP in Russian energy sector. To reach the purpose it is necessary to process the data, received from in-depth interviews with the managers of TP participants (State Coordination or Expert Councils etc. – representatives of the highest level of TP, Federal Agency correspond to middle level of TP, different companies, research laboratories, Universities – from bottom level of TP) to know their opinion about the entry and exit motives and about barriers of TP joining. As a preliminary result we plan to construct a map of the motives of TP joining.

Rachel Isba
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Medical student professionalism: a social network approach.
Introduction In the UK, medicine is mostly studied as an undergraduate degree, with many students entering university directly from secondary education. During their time at medical school, as well as learning the art and science of medicine, students are expected to develop skills and attitudes around professionalism. In undergraduate medical education, some “learning” of professionalism is thought to occur within the “hidden curriculum”. Whilst the use of social network analysis (SNA) in medical education remains novel, there is interest in the influence of social networks on the medical students within them, as part of this hidden curriculum. It may be that professionalism “diffuses” or is “transmitted” through medical student social networks in a similar way to other phenomena in other networks. If this is the case, then unprofessional behaviour may also spread through the network. Lancaster Medical School (LMS) is a small medical school in the North West of England that has approximately 50 students in each of five years of study, resulting in a total student body that is smaller than other UK-based medical schools have in a single year group. It therefore provides a natural laboratory for the study of a whole medical school student network. Students at LMS who display unprofessional behaviour may receive one or more “yellow cards” which flag up their behaviour to the medical school and trigger a formal intervention and review. Aim The aim of this study was to see how yellow cards were distributed within the social network of the student body, and to see if differences existed in the egonets of students exhibiting unprofessional behaviour. Methods In the academic year 2011-12, a social network analysis study was carried out at LMS that mapped the social networks of all the students at the medical school (n=248) at a single point in time. These data were then combined, retrospectively, with data relating to yellow cards that had been awarded to students that same academic year. Then, in 2013-14, a similar data collection took place where the social networks of medical students were again mapped (n = 254) and data collected relating to yellow cards (a direct measure of professionalism) and an independent measure of emotional intelligence (as a proxy for proto-professionalism). Results Ten students received yellow cards in the academic year 2011-12. These students were clustered in Year 3 – one of the most well-connected year groups within the network. The structural properties of the ego-nets of the students with yellow cards were also examined. Analysis of data from the 2013-14 academic year is ongoing. Conclusions Professionalism may diffuse through the social networks of medical students in a similar way to other behavioural phenomena. The network-based influence of students exhibiting unprofessional behaviour is therefore of importance to those delivering undergraduate medical education.

Cornell Jackson
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Using Network Density to Identify Potential Opinion Leaders in Medieval Scotland

This research attempted to see if social network analysis could identify opinion leaders who help to spread the innovation of the use of the Scottish regnal sicut clause in charters starting in the mid-twelfth century where traditional historical methods cannot. The data comes from the People of Medieval Scotland (PoMS) database which consists of mainly medieval Scottish charters. Because the PoMS database has been designed to reflect the formal structure of medieval charters, it is possible to test out the diffusion of innovations model using the spread of a particularly significant feature of Scottish charters. This is the ‘regnal sicut clause’. A sicut clause describes the terms of the holding of property through reference to the terms by which such possessions were held by others within a specific geographical area. The regnal sicut clause, then, is a statement that a church, settlement or other property is to be held as freely, peacefully and honourably (or suchlike) as any other equivalent property in regno Scotie or in regno Scottorum (‘in the kingdom of Scotland’ or ‘in the kingdom of the Scots’). This is significant because in the twelfth century, the term ‘Scotland’ only referred to a portion of the modern country, roughly between the Firth of Forth and the River Spey. The gradual emergence of the sicut clause in charters perhaps parallels the emergence and spread of a more modern sense of Scotland as a nation. This research combines social network analysis and the theory of the diffusion of innovations. The theory of the diffusion of innovations was created by Rogers (2003) and explains how change spreads through a population. Using Roger’s work, Valente (1995) proposed several models of how innovations diffused through a network. One of Valente’s types of relational network models uses an approach similar to ego network density. The denser this network, the more likely the individual is a late adopter of innovations. Because of the uncertainty of the dating of the charters, it was not possible to do a traditional diffusion of innovation study by building a communication network to see how the innovation of the Scottish regnal sicut clause travelled through the network over time. Instead, Valente’s
network density type of relational network model would be tested to see if it could also identify opinion leaders in the People of Medieval Scotland database. The first step was to use traditional historical methods to identify the opinion leaders who were involved in the diffusion of the Scottish regnal sicut clause as described above. The network built using the charter co-witnessing of all 9078 witnesses in the database was used to generate the ego network density for all of the possible opinion leaders. These densities were put in ascending order. There was a strong correlation found between those identified by traditional historical methods and those identified by relatively low ego network density. This gave high confidence that any other additional person with a low network density was also an opinion leader. This research attempted to see if social network analysis could identify opinion leaders who help to spread the innovation of the use of the Scottish regnal sicut clause in charters starting in the mid-twelfth century where traditional historical methods cannot. The data comes from the People of Medieval Scotland (PoMS) database which consists of mainly medieval Scottish charters. Because the PoMS database has been designed to reflect the formal structure of medieval charters, it is possible to test out the diffusion of innovations model using the spread of a particularly significant feature of Scottish charters. This is the ‘regnal sicut clause’. A sicut clause describes the terms of the holding of property through reference to the terms by which such possessions were held by others within a specific geographical area. The regnal sicut clause, then, is a statement that a church, settlement or other property is to be held as freely, peacefully and honourably (or suchlike) as any other equivalent property in regno Scotie or in regno Scottorum (‘in the kingdom of Scotland’ or ‘in the kingdom of the Scots’). This is significant because in the twelfth century, the term ‘Scotland’ only referred to a portion of the modern country, roughly between the Firth of Forth and the River Spey. The gradual emergence of the sicut clause in charters perhaps parallels the emergence and spread of a more modern sense of Scotland as a nation. This research combines social network analysis and the theory of the diffusion of innovations. The theory of the diffusion of innovations was created by Rogers (2003) and explains how change spreads through a population. Using Roger’s work, Valente (1995) proposed several models of how innovations diffused through a network. One of Valente’s types of relational network models uses an approach similar to ego network density. The denser this network, the more likely the individual is a late adopter of innovations. Because of the uncertainty of the dating of the charters, it was not possible to do a traditional diffusion of innovation study by building a communication network to see how the innovation of the Scottish regnal sicut clause travelled through the network over time. Instead, Valente’s (1995) network density type of relational network model would be tested to see if it could also identify opinion leaders in the People of Medieval Scotland database. The first step was to use traditional historical methods to identify the opinion leaders who were involved in the diffusion of the Scottish regnal sicut clause as described above. The network built using the charter co-witnessing of all 9078 witnesses in the database was used to generate the ego network density for all of the possible opinion leaders. These densities were put in ascending order. There was a strong correlation found between those identified by traditional historical methods and those identified by relatively low ego network density. This gave high confidence that any other additional person with a low network density was also an opinion leader.

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Magnus Dau (University of Siegen)

**Big Data’s Big Footprint: Big Data, Social Media, and International Politics**

‘Big Data’ already has a ‘big’ footprint in many areas of the pop culture most people are familiar with (think: predictions about box-office hits…). But when can Big Data help us know about the intersection of pop culture and international politics? This paper considers some of the key methodological challenges social scientists, and especially IR scholars, face when using Big Data to understand the linkages between the international and the everyday. As part of the Militarization 2.0 project, to examine these linkages, this paper focuses on how the arms production industry represents itself on social media and how these ‘legitimate’ images and texts form an important part of national branding—an exercise enhanced/exacerbated by user-generated content non-industry actors post elsewhere on social media. Relying on Michel and Aiden’s (2013) notion of culturomics (‘the application of massive scale of data collection and analysis to the study of human culture’) and Krieger and Belliger’s (2014) approach to using new media to interpret networks, this paper aims to develop a social network analysis for tracing
the how and where these ‘legitimate’ industry representations flow on social media, as a means of visualizing and interpreting these flows as networks.

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Gunn Elisabeth Birkelund (Oslo University, Norway)

Segregation within School Classes: Deriving Social Ties from Register Data

We present a method for deriving correlates of social ties in schools using large amounts of data from national registers, together with methods from network theory. While school segregation has been established at the macrolevel, we used this method to identify segregation patterns among immigrants also at the microlevel. Are social ties more prevalent among students of the same origin (to the extent that it affects educational choices)? We looked at educational choices within the Norwegian school system, where choices not only determine what subjects the students will study, but also which of their classmates will remain their classmates. The clusters of people making the same choice thus have two major properties. They are preference networks of those with similar academic interests, but also social networks. The issue here is to disentangle the latter from the former, and find predictors of the social ties. We used register data to construct choice networks within school classes and correlated these to ethnic origin. (Even though these are not necessarily social networks, they are still networks in the formal meaning, and modelling them as such gives us access to conventional network methods.) We also constructed hypothetical choice networks between students on the same school and educational programme, but where social ties were absent. These are thus proper preference networks, and by correlating these to the variable of interest (here ethnic background), we found a baseline for academic preferences with respect to individual properties. By studying the net effects of the first networks, with preference and social properties, compared to these proper preference networks, we could isolate the social effect from preferences predicted by the variable under study. By using the quadratic assignment procedure (QAP), we could account for statistical dependencies such as triadic closure. Finally, we performed a meta-analysis over all networks. In this paper, we thus suggest methods both for predicting social ties controlling for group-level preferences, and for providing accurate measures of these. Our main hypothesis was that students with the same country of origin would associate more than students with different countries of origin. For each cohort, we constructed 1,000 simulated networks for significance testing, following the concept of QAP. The weighted average correlation coefficient within classes is 0.057, which is significantly different to what we expect under the null hypothesis, according to the QAP. Repeating the same for the between-class design, the correlation is 0.019, giving a net effect of 0.038 (all p < 0.01). We conclude that there is a significant correlation between shared origin and making the same educational choice, also when accounting for group-level preferences. We also made further studies and can conclude that our results suggest that social ties are indeed more likely to form between immigrant students (including second-generation immigrants) of the same countries of origin, over and above cultural propensity effects, but this does not apply to students from culturally similar countries. There are also small, but significant, effects of shared gender, parental education and income.

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Michelle Birkett, Gregory Phillips II (Northwestern University, Department of Medical Social Sciences), Joshua Melville, Bernie Hogan (University of Oxford, Oxford Internet Institute), Noshir Contractor (Northwestern University, Department of Communication Studies, Industrial Engineering and, Management Sciences, and Management and Organizations), Brian Mustanski (Northwestern University, Department of Medical Social Sciences)

Multiplexity in Social, Sex, and Drug Networks among Young Men Who Have Sex with Men

Few studies have comprehensively assessed the intersection of multiple network types such as social, drug, and sexual networks. However, some prior research has suggested that overlap in sexual and social networks may facilitate increased levels of risk behavior given the higher levels of intimacy inherent in multiplex relationships. Similarly, overlap in drug and sexual networks may also facilitate increased risk behavior through risky peer social norms and the intersection of drug use and sex.
Alternatively, network multiplexity could promote healthy behavior if health-positive social norms travel more quickly or are enforced more efficiently in multiplex networks. Yet, little is known about multiplexity in sex, social, and drug use networks and, given the important, and sometimes contradictory, predictions of previous studies, important questions remain unanswered. Accordingly, this study explores predictors of multiplexity in the social, sexual, and drug use networks of young men who have sex with men (YMSM). As YMSM experience significant health burdens, such as heightened risk for substance use and HIV, both multiplexity and the relationships between multiplexity and drug use behavior will be explored. Data for this study come from RADAR, a large longitudinal cohort study of YMSM. Egocentric network data for RADAR is captured using a novel digital touchscreen interviewer-assisted tool (NetCanvas), which was developed for this project. Preliminary results suggest the highest level of multiplexity is between social-drug use networks (mean correlation = 0.49), with social-sexual networks showing the next highest correlation (mean correlation = 0.34) and sexual-drug use networks showing the lowest correlation (mean correlation = 0.21). Only 9.5% of participants had significant correlation between social-sexual networks, as determined by quadratic assignment procedure (QAP). However, 47.6% of participants had significant correlation across social-drug use networks using QAP.

Ego use of marijuana in the past 6 months (b = -0.29, p < 0.01) and use of drugs other than marijuana in the past 6 months (b = -0.25, p = 0.02) was associated with lower correlations between social-sexual networks compared to egos who did not use drugs in the past 6 months. However, ego use of marijuana was associated with higher correlations between sexual-drug (b = 0.31, p = 0.01) and social-drug (b = 0.24, p < 0.01) networks compared to egos who use drugs other than marijuana. Accordingly, network multiplexity does appear to vary across YMSM, and individuals who use drugs tend to have less overlap across their networks. These results will be discussed in the context of the potential importance of multiplexity to health promotion.

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Tsinghua U

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Why is Trust in the Central Government Higher than Local Governments in Rural China?

In China, the high-level government is the most trustworthy level of government for the public, while the various local governments and villages are the least trustworthy. This paper would like to propose a viewpoint concerning distributive justice of local governments to explain this puzzle. We first hypothesize that an individual's cognition of fairness in government service reduces the difference between his or her trust in the high-level and local governments. Chinese rural residents enjoy the same high-level government policies without difference, but may find these policies implemented in various ways. In other words, they may receive different treatment from the local governments. A person who receives poor treatment will consider the local government unfair, and this reduces trust in local governments. Following this argument, we then propose that individuals either with rich micro-level social capital or deeply embedded in a community may have opportunities to influence the distribution of public resources which benefit their own interests. Local governments are thus transparent and helpful for them; that raises their trust in local governments. 556 cases sampled from Wenchuan earthquake area are included in our explanatory model. These hypotheses are confirmed, so we conclude that only local governments, rather than high-level government, are blamed due to distributive injustice, since they take responsibility to distribute government resources in executing public policies. When the inequality in rural community increases, the difference between trust in high-level and local government turns to be huge.

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A Typology of Embeddedness: An Application to Civic Organizations in Cape Town, South Africa

The urban environment of Cape Town is contested along various dimensions of race, class and geography and presents an important case study to (i) learn about collective action processes in newly
developing democracies, and (ii) how legacies of apartheid shape the structuring of civic networks. Drawing on a structural and relational network approach, we interviewed 130 civic associations mobilizing on a range of issues, including conservation of animals and habitat, the promotion of urban agriculture, and access to housing, water and sanitation. Groups came from white affluent areas, to black informal settlements (slums). Here we use Exponential Random Graph Models to test the extent by which there is mixing across geographic locales, racial composition, and levels of radicalization in the network of 120 organizations. We compare findings across networks of multiple types of ties: sharing information, sharing resources, working together on events, and sharing membership.

Eva Jaspers
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Positive or Negative Interethnic Ties and Ethnic Identity among Adolescents

Ethnic identity is one of the most studied and debated aspects of human identity. Ethnic identities are not problematic in itself, however in multi-ethnic settings strong ethnic identities may lead to conflict and avoidance between ethnic groups. We know that friendships tend to be homogeneous with respect to ethnicity. But also that intergroup friendships have shown to be the best way to reduce prejudice. Children as young as eight years old develop an ethnic identity and a preference for their own ethnic group, unless they learn to include others. The current paper studies to what extent positive and negative ties with own and other ethnic groups affect the importance young people attach to their ethnic identity. We know that The current study will focus on the relative importance of negative ingroup versus outgroup relations based on the ethnic congruence of the relation. While a number of studies have investigated frequencies of inter-ethnic bullying and victimization (Tolsma et al., 2013; Veenstra et al., 2007), no research so far has attempted to compare the relative impact of intra-ethnic versus inter-ethnic negative ties on the importance of ethnic identity for minority and majority adolescents. However, following Social Identity Theory, differences in impact can be expected depending on whether it concerns an ethnic ingroup relation (i.e. intra-ethnic) or an ethnic outgroup tie (i.e. inter-ethnic), especially in multiethnic school settings. In line with this argumentation, previous studies have shown that significant others are mostly co-ethnic peers (e.g. Baerveldt et al., 2007). Further support was provided by Bernstein et al. (2010), who found that the negative effect of social exclusion on individuals’ basic social needs (e.g. belongingness and self-esteem) was moderated by the racial ingroup and outgroup relationship between the interacting parties. Rejection by racial ingroup members had a significantly stronger impact on one’s sense of belongingness and self-esteem than rejection by racial outgroup members. It is expected that negative ties with outgroup members increase (importance attached to) ethnic identities, whereas negative ties to ingroup members decrease these. We make use of the first two waves of the longitudinal dataset Children of Immigrants Longitudinal Survey in the Netherlands among adolescents, for which approximately 4,000 pupils were interviewed twice in their classrooms. We calculate negative ties with in- and outgroup members based on a sociometric questionnaire at T1 and ethnic identity at T2. We use structural equation modelling. Preliminary results indicate that negative ties with outgroup members increase importance attached to ethnic identities, however the strength of the relationship is dependent on the relative size of the ingroup in class.

Daniela Javorics

Brokerage and historical network analysis in the weekly journal "The New Europe" 1916-1920

Historians used network as a metaphor for friendship and connections between different actors of their analysis. In the past 20 years historical network analysis became more and more popular as a methodical tool to visualize the networks of different actors. This presentation focuses on an elite network of important politicians, historians and advocates around Europe discussing the reordering of Central Europe after the end of the First World War. Within the exemplary network of the weekly journal "The New Europe", published in London from 1916 to 1920, the network brokerage such as propensity for some ties to bridge between these more closed network regions can be visualized. Burt (2005) argues that when social capital is optimized, brokerage and closure operate together. Robins, Pattison et al. argue that different types of network brokerage exist such as brokerage through hubs or a core of nodes; brokerage distributed across the network through overlapping group membership and brokerage through bridging ties. After identifying the brokers within the network, different set of brokerage are able to locate. The written sources of the group of authors of journal “The New Europe” will be analyzed.
The actors had their own ideas how the Habsburg Empire might be reformed or what kind of state could be function instead in the area of central Europe. Borders between the different regions where drawn in maps. Concepts of ethnicity, nationality, language and identity in general were established as new categories to build unities. The journal was mainly financed by the British historian Robert W. Seton Watson and the later Czechoslovakian president Thomas G. Masaryk. Questions of which theoretical input of the social network analysis is useful for historical network analysis will be also answered as well as questions of the broker positions within this small elite network, which reached from Canada to Asia, including prominent figures of the opposition movements in East and Central Europe.

Michael Jenkins
Ann Bisantz, James Llinas, Raskesh Nagi

Towards Effective Visualizations for Social Network Analysis: Empirical Study of Human Sensemaking with Network Visualizations

Network visualizations are being used increasingly across a range of domains to support visual analysis of complex datasets. However, little empirical research exists on what types of tasks they effectively support and how to design them to do so. Instead, designing network visualizations is often carried out with the goal of maximizing visible information in an aesthetic form, with the expectation that information will transfer to viewers' heads in a straightforward manner. This is largely due to a lack of empirical evidence justifying their use and providing concrete guidance for visualization designers. To begin to address these challenges, we present summarized results of an empirical investigation evaluating the effectiveness of visualizations at supporting five tasks necessary for identifying patterns and exceptions in represented data to enable generation and refinement of hypotheses to discover unknown phenomena (i.e., human sensemaking). A basic visualization design was compared to both a tabular display and two visualizations that used additional graphical variables to encode data attributes in the primary visualization view. To summarize performance benefits across 100+ dependent task performance measures, mean performance rankings were generated across displays. Results showed that basic visualizations often failed to offer performance benefits over non-visualization displays for both foraging and knowledge-based sensemaking tasks, frequently resulting in decreased performance, while graphically-enhanced network visualizations provided significant performance benefits. This finding provides empirical support illustrating that network visualizations, when not designed to meet data, task, and viewer requirements can actually hinder performance, but when appropriately designed can significantly improve sensemaking task performance.

Samuel Jenness
University of Washington

Steven Goodreau (University of Washington), Martina Morris (University of Washington), Susan Cassels (UC Santa Barbara)

Effectiveness of Male Circumcision for HIV-1 Prevention Depends on Contact Network Structure

Background Targeting implementation of effective biomedical HIV prevention tools like male circumcision based on behavioral composition of the population is needed to maximize public health resources. Additionally, the design and rollout of combination prevention packages depends on the synergistic effects between biomedical tools and behavioral change. We investigate how dynamic sexual network structures influence the impact of circumcision among heterosexuals in Sub-Saharan Africa (SSA). Methods With a dynamic stochastic network model using the statistical framework of exponential random graph models (ERGMs) for HIV-1 transmission dynamics, we parameterized a baseline model for western Africa using egocentric network data from a new population-based study in Ghana. Levels of male circumcision prior to sexual initiation were varied from 90% (baseline) to 10%. Levels of network connectivity were varied relative to the observed point prevalence of concurrency, from 50% to 150% of baseline levels. Results The combined effects of circumcision and concurrency appears sufficient to explain the empirical population-level variation in disease burden across regions of SSA. For interventions, a 10% absolute change to concurrency prevalence is equivalent to an 80% change in circumcision prevalence. A 10% increase in circumcision would reduce HIV incidence 3.3-
fold in low-concurrency settings and 1.1-fold in high-concurrency settings. Given current ART coverage, epidemic extinction only occurred during both large-scale changes to network connectivity and circumcision prevalence. Conclusions Structures of dynamic sexual networks should be considered in targeting circumcision campaigns, and integrated into combination prevention packages. Synergistic biological and behavioral change in southern Africa could lead to a reduction of incidence to the low levels observed in western Africa.

Kent Wickstrøm Jensen
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Networks around indigenous and migrant entrepreneurs: Embedded in different spheres

This paper is concerned with unpacking the differences in the network compositions of migrant and indigenous entrepreneurs. Entrepreneurs are networking for advice from several environments such as the private sphere, the work-place, the professions, the market and the transnational environment. Entrepreneurs differ in their networking in such environments. Notably, the networking of migrant entrepreneurs in the private sphere and the transnational sphere has been emphasized as particular important for the establishment of migrant businesses. In particular, the social capital of immigrant entrepreneurs has been associated with immigrants’ embeddedness in cohesive and supportive family and ethnic community structures (Zhou, 2004; Light 1972; Bonacich; 1987; Coleman, 1988; Alejandro Portes & Jensen, 1989). Also, entrepreneurial advantages derive from bridging across institutional boundaries (Dori et al., 2009; Rath & Kloosterman, 2000; Vang and Overby, 2006). Thus, immigrants seem to have particular advantages from networking more intensively in specific social spheres that are somewhat distinct from those accessible for indigenous entrepreneurs (Carmichael et al, 2010; Levin and Barnard, 2010). Opposite, migrants may experience several constraints in accessing resources from important actors in their host country; in particular when such actors are located outside the ethnic community. Examples of such constraints include those arising from racism, discrimination, prejudice and stereotype interpretations (Amin, 2013; Zhou et al, 2007; Patel and Conklin, 2009). In addition, immigrant entrepreneurs may be constrained by a lack of knowledge of the institutional structures of their host country; i.e. how to speak the language, how to act according to local norms, customs, and legal regulations, etc. (Busenitz, Gomez, & Spencer, 2000; Muegge & Reilly, 2011; Portes & Sensenbrenner, 2003). While many studies have delivered an impressive knowledge base on the particularities of migrant networks, there are still important shortages in our knowledge of how networks of migrant entrepreneurs compare to the networks of indigenous entrepreneurs. To our knowledge, no large scale studies have so far examined the extent to which migrants networking in different spheres vary from the networking of indigenous entrepreneurs. Using a sample of 40,494 entrepreneurs across 37 countries surveyed in 2012-13 in the Global Entrepreneurship Monitor, we compare first and second generation migrant entrepreneurs’ networking in different spheres with the networking of indigenous entrepreneurs. Their networking is analyzed by hierarchical linear modeling. Results indicate that first generation entrepreneurs have larger advice networks compared to indigenous entrepreneurs. First generation migrants as expected networked more in the transnational sphere. More surprisingly, however, they also had larger networks in the professions sphere compared to indigenous entrepreneurs. Also counter to our initial anticipations, second generation migrants have larger networks in the professions sphere when compared to indigenous entrepreneurs, and they network less in the private sphere. The results suggest that the role of the private sphere in immigrant entrepreneurship may not be as prominent as often asserted in previous migrant entrepreneurship studies. Also, while first generation migrant entrepreneurs likely benefit from social capital associated with their bifocal connectedness, these potential network advantages do not readily seem to transfer to second generation migrants.

Nasreen Jessani
(Johns Hopkins University)

Marc Boulay (National Insitutes of Health), Dismas Ongore (University of Nairobi), Sara Bennett
(Johns Hopkins University)
Do academic knowledge brokers exist? Using Social Network Analysis to identify research-to-policy networks of faculty from six Schools of Public Health in Kenya

Introduction The potential for academic research institutions to facilitate knowledge exchange and influence Evidence-Informed Decision Making has been gaining ground. Understanding academic-policymaker networks can facilitate the enhancement of links between policymakers and academic faculty at Schools of Public Health (SPHs), as well as assist in identifying academic knowledge brokers (KBs). Methods We identified academic KBs across six SPHs in Kenya using Social Network Analysis (SNA) in a two-step approach: First, we ranked individuals based on 1) Number of policymakers in their network; 2) Number of peers who report seeking them out for advice on Knowledge Translation; and 3) their network position as “connectors” between researchers and policymakers. Second, we triangulated the three scores and re-ranked individuals. Those scoring within the top decile across all three measures were classified as KBs. Results The results were striking with each SPH commanding a variety of unique as well as overlapping relationships with national ministries in Kenya. We identified 7 KBs out of 124 full time faculty. KBs represented 4 SPHS, only 1 was female, and 4 held positions of leadership. Those scoring high on the first measure were not necessarily the same individuals scoring high on the second. KBs were situated in a wide range along the “connector/betweenness” measure. Conclusion SNA is a novel and valuable methodology for identifying academic-policymaker networks in Kenya. We propose that triangulation of three scores, rather than reliance on the traditional use of “betweenness centrality,” best captures the nuances of the roles of KBs within these networks. More efforts to conduct similar network studies would permit SPH (and other academic) leadership to identify existing linkages between faculty and policymakers, shared linkages with other SPHs, and gaps so as to contribute to evidence-informed health policies

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Dynamics of Culture Frames and Framing Effects on the Macro Level: A Semantic Network Analysis

Culture is thought to be determinant of society’s framing activities. In the era of globalization, the world’s media provides a series of arena in which symbolic interactions and competitions are being carried out among various cultural groups on the macro level. Their purpose is to negotiate the reality of the perceived world and the dominant world culture. A directional semantic network analysis was conducted to investigate how national political culture shapes the news frames of media coverage of peace in the United States, China, and Russia. Specifically, the ConText software was used to analyze news coverage of peace from U.S. (Associated Press & New York Times), China (Xinhua News Agency & China Daily), and Russia (TASS Russia News Agency & RIA Novosti) in 2014. English-language news stories were selected from the LexisNexis database. 1,095 (365 x 3) daily semantic matrices of news coverage of peace, one each for the U.S., China, and Russia were generated. The saliences of symbols were measured by analyzing the in-degrees (the object) and out-degrees (the subject) of symbols in semantic networks. The dynamic co-evolutions of these symbolic network measurements were examined to illuminate how the American, Chinese, and Russian news agencies interact and compete in sponsoring their culture frames to negotiate the meaning of peace. Time lags were examined to determine the causes and directions of the symbolic co-evolutions. The cultural characteristics of news frames were relatively stable over time. The concept war had the greatest mean in-degree in semantic networks of news coverage of peace in the U.S., indicating America’s emphasis of war-culture. The concept stability that illustrates the central concern of Chinese political culture had the greatest mean in-degree in semantic networks of news coverage for Russia. At the macro level, the co-evolutions of the network measurements of the cultural symbols and the time lags for the symbolic co-evolutions were found, indicating the symbolic interactions and competitions happened between news coverage of peace for
international news agencies from different nations. The cultural, historical, religious, and geopolitical implications of these symbolic interactions are discussed.

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Exeter University

Dr Kai Liu (University of Greenwich)

Social Network Analysis and the Creative Industries: searching for similarities between creative domains

In this paper we discuss creativity through a Social Network Analysis (SNA) perspective (Gloor et al, 2008; Perry-Smith & Shalley, 2003) and if there is commonality between different Creative Industries (CIs). The CIs have often been grouped together for political and economic analysis because they are said to have certain creative features. The Department of Culture, Media and Sport (DCMS) in the U.K., for instance, has currently categorised the following CIs: Advertising, Architecture, Crafts, Design, Film/TV/Video/Radio/Photography, I.T./Software, Publishing, Museums/Galleries/Libraries and Music/Performing Arts (DCMS, 2015). We have used this CIs framework to research the commonalities between the industries, and if similar themes are sought for and revealed in network analysis literature that has been applied to each of them. To do this, we undertook a small systematic literature review of CI literature using SNA, published between 2005 and 2015. Using Science Direct we used the advanced search facility to search for the CI in question as well as “social network” or “network analysis” to appear in the journal paper title. The resulting journals were manually considered so that research was specifically about the CIs. Thematic analysis was then applied to the abstracts of those papers found to ascertain themes and common themes emerging in different CIs. It is acknowledged that there may be many other papers about each of the CIs that do not make reference to the core search terms referred to in this paper, or that maybe found through other scholarly search engines. Our results found there was a large range in the number of journal papers founds between the CIs, with some CIs having far more journals referencing SNA than others. For instance, there were 17 journal papers in reference to SNA and the CI of I.T./Software. In comparison, there were no journal articles found in relation to the craft industry. We also found that were some overlaps between CIs, for example, the use of film, software and TV within the advertising CI. Major themes of commonality that emerged between the CIs were adoption (information, knowledge or new product), collaboration between team members and firms and finally the role of social media and learning in the context of each CI. Our research highlights CI areas where the application of SNA has not been adopted as readily as in other areas (such as the craft industry), and points to future areas of research. Our research also suggests common CI themes that seem prevalent in CI SNA research – diffusion of creativity, creative team collaboration, and the importance and role of learning in the creative process.

Jeffrey C Johnson
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David T Dillon (University of Florida)

Guns, Bibles, Women and Violence: A Network Analysis of Gun Conceal and Carry Reciprocity among States in the U.S.

This study offers a novel, network perspective in the ongoing debate between gun advocates and those who seek to limit the number and range of firearms available for purchase in the United States. Pro-gun politicians and interest groups have repeatedly claimed that increasing the number of law abiding citizens with guns will reduce the overall rate of crime as in Wayne LaPierre’s, Executive Vice President of the National Rifle Association, quote “The only thing that stops a bad guy with a gun is a good guy with a gun…” We sought to test the assertion that increased access to guns is related to, among other factors, a decrease in violent crimes such as aggravated assault and forcible rape. We created a network of firearm conceal and carry reciprocity agreements between U.S. states to examine the network structural properties of conceal and carry reciprocity. We examined the structural equivalence of reciprocal agreements among states and visualized the results using non-metric multidimensional scaling (nMDS). Property fitting analysis was then performed using the nMDS coordinates against additional state level data on crime, religion and women’s rights to examine their relationship to the
position a state occupies in the structural equivalence of reciprocal agreements. From this there emerged two clear clusters (dimensions) of states, one composed largely of more liberal states with little to no reciprocity (e.g. California, New York, Hawaii) and second of more conservative states with large numbers of reciprocal agreements (e.g. Arizona, Alabama, Montana). Contrary to what gun advocates might claim, states with less restrictive gun laws and higher rates of gun ownership (i.e., had many reciprocal conceal carry agreements) tended to have higher rates of violent crime, particularly forcible rape. Further, and also of cultural interest, these states were also higher in religiosity. On the other hand, the cluster of more liberal states (i.e., those with fewer reciprocal conceal carry agreements) was associated with less violent crime (e.g., burglary), lower levels of religiosity and more indicators of the presence of women’s rights.

Adam Jonas
University of Kentucky

Marissa D. King (Yale University)

Better get a second opinion (from another network component): Does the structure of U.S. physician patient sharing networks help explain regional variations in prescription costs?

The role that social relations play in pricing behavior is of central interest to scholars working at the intersection of markets and networks. Social networks have been found to influence prices in a wide variety of industries ranging from securities markets (Baker 1984) to legal services (Uzzi and Lancaster 2004). However, very little work has used network analytic approaches to help explain persistent differences in health care costs. One of the most puzzling questions in health care is why prices for the same goods and services will often cost twice as much in some regions of the country as in others. The only previous study examining the association between network structure and health care prices found that a standard deviation in physician median degree centrality was associated with a 17.8% increase in cost of care. However, this study was limited to patients on Medicaid which limits its generalizability. Our study uses a prescription dataset that contains the majority of psychotropic prescriptions filled in the U.S. from 2005-2009. Using data from more than 900,000 physicians who wrote a prescription for a mental health medication, we construct 2-mode physician-patient networks. These networks were then converted to 1-mode physician networks based on sharing of four or more patients and bounded by the three digit zip code in which the physician practices (Barnett, et al. 2011). The resulting 876 networks of 220,238 total physicians were subjected to a battery of statistics to better understand their network structure, such as component distribution, diameter, density, average path length, centralization, modularity, average degree, and average betweenness centrality. Homophily among prescribing habits of specific drugs is also examined. Lastly, preliminary analysis using hierarchical linear modelling demonstrates that areas with more cohesive physician networks tend to have significantly higher prescription drug costs. The dramatic variation in network structure we observed, which is strongly associated with cost of care and are unobservable to patients, suggest that both patients and payers may benefit from getting a second opinion.

Martijn Jungst
Maastricht University

Work relationships and organizational citizenship behavior over time: a social ledger perspective

Since the introduction of the weak tie theory (Granovetter, 1973) and structural holes theory (Burt, 2000), many network scholars have focused exclusively on positive relationships (Labianca, 2014). Scholars focusing on positive relationships argued that social embeddedness (i.e., the contextual influences of social ties and networks on individual actions (Granovetter, 1985)) provides individuals opportunities and benefits, such as career success (Seibert, Kraimer, & Liden, 2001) and job performance (Sparrowe, Liden, Wayne, & Kraimer, 2001). However, in a recent meta-analytical review, Brass (2012) showed that empirical evidence linking individuals’ social network to distal and proximal outcomes has been equivocal at best (Venkataramani, Labianca, & Grosser, 2013). One important reason for these inconsistent findings could be the overemphasis on positive relationships and the exclusion of negative relationships (Labianca & Brass, 2006; Labianca, 2014). In the present study, we examined how positive relationships (i.e., team density) moderates the effects of negative relationships
(i.e., task conflict) on organizational citizenship behavior (OCB). Departing from the social ledger model (Labianca & Brass, 2006), we suggest that positive and negative relationship must be studied together to understand the complexities of social interaction at work. We collected four waves of data from 88 students (28 project teams) enrolled in a graduate course of an international business school in the Netherlands. Random coefficient modeling (RCM) was used to analyze the dynamic relationships among the constructs (i.e., psychometric and sociometric) (Bliese & Ployhart, 2002). The results showed that negative relationships (i.e., task conflict) associated positively with OCB over time. We also found that the higher the density of the team, the more likely it was that task conflict associated positively with OCB over time. This study makes several important contributions. First, this study showed that positive and negative relationships influence the effects of each other over time and must be studied together to understand the complexities of social interaction at work (Labianca & Brass, 2006). Second, enhancing our understanding of the complex nature of intrapersonal relations at the workplace might be helpful for HRM professionals or managers in creating and implementing those HR practices stimulating the development of beneficial relationships at work.

Anna Karoline Kaiser
PhD - University of Mannheim

How legitimacy travels though social networks: cooperation patterns among witchcraft persecutors in Early Modern Scotland, 1563-1736

The paper I propose for this year’s Sunbelt Conference is a network study about legitimacy. My case is witch-hunts in Early Modern Scotland. Using a unique database that contains the full population of accused witches, I investigate different cooperation patterns in a network of persecutors who made strategic alliances in order to generate legitimacy. I argue elsewhere that witch trials were a by-product of a search for reputation conducted by people who anticipated career opportunities (Mitschele 2014). Persecutors used witch trials as a means to get access to career opportunities. In the paper I propose to present, I show empirically how rather than why they did that. On a theoretical level, this allows me to make inferences about how legitimacy is coupled with social structure. Legitimacy is notoriously hard to measure. The consequences of its existence or absence can be observed in moments of popular consensus or resistance, respectively. However, it’s much more challenging to investigate how legitimacy is brought about. Witch trials offer a unique opportunity to study the production of legitimacy, as they are entirely and exclusively dependent on it. From the perspective of the persecutor, legitimacy is the necessary and sufficient condition for witches to exist. The question therefore is: How were persecutors able to extract individuals from their local communities and either convince the public or force the community to accept that there are witches amongst them. In total 3212 named individuals were accused of witchcraft in Scotland between the years of 1563 and 1736. I use an existing database that contains every person ever accused of witchcraft in Scotland, her place of residence, the date of her trial, other witches that she accused and the prosecutors and judges she was confronted with. I analyze these data using social network analysis. This approach enables me to show how conceptualizing legitimacy as socially embedded fosters our understanding of social mechanisms and helps to generate theories that are more realistic. Legitimacy has hitherto been understood as a property or resource of a person or office. I argue that rather than holding themselves positions of traditional, legal or charismatic leadership, actors may benefit from connecting to others holding these positions. Legitimacy travels through networks. I find that Protestant ministers are propelled into witch-hunting in moments when their position is weak. Traditional officeholders are recruited by virtue of the duties of their office. All of this is part of a strategic scheme of career opportunists who harvest legitimacy through the channels of network connections. In other words, cooperation patterns change with political context both in terms of actors’ attributes and types of ties. Goodare, J. et al., 2003. Survey of Scottish Witchcraft. Available at: http://www.arts.ed.ac.uk/witches/. Mitschele, A., 2014. Identity and Opportunity in Early Modern Politics: How Job Vacancies Induced Witch Persecutions in Scotland, 1563–1736 151. In G. Manzo, ed. Analytical Sociology: Actions and Networks. John Wiley & Sons, pp. 151 – 178.

Yuval Kalish
Tel Aviv University

Leadership emergence in short-lived groups: Shared expectations, personal preferences and time in leadership perceptions
Research into leadership emergence typically focuses on the attributes of the emergent leader. By considering also the attributes of perceivers and the passage of time, we develop a more complete theory of leadership emergence in short-lived groups. Using Expectation States Theory as an overarching theoretical framework, and integrating it with theories of person preference, we examine the predictors of leadership emergence in short timeframes. We conduct two field studies, the first in an academic workshop (n = 65) and the second in a military assessment bootcamp (n = 87). For each study, we use cross-sectional and longitudinal Exponential Random Graph models to analyze data on participants' personalities and abilities and on their perceptions of who, in their respective groups, were "leaders". We find that the criteria by which people perceive leadership in others change over time, from easily noticeable attributes to covert leadership-relevant attributes, and that people also rely on leadership-relevant attributes that they possess at high levels to inform their perceptions of leadership in others. The integration of Expectation States Theory and personal preference theories is needed for a full understanding of leadership emergence in groups, because perceivers' own personalities and abilities are instrumental in shaping their perceptions of emergent leadership over time. Theoretical and practical implications are discussed.

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Do personal relations affect employees' task performance?

This study analyzes an effect of the structure of social networks of workers on their job performance. The main hypothesis is that the worker's centrality in a network is positively correlated with her or his job performance. Our study based on data collected from three departments of a biggest Russian insurance company "Rosgosstrah". Data set contains observations of 69 persons (51 women and 18 men), including 16 supervisors at different levels. Data includes information about relationships between employees and workers' job performance. Relationships are divided for four types: friendship, professional relations, supervisor – subordinates, supports (emotional, professional, advising). Relations are valued along to a seven-point scale that allows building weighted directed networks. Also, data provides information about different aspects of job efficiency. It includes (i) employees' self-evaluation of their job behavior performance and (ii) supervisors' evaluation of workers' productivity. Based on this we construct an objective measure of workers' performance. Moreover, the data set includes workers' characteristics (such as job position, experience, education, age and sex), and that allows separation of effects of individual' features from network effects. Thus, our analysis determines the self-sufficient role of network characteristics on employees' job performance.

Marlene Kammerer
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Christian Hirschi (ETH Zurich)

Networks, policy beliefs and advocacy coalitions in international climate change politics 2005-2014

In this paper, we analyze policy stasis and change in the realm of international climate change policy-making with a particular focus on the underlying change preventing or promoting political structures. Specifically, we are interested in the stability and alteration of network features, policy-relevant belief structures and actor constellations over time as key drivers of policy change (or the lack thereof). Although nation states undoubtedly continue to remain the main actors in international climate change policy-making, we argue that the international climate change policy field today actually resembles a policy subsystem – a concept usually assigned to the domestic policy arenas, involving a wide range of different types of actors (state and non-state actors from various levels) who regularly seek to influence policy choices around the climate change issue. To analyze and understand policy processes in the international climate change policy subsystem, we apply the Advocacy Coalition Framework (ACF, Sabatier and Weible, 2007) as a suitable approach to better understand coalition formation and behavior, learning and policy change. In doing so, we break new theoretical grounds as former
applications of the ACF usually focus on domestic policy processes in Western Europe and North America. In line with most recent applications of the ACF outside this regional focus (Henry et al., 2014) and with a particular emphasis on foreign policy issues (Hirschi and Widmer, 2010, Pierce, 2011), we further extend the theoretical scope of the ACF and explore the framework’s potential to better understand the policy process on a global policy issue such as climate change. Empirically, we use political event data analysis to collect and systematize information on the international climate change policy process in a long-term perspective. Event data describes interaction patterns between various kinds of actors over time by encoding who did what to whom and when. In addition, we code for all the actors their key policy preferences and understand them according to the ACF as a function of underlying belief systems. Methodically, we apply a time dynamic network model (Separable Temporal Exponential Random Graph Model, STERGM) that allows for a systematic testing of hypotheses on how and why network features, policy-relevant belief structures and actor constellations have evolved over time (Krivitsky and Handcock, 2014).

Jun Kanamitsu
Kyoto Sangyo University

Does good Reputation lead to good governance and ROA for interlocked corporations?

Corporate reputation as a form of corporate social capital plays an important role in contemporary corporate governance. We investigate mechanisms of external control of corporations through corporate reputation, prestige and status among director-interlocked corporations. Large data sets of corporate directors and profiles of listed Japanese companies in 2014 enable us to detect such corporate mechanisms. Multiple regression analyses reveal that highly reputed corporations have long corporate history enjoying higher status and prestige despite their mediocre corporate performance. Honda, Sony, Panasonic are such corporations. However good corporate reputation does not lead to either high ROA or ROE. It is surprising to see that corporations with lower status and fewer outside directors enjoy higher ROA. That contradicts our assumptions.

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Florida International University Center for Research on U.S. Latino HIV/AIDS & Drug Abuse – CRUSADA

Jessica Weissman (CRUSADA), Maritza Jaramillo (CRUSADA), Maria del Carmen Santos (CRUSADA), Rosa Babino (CRUSADA), Patria Rojas (CRUSADA), Patsy Cardwell (enFAMILIA), Yesenia Rojas (enFAMILIA)

US Latina seasonal farm workers: a qualitative study of their social network and its impact on substance abuse

PURPOSE: Most public health studies with US farm workers focus on migrant workers—those who travel to work in agriculture. Migrant workers are now relatively rare (~5% of farm workers). Due to improved mechanization, having US citizen children, and concerns over US immigration policies, seasonal workers—those who do not migrate—now compose the vast majority of farm workers (~3-4 million people). Although few studies with Latino female seasonal workers (LFSWs) are available, the literature suggests an emergent problem in the prevalence of non-medical use/abuse of prescription medication and substance abuse. This qualitative study aims to identify the characteristics of LFSWs’ social networks and explore how LFSWs’ social networks have changed over the past 10 years. Methods: Three focus groups were conducted in South Florida (N=27) in January-February 2015. Using core questions as initial structuring framework, major themes were identified using ATLAS.ti. Two independent researchers analyzed transcripts separately. Global analysis of common elements and discrepancies was performed. Results: At immigration police checkpoints in Florida, South Carolina, and North Carolina, almost half of LFSW network members were deported. As a result, configuration of LFSW social networks constantly changed. Initially, LFSW social networks members were only Mexican. The community has diversified and its social networks now include Central American- and US-born Latino women. Due to Hurricane Andrew in 1992, industrialization, and urban expansion, work in the fields has decreased; now, most LFSWs work in packinghouses and nurseries. LFSW in the focus groups did not adhere to migrant worker stereotypes: being closed-minded, humble, timid, and unrefined. These LFSW enjoy wearing fashionable clothing, wore makeup, and were open and talkative.
Almost all the women prefer having small social networks due to fears that the larger group may gossip about their problems. LFSW consider themselves less privileged and different from other Latino groups (e.g., Cubans) in South Florida. As a result, many of these social networks were isolated from the rest of the Latino community. Social hierarchies rule their social networks: the most respected social networks were those with members working in nurseries (regular, year-round work). Women in the least respected social networks worked in the packing industry (long shifts in few month-intervals). Religion affiliation often determined social network affiliations. LFSWs interact with elderly people to buy their prescription medications (e.g., sedatives, pain medication). While they attend similar social events, female social networks did not interact with male social networks. Though not all agreed, some women mentioned that excessive alcohol and drugs were consumed during these gatherings. Some women attended soccer games to meet casual sexual partners. LFSW must work extensive hours, leaving their children unattended. As a result, marijuana use was common in their children's social networks. Technology has transformed communication within social networks. Texting and Facebook messages are as common as face-to-face interactions. Discussion: Social network studies should analyze LFSW substance abuse. Due to LFSWs' social networks specific characteristics and influences, information from social network studies with other Latino populations or migrant workers may not be generalizable to LFSW.

Igor Kanovsky
The Max Stern Yezreel Valley College

Ability to be an Influencer in Social Network

We proposed a new model, which capture the main difference between information and opinion spreading in social networks. In the case of information spreading additional exposure to certain information has a small effect. Contrary, when an actor is exposed to 2 opinioned actors the probability to adopt the opinion is significant higher than in the case of contact with one such actor (called by J. Kleinberg "the 0-1-2 effect"). In each time step if an actor does not have an opinion, we randomly choose 2 his network neighbors. If one of them has an opinion, the actor adopts opinion with some low probability, if two – with a higher probability. Opinion spreading was simulated on different real world social networks and similar random scale-free networks. The results show that small world structure has a crucial impact on tipping point time. The "0-1-2" effect causes a significant difference between ability of the actors to start opinion spreading. Actor is an influencer according to his topological position in the network. Known characteristics of an actor in a network cannot indicate if he or she is a potential influencer. It's clear that an influencer must not have a low degree and must have a high clustering coefficient value. To become an influencer, a special position of an actor in the network is needed and this position is not a local property of the actor.

Sylvia Keim
University of Rostock

How social networks, well-being and health are related - the case of unemployed lone parents

Lone parenthood is often associated with unemployment, a precarious financial situation and dependence of social welfare benefits, a risk for poverty and ill health (BMAS 2013). Previous research has shown how personal relations, social support and social networks can enhance the well-being of lone parents, however lone mothers have more limited access to support than employed mothers (Niepel 1994, IAB 2013). In our research we want to shed light on the social networks of unemployed lone mothers and how their well-being and health are related to their social integration. We are interested in a two-sided process: looking at how personal relations and network structures impact well-being as well as how health conditions enable or restrict engaging in personal relations. To capture both, network structures and their meaning for the respondents, we employ a mixed-methods design. We have conducted 40 biographic-narrative interviews with unemployed lone parents in north-east Germany, in a region where the rate of lone parenthood as well as unemployment is relatively high. The interviews center on the life course, the current situation regarding job and family, current well-being, future plans as well as social relations, conflicts and received as well as provided social support. Additionally, we have collected structured network data. The results show how personal relations and health are intertwined and present structural characteristics and mechanisms involved.

David Kennedy
Using EgoWeb 2.0 to deliver a motivational social network intervention to reduce alcohol, drug and HIV risk behaviors among Housing First residents

Individuals transitioning from homelessness to housing face challenges to reducing alcohol, drug and HIV risk behaviors. They also face challenges to their social environments during this transition. Formerly homeless individuals must reconfigure their social lives to adjust from living on the street to living in new housed environments. Social network adjustments may involve breaking ties with others on the street, making new ties, strengthening old ties, attempts to connect, reconnect, or break ties between others, etc. Residents entering housing first programs face some unique social challenges while making this transition out of homelessness. Housing First programs are an alternative approach to traditional programs which provide homeless individuals with housing once they demonstrate abstinence from alcohol and drugs. Housing First programs do not require this initial abstinence arguing that homelessness is the primary driver of unhealthy behaviors. These programs aim to provide immediate permanent housing followed by support for reducing alcohol and drug use and addressing other issues, such as mental health problems. This presentation details a project that aims to augment typical Housing First support with assistance in making social adjustments. New Housing First residents not only must transition away from their networks on the street, but they must also navigate the new social environment of their Housing First apartment buildings. These buildings potentially include a mixture of positive and negative social ties which may assist the transition out of homelessness or serve as barriers to a healthy transition. The proposed project fills a critical gap by developing and pilot-testing an electronically delivered social network intervention that incorporates motivational interviewing techniques delivered by existing case managers. The electronic intervention is administered with EgoWeb 2.0. Residents are first given a short network interview about their recent social network interactions. After they nominate 10-15 network contacts and answer questions about their interactions with these network alters over the past two weeks, they are shown several visualizations of these networks, highlighting various compositional and structural features of these personal networks. Intervention administrators conduct motivational interviews with participants, encouraging them to verbalize strategies for changing their substance use and HIV risk behaviors as well as changes to their social networks. Participants are then re-interviewed 3 times over the next six weeks. The goal of the motivational interview is to make participants aware of their social environments as social systems, how these systems promote or inhibit healthy behaviors, and to identify opportunities for facilitating healthy behaviors through changes in their social networks. The project aims to couple presentation of network visualizations with neutral encouragement of participants’ latent desire for change and reinforcement of successful change attempts. The presentation will provide an overview of the development of the electronic tool and present preliminary findings from initial beta testing with residents, case managers, and administrators. The presentation will also address the potential for this tool to augment Housing First case management.

Marie Kennedy
Loyola Marymount University

David Kennedy (RAND Corporation), Kristine Brancolini (Loyola Marymount University)

The personal networks of novice librarian researchers

This presentation reports on the results of an exploratory study that uses personal networks as the basis for considering a novice researcher’s self-designed community of practice. We use social network analysis to begin to answer our fundamental question, “How does a novice librarian researcher develop into an experienced researcher?” In addition to mastery experiences, such as exhibiting competence/confidence in completing the steps in a research project, we suspect that a successful researcher is also continually building his/her own personal network of like-minded practitioner researchers to call on for assistance or to offer assistance over time. We have a unique opportunity to examine this in the relative short term of the three-year, grant-funded project, the Institute for Research Design in Librarianship (IRDL), an institute designed specifically for novice researchers. We have
constructed an exploratory research project in order to observe if participating in IRDL has an effect on the personal networks of the researchers, and how it may change over time. This presentation will report the findings of the analysis of the personal network data gathered during the first year of the Institute. The first wave of data was gathered before the participants began IRDL, again at the completion of the workshop, at six months after completing the workshop, and will be gathered again at the one-year marker. The data gathered is about the people and the strength of the relationship in the personal research networks of each of the IRDL participants. During the presentation we will report on the observations of the composition of the research networks over time. Highlighted in the presentation is an illustration of the EgoWeb 2.0 software to collect personal network data. This web-based software is open source and freely available. We will describe the process of using EgoWeb to develop a customized survey designed to help researchers identify key people in a network, characterize these network contacts in different ways, and measure the interactions among these network members. We will present findings that summarize the networks of these novice researchers, including how much and under what circumstances they interact with their network contacts, the role their networks play in giving or requesting advice about research, and how interconnected these network members are with each other. We will present results of the statistical analysis of these networks generated from the software, such as how densely connected the network is or how central key network members are in the networks. We will also present examples of the software’s customized visualization features to illustrate general trends in the network data.

Chong Min Kim
Gyeongin National University of Education

Exploring Elementary School Teachers’ Advice and Information Networks in Student Evaluation and Life Guidance in Korea

Research over two decades has shown that teachers’ social networks in schools and school districts can be a source of various resources, including trust (Bryk & Schneider, 2002; Louis, Marks, & Kruse, 1996), expertise (Daly & Finnigan, 2010; Frank et al., 2004; Kim, 2011), opportunities for joint sense-making (Coburn, 2001; Spillane, 2004), and innovation through peer pressure or a sense of obligation (Frank, Zhao, & Borman, 2004; Penuel et al., 2013). Additionally, studies indicate the importance of social capital in enabling instructional reform and school improvement (Bryk & Schneider, 2002; Frank, Zhao, & Borman, 2004; Louis & Kruse, 1995; McLaughlin & Talbert, 2001; Rosenholtz, 1991; Smylie & Hart, 1999; Spillane, Kim & Frank, 2012). Although these studies have investigated the various effects of teachers’ social networks with focus on reading and mathematics subjects, teachers’ advice and information networks in students’ evaluation methods and life guidance have not been examined in schools. In Korea, specifically, innovation in evaluation methods and life guidance through teacher collaboration has been given more attention for school innovation. Thus, we explore another type of teachers’ social networks in Korea: that is, the tie formation of elementary teachers’ advice and information networks in student evaluation method and life guidance (e.g., bullying, and school violence) in Korea. Our research question is this: What affects elementary teachers’ advice and information networks in student evaluation and life guidance in Korea? The dependent variables were advice and information networks in student evaluation and life guidance within schools, while independent variables are teachers’ attributes, such as gender, position, teaching experience, and teacher-teacher trust of 513 elementary teachers in 20 schools in 2014. This study will use multilevel p2 models (Van Duijn, Snijders, & Zijlstra, 2004; Zijlstra, Van Duijn, & Snijders, 2006) and RSiena (Simulation Investigation for Empirical Network Analysis) software for data analysis. The researchers expect that different network patterns of seeking and providing advice and information between student evaluation and life guidance will exist across 20 elementary schools in Korea. Findings will indicate that elementary teachers’ social network can affect elementary school climates by influencing teacher collaboration in student evaluation and life guidance. Based on these results, discussion and conclusion will be provided with focus on elementary school innovation.

Heewon Kim
Rutgers University

The effects of network range and tie strength on knowledge sharing and performance in the midst of organizational change
Knowledge sharing across units and specialties is a key success factor for enhancing organizational performance and achieving competitive advantage. However, decision-makers should acknowledge that the outcomes of boundary-spanning communication can be shaped by structural and environmental factors. In the context of organizational change, this study examines how boundary-crossing ties and strong ties play a different role in knowledge sharing outcomes. To this end, this study investigates the impact of three different types of boundary-crossing communication—functional, geographical, and hierarchical boundaries—on expertise recognition, knowledge transfer, and knowledge acquisition among distributed workers in a multinational high-tech organization. In turn, this study aims to ascertain the relationships between the quality of knowledge sharing and performance outcomes. The online survey has been implemented in a global high-tech organization approximately one month after its large-scale organizational restructuring to capture newly configured task-related communication networks. During the restructuring process, divisions were merged, some departments were moved under another division, and reporting structures were reconfigured, all of which redefined members' roles and responsibilities. The survey was distributed to 275 full-time employees across all regions directly by the author; over a 1-month period, 224 employees completed the survey, yielding an 81.45% completion rate. To capture full network data, the respondents were provided with a complete roster of employees to identify their knowledge-sharing network. Complete network data collected from the organization were analyzed using multiple regression quadratic assignment procedure (MRQAP). The results demonstrate that functional and geographical diversity had a negative impact on knowledge sharing whereas hierarchical diversity and tie strength were positively associated with knowledge sharing. This study suggests that network cohesiveness, rather than boundary-crossing connections, promotes the quality of knowledge sharing when members face new demands and a source of uncertainty in the midst of organizational change, implying that diverse connections can promote knowledge sharing only after organizational members establish a shared understanding and coordinated routines.

Jang Hyun Kim  
Sungkyunkwan University  

Minju Yoo (Sungkyunkwan University)

How Internet of Things (IoT) is Perceived by General Publics and Researchers? : A Comparative Study

So-called 'Hyper-Connected Revolution' is being established on a basis of Internet of Things (IoT). IoT is expected to solve diverse problems in such areas as public service, productivity, efficiency of industry and safety. Only rare studies have examined how general publics perceive the technology and/or how scientists recognize it. The current study analyzed general publics’ opinions on the IoT through Facebook, Twitter, and Google Trends service, and examined researchers perception from Web of Science, a scholarly database. Semantic network analysis and social network analysis are employed for this research. Relevant software including NodeXL, Ucinet, Wordij, and others are used for the analysis. Results indicate that general publics perception of IoT is dependent upon mass media’s rosy expectations, and scholarly approaches to it are more on the technological advancements. Suggestions for future research and limitations of the present study are addressed.

Ji Youn (Rose) Kim  
University of Kentucky  

Michael Withers (Texas A&M), Mike Howard (Texas A&M)

The origin and evolution of board interlock formation

Extensive research has argued that director ties among large, established firms result in the creation and persistence of a corporate elite in the U.S. economy (Mills, 1956; Palmer, Friedland, and Singh, 1986). These powerful elites act to ensure the maintenance of their privileged position in the economy as well as offering a platform for the diffusion of information and new managerial practices (Davis, 1996; Haunschild, 1994; Haunschild and Beckman, 1998; Mizruchi, 1996). Thus, board interlock ties have important economic consequences for managers, corporations and consumers. While many outcomes of board interlocks have been established in prior research, far less attention has been paid to the
origins and changes occurring in such an important network. Only a handful studies examine firm- or dyad-specific characteristics (e.g., Beckman, Haunschild, and Phillips, 2004; Yue, 2012). In our paper, we aim to fill this gap in prior research in two ways. First, because relationships emerging from interlock formation are inherently social, with interlock ties forming clear, often long-lasting links between firms, we examine whether there are any endogenous structural processes—such as reciprocity and triad closure—operating at the global level that shape a particular structure of board interlock network independent of individual firm- or dyad-specific characteristics. Second, prior research has established that institutional change, particularly changes in law, is a significant cause of changes in firm behaviors (Edelman, 1990), which in turn causes network evolution. In the context of board interlocks, the Sarbanes-Oxley Act (SOX) represents such an institutional change. Enacted amid high profile corporate scandals in 2002, the law is considered as one of the most important pieces of legislation in federal securities law (Donaldson, 2003). Because SOX was adopted in a period of serious concern over the actions of corporate executives, directors, auditors, and self-regulatory organizations, it not only imposed particular requirements on the audit committee but also yielded substantive changes in board composition and membership (Linck, Netter, and Yang, 2009). As a result, we may observe a substantially different structure in the board interlock network in the period following the adoption of the legislation. We examine the origin and evolution of the board interlock network for Fortune 500 firms during the 1997-2003 period using Exponential Random Graph Models (ERGMs). ERGMs are ideally suited for our research questions because they allow for the consideration of how structural factors of existing board interlocks predict future patterns of board appointments. This is especially interesting because it highlights the interplay between social and structural processes in the governance structure of the corporation (Westphal and Zajac, 2013). We find that endogenous structural processes such as reciprocity and transitivity are significant antecedents of the network formation, independent of firm- or dyad-specific factors. In fact, after accounting for such network self-organizing processes, high performing firms show no difference in terms of sending or receiving board interlock ties in the network observed in 1997. However, in the network observed in 2003, after the passage of SOX, we find that firms are more likely to add outside directors from those firms that are financially successful. This evidence is consistent with our conjecture that SOX has greatly influenced board interlock formation, and firms made substantial adjustments directly in response to the legal change. In turn, the structure of the corporate elite network has been altered as a result of the institutional changes following the passage of SOX.

Charles Kirschbaum
Inesper-CEM/Cebrap

What drives collaboration among teachers? A qualitative study emphasizing salient triads

Extant literature in Education and Sociology of Education has recently introduced social networks as a central device to understand interaction and relationships among teachers (e.g. Daly, 2010). While these scholarly contributions have shed light on school organization dynamics, most social network analysis data collection devices rely on questionnaires borrowed from different contexts. We pursued a qualitative phase in order to broadly understand the relational context. Throughout this research effort, we established the following goals: (1) explore the types of relationships that take place among teachers, pedagogy coordinators and principals, (2) understand how these relationships are perceived, and (3) how they impact collaboration among teachers. This paper brings the results originated in the qualitative phase in the ‘ethnographic sandwich’ suggested by Borgatti, Everett and Johnson (2014). In order to pursue these goals, we developed non-participant observation at four public schools in São Paulo, Brazil. These observations took place in two months spells for each school, mainly based on meetings (relational events). In addition, we interviewed principals, pedagogic coordinators and teachers, and conducted focus groups among teachers, where they could explore their relationships with each other and with other actors (relational states). Our results show the extent that school managers (principals and pedagogic coordinators) insulate themselves from teachers, while seeking to signal cohesion to the latter group. Teachers reveal the conditions and constraints for establishing collaboration relationships with each other, including lack of time, misfit in pedagogic orientation, personal misfit, and lack of adequate school climate. In several schools, teachers rarely seek pedagogy coordinators for advice, besides dealing with disciplinary challenges among students. Across teachers and managers, relationships are differently signified. When the meaning attributed to relationships converges, there is a higher tendency for satisfaction. Although children, family and the municipality supervision were not the research focus, these actors are frequently cited as important third-parties.
Following the simmelian insight of triads, we conclude this study emphasizing how teachers’ collaboration is frequently influenced by perceived ‘third-party shadows’.

Mitri Kittu
University of Turku

Axioms for a family of betweenness centrality indices

Shortest-path betweenness centrality is among the most commonly used centrality metrics in social network analysis. There is a number of variants of the original betweenness index of Anthonisse (1971) and Freeman (1977), and several other indices that rely on the principle that a person in a social network is in a central position when he or she has control over the flow of information between pairs of others. It is possible to list a number of intuitively appealing features of betweenness indices, some of which are lacking from other commonly used centrality metrics. However, having such properties does not necessarily mean that shortest-path betweenness or any of the other betweenness indices were somewhat unique in the sense that there were no other centrality indices having the same properties. In this work the question is what are the features that describe betweenness indices uniquely in the sense that no other centrality metric has exactly the same combination of properties. The attention is on a family of indices having two particular features: only a certain selection of paths, such as the shortest paths, contributes to the centrality of a vertex, and the score is computed by taking the fractions of paths containing a given vertex. The properties of betweenness centrality indices can be traced back to the fraction function and selection rules that are used. Hence, in order to understand how these indices works it is crucial to understand how these building blocks work. As demonstrated in this paper, many common features of different betweenness indices can be explained by the properties of the selection rules used in defining them. The axioms presented in this paper characterize betweenness type centrality indices in which the rule for selecting the paths is fixed. The first axiom is that the centrality index is additive with respect to partitioning the set of paths to paths between pairs of vertices. Second, the restriction of the index to a partition involving paths between two vertices satisfies the axioms for the fraction function. Full characterization of shortest-path betweenness follows from the axiomatization of the shortest-path selection, i.e., selection rule that picks only those paths for each pair of vertices that are of the minimal length.

Andreas Klärner
University of Hamburg

André Knabe (University of Rostock)

Social Networks’ Dynamics and the Reproduction of Health Inequalities among Long-term Unemployed

The nexus between lower social status, long-term unemployment and poor health is well known. The relation is two-fold: Poor health can lead to or be an effect of unemployment. There are different mechanisms that cause this relation. Unemployment can either be a consequence of disabilities, accidents, or severe sicknesses, or poorer, unemployed people often lack the financial funds for sustaining individual health care. They are often less educated and have to work in jobs that are physical strenuous or dangerous, and they engage more often in unhealthy behaviors such as smoking. In our presentation we want to add to the discussion about causes and consequences of health inequalities by taking a closer look at social network influences on individual behavior. We want to look at the buffering or enabling effects that social networks often have by providing social and material support, but we also want to take their negative, restraining effects into account, e.g., there can be social pressure in social networks that leads to adopting harmful behaviors. We analyze qualitative interviews with 35 long-term unemployed women and men, who were asked about their everyday life and their coping with having very little money. We devoted considerable time of the interview to health issues such as diets, alcohol, smoking, and sports. We also collected social network data using the software Vennmaker, mainly asking for supporting but also for quarrelling people. This mixed-methods approach enabled us to analyze the social support network within the frame of the lifeworld of respondents.

Laura Koehly
Families SHARE: using family health history to activate communal coping

Family health history (FHH) is a genomic tool that is often used within the clinical setting to personalize lifestyle and screening recommendations to a patient’s disease risk. FHH knowledge, however, comes through families communicating about their own and relatives’ disease diagnoses. In turn, communication of family risk information may increase family members’ perceptions of their shared risk of disease and motivate the members to develop strategies, such as encouragement, to address their risk through risk reducing behaviors. The current paper describes results from a randomized, controlled trial that using a FHH tool, Families SHARE, to activate FHH communication and encouragement of healthful diet. Baseline and 6-month assessments were completed by 262 members of 61 families randomized to receive the Families SHARE FHH tool or not. On average, each participating family member nominated 42 (SD=16) network members. There was no significant main effect of intervention (vs. control) for shifts in communication and encouragement network density between baseline and follow-up, controlling for racial/ethnic group. Conditioning on no baseline communication ties and controlling for racial/ethnic group, results indicate that households that did not receive the Families SHARE workbook reported significantly more new communication ties about family health history (Control: M=2.30 (SD=2.77); Families SHARE: M=1.46 (SD=2.01), RR=.64, p=.024) and family risk of diabetes (Control: M=1.85 (SD=4.23); Families SHARE: M=0.83 (SD=1.05), RR=0.45, p=.001). For encouragement of dietary behaviors, participants reported fewer new encouragers for fruit and vegetable consumption (Control: M=3.55 (SD=4.52); Families SHARE: M=1.60 (SD=2.87), RR=0.71, p=.029). Follow-up analyses suggest that family risk is an important moderator for both health communication and behavioral encouragement. Results indicate that in those families for which a younger generation family member is at increased disease risk, there were higher numbers of new health communication partners and increased behavioral encouragement, compared to those in which the younger generation was not at increased risk. Results indicate the promise of FHH-based risk as an approach for motivating family-level strategies to address risk when younger generation family members are particularly vulnerable due to their family health history.

Understanding the policy landscape for nutrition at the national and state level in India using the Net-Map tool

In India, as in other countries, a complex set of actors influence policy agenda setting, policy framing and policy implementation. This is likely due to the diversity of formal and informal interactions across actors including government, development partners, NGOs, and civil society organizations. To understand interactions in a such a network of policy engagement around nutrition, we used the Net-Map tool (https://netmap.wordpress.com/about/) in participatory group interviews with interviewees knowledgeable about the policy landscape at the national level and in three states in India: Uttar Pradesh, Madhya Pradesh and Odisha. Aim: To identify stakeholders who play a role in shaping maternal and child policy and program decisions related to nutrition. Interviews were facilitated by trained individuals; interviewees listed influential individuals and institutions, explained why they were important, specified how they were connected with each other in technical, funding or sharing information linkages, and assessed the degree of influence of the actors on the map. Data from the participatory interviews were entered into Visualyzer for quantitative network analysis and the notes from the interviews, which provided additional details of network interactions, were analyzed separately. Results: In all the network interviews, at least 40 actors were identified across sectors (in Madhya Pradesh it was as high as 87). Although specific government departments emerged as the major influencers at both national and state levels, at the state level, other actor groups such as civil society organizations and development partners were found to be almost as influential as government actors in shaping decisions. The analysis also helped identify stakeholders who were supportive of nutrition
but not influential enough and those who were influential but not always supportive of nutrition. At the national level, other findings included the role of technical evidence in influencing policy decisions, a substantial disconnect between research organizations and policy makers, and an overall need for more coherent advocacy around the issue of nutrition in the network. The tool was well received by nutrition stakeholders; and in one state, the government even requested a Net-Map interview so they could better understand the landscape of stakeholders. Some of the challenges in using the Net-Map tool in India included possible power play, influence by interviewees and potential selection bias of interviewees. We mitigated these challenges through careful facilitation and through sharing of network analysis results with a wide set of stakeholders to validate and check findings. Despite these limitations, the tool helped to identify the diversity of network stakeholders and their role in nutrition, the linkages between these actors and initial insights into the potential influence and support for nutrition across actors. It revealed the similarities and differences between national and state-level networks and across state networks. Overall, the application of the method provided greater insight into how such a diverse stakeholder network might be engaged to mobilize evidence for nutrition program and policy decision-making.

Nahoi Koo

Network Analysis of Startups Participating in the Sharing Economy

The rise of the so-called sharing economy and collaborative consumption movements has accelerated the growth of start-ups like Airbnb and Uber that run on business models built around the new technologies of peer-to-peer economic activities. Start-ups participating in the sharing economy with business models that depart from the traditional models of sales and ownership carry large profit margins and receive high market valuations relative to their revenue. By examining the investor-investee relationship in the sharing economy, this paper investigates the kinds of networks the sharing economy produces and how these networks reflect the current structural trends in the sharing economy start-up ecosystem. To do this, start-ups from Peers, a non-profit organization with more than 7,000 members participating in the sharing economy, were selected as the sample data. Drawing on the data parsed from the CrunchBase API, this paper examines the relationship between 21 start-up companies and their 171 investors. The collected data were organized in a two mode, affiliation matrix transformed to one mode data by its row dimension, constructing a start-up-by-start-up network based on a shared investor. Along with the investor information, attributes of the companies were collected. These attributes are: (1) location of the company headquarter (2) founding year of the business, and (3) the company's business category. Using social network analysis, the paper then identifies who the key players are in the sharing economy and tests the homophily principle of whether certain attributes characterizing the start-up companies influence the investment trend. Results illustrate that start-ups are more likely to be linked by the same investors based on their location attribute. Implications and future directions are discussed.

Julian Körber
University of Bamberg

Tensor regression models for multilayer networks with missing values

Missing values in the analysis of social network data are a common problem occurring either as missing tie information or as missing nodal covariates. Missing values in multiple networks can additionally bias the estimation of between-layer interdependence. Ignoring missing tie information and analysing only complete cases redefines the boundary of a network and may lead to substantial loss of nodes. Also it is unclear whether the resulting subgraph still implies the same dependence structure. Ignoring missing values in covariates increases the bias of model estimation if both nodal and tie information shall be analysed. Observed covariates can be used to estimate missing tie information and vice versa with stochastic imputation models in a Bayesian framework using MCMC algorithms. Koskinen et al. (2013) implement a data augmenting algorithm for the estimation of exponential random graph models (ERGM) with partly observed tie variables and covariates. They combine the auxiliary variable method of Koskinen et al. (2010) with the exchange algorithm of Caimo and Friel (2011) for models with intractable normalizing constants. The algorithm can handle missing tie information and partly observed nodal covariates. While the ERGM is well established for single or bipartite networks it has deficits in the
estimation of multiple networks with missing values. Also, ERGMs tend to suffer from non-convergence of estimating algorithms. The multilinear tensor regression model (MTRM) by Hoff (2014) generalizes a latent variable approach (Hoff 2005) for monoplex network matrices to multilayer network tensors. A latent normal variable approach is able to handle any type of tie variable via different link functions. The data tensor of a multilayer network is explained by a Kronecker-structured regression parameter and a separable covariance model making use of the Tucker product. The MTRM can easily be extended to model combinations of network dynamics and multiple types of edges. Its covariance structure can be used to model interdependencies between network layers and time points. It is possible to add a data augmenting imputation step into the MTRM Gibbs sampler, estimating network parameters conditionally on completed tie information and covariates. The performance of the ERGM and the MTRM shall be compared in the estimation of missing network information and goodness of fit. Three multilayer political communication networks from sub-Saharan African countries containing only partly observed tie variables and nodal covariates shall be analysed. The MTRM does not show the ERGM’s tendency of non-convergence and offers a natural approach to complex multi-mode relational data settings.

Olga Kornienko
Arizona State University

Schaefer, David R. (Arizona State University, University of Maryland), Seay, Danielle (Arizona State University), Granger, Douglas A. (Arizona State University; Johns Hopkins University)

Networks and Health: Exploring the role of friendship and conflict ties for immune system functioning

Empirical evidence documents the key role of social relationships for physical health; yet little is known about the mechanisms linking the social world with physiological mechanisms mediating health and disease. To address this gap, we explore how friendship and conflict ties affect immune system functioning. We specifically examine how network ties affect levels of secretory immunoglobulin A (sIgA) - a salivary biomarker of oral immunity providing a first line of defense against pathogens and respiratory infections. Past research shows that stressful environments and physical exhaustion lead to lower sIgA, which increases susceptibility to infections. Managing friendship and conflict networks could be stressful in a competitive, performance-oriented social organization and, thus, be associated with lowered immune system activity. Complete network data were gathered from the Arizona State University marching band (n =175, 53% female, Mage = 19.4), a model system for a competitive social organization. Data collection took place at a regularly scheduled rehearsal, when participants donated saliva (later assayed for sIgA). After rehearsal, study participants provided nomination data on two types of relations: (1) friends and (2) individuals with whom they have conflict. Our initial linear regression analyses examined how friendship and conflict in- and out-degrees were associated with sIgA, while controlling for gender, age, key health control variables, body-mass index, perceived stress and marching band leadership position. Our results showed that friendship network indegree was inversely associated with sIgA suggesting that friendship network popularity and, possibly, over-integration is associated with immune suppression and increased risk of upper respiratory infection. Our further analyses focus on examining several network configurations that could be associated with greater stress levels and lowered immunity, including: (1) intransitive triads and bridging ties in the friendship network, (2) having a friend and conflict tie to the same person, and (3) having conflict with the friend of a friend. Finally, we use exponential random graph modeling approach to examine associations between sIgA and friendship and conflict network selection processes, while controlling for network structural effects. Simultaneous saliva donation allows us to study the links between social networks and the activity of immune system in an ecologically valid setting. Our findings have implications for interdisciplinary research on networks, public health, and organizations because they elucidate the specific pathways through which networks and stress affect health by contributing to the spread of respiratory infections.

Johan Koskinen
University of Manchester

Tim Müller (Institute for Analytical Sociology, Linköping University), Thomas Grund (Institute for Analytical Sociology, Linköping University)

Network Perspectives on Residential Segregation
Ethnic segregation has been proposed as a driving factor in the reproduction of social inequalities in Western society. Several mechanisms have also been put forth for explaining segregation, most notably tipping points, white flight and white avoidance – all encompassing some measure of meso-level considerations on the level of the neighbourhoods. We argue that as these explanations presuppose flows of households between neighbourhoods, additional insight into the reproduction and sustenance of segregation may be had from studying the stable patterns of moves between neighbourhoods that these flows give rise to. We propose to study residential segregation as a system, where the binary ties between neighbourhoods represent the infrastructure of the moves. The conceptualisation of the moving graph as a network allows us to study the system, taking into account structural constraints that are otherwise difficult to model. We apply these techniques to the case of the housing market in Stockholm in the period 1990-2003 and explore the spatial, structural and temporal dynamics using exponential random graph models. We find evidence for processes associated both with immigrant density as well as local and global hierarchy.

Jeremy Koster
University of Cincinnati

George Leckie (University of Bristol)

The Multilevel Social Relations Model for Count Data with an Application to Food Sharing Networks in Nicaragua

We present a multilevel modeling formulation of the Social Relations Model that is adapted for count data, which are common in observational studies of human and animal behavior. For directed networks, the model partitions the variance associated with node-level giving and receiving, respectively, along with unique relationship-level effects. The model permits estimates of “generalized reciprocity,” namely the extent to which nodes’ giving tendencies are correlated with their receiving tendencies. The model also permits estimates of “dyadic reciprocity,” the extent to which the directed relationships within a dyad are correlated. The model further permits the inclusion of “fixed effect” predictor variables at all levels of the data structure, whether node-level or relational covariates. We apply this model to ethnographic research on food sharing over a yearlong period among 25 households of indigenous Mayangna and Miskito horticulturalists in Nicaragua. Along with other covariates, such as the kinship ties and distance between households, we examine the effect of an “association index,” which reflects the amount of time that households interact with one another. The association index exhibits a positive effect on sharing, and our overall results indicate that food sharing networks largely correspond to kin-based networks of social interaction, suggesting that food sharing is embedded in broader social relationships between households. We discuss possible extensions of our methodological approach, as appropriate for research on food sharing and social network analysis more broadly.

Consuelo Kreider
University of Florida

Mary B. de Laosa, (University of Florida), Caroline S. Mikael, BS (University of Florida)

Peer-networks and relationships to health-related quality of life (HRQoL) for youth with learning, attention and autism disorders.

Background: Youth growing up with invisible disabilities, such as autism, can have differences in their networks when compared to typically developing youth. For these youth, constrained social networks have been described to include smaller networks containing fewer peers, fewer connections within classroom networks, and smaller numbers of close ties, whereby fewer are reciprocated as close. Health-related quality of life (HRQoL) encompasses aspects of quality of life that affect health, such as social and emotional functioning; social support is an important determinant of HRQoL. This research tested for network relationships to HRQoL, and assessed differences in peer network structures and network support for youth in the clinical group and youth in the typically-developing group. Methods: Methods of personal network analysis were used to collect cross-sectional network data and HRQoL measures from 36 youth, ages 11-16 year. Nineteen youth had a clinical diagnosis of learning, attention and/or autism disorder (mean age 13.9 ± 1.3; 84.2% male) and 17 were typically-developing (mean age

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Data were collected using a combination of interviewer-assisted paper and pencil and computer data collection modes. Interviewer-assisted data collection strategies were used to accommodate attention and language/communication difficulties often associated with diagnoses of youth in the clinical group; youths’ parents assisted as needed. Each youth identified 15 individuals whom they regularly do things with, 10 whom they are acquainted with, and reported on characteristics of (i.e. age, gender, kinship, and types of support provided) and relational ties amongst (i.e. interacts with) network alters. All kin and all adults were removed from the networks to derive each youth’s peer network prior to network analysis. UCINet version 6.554 was used to calculate degree centrality metrics. The Pediatric Quality of Life Inventory (PedsQL) was used to measure overall functioning related to health (i.e. HRQoL). SPSS version 22 was used for descriptive, correlation and group difference analyses of demographic, network and HRQoL variables. Spearman’s rank correlation coefficients were calculated for all combinations of network and HRQoL variables for each study group; significance was set at p ≤ 0.01. Mann-Whitney U or Independent Samples t-test, as appropriate, were used to test group differences; significance was set at p ≤ 0.05. Results: For youth in the clinical group, degree centrality of the most developmentally supportive peer had strong negative associations with the youths’ total PedsQL scores, where lower scores indicate higher functioning (rs = -.621; p = 0.005). For youth in the clinical group, the amount of total (developmental and instrumental) support (rs = .589; p = 0.008) and instrumental support (rs = .615; p = 0.005) provided by network peers had strong positive associations with total PedsQL scores. No significant associations were observed for youth in the comparison group. Only peer network size differed between groups (t(25.057) = 2.636; p = 0.014). Conclusion: For youth with clinical diagnoses of learning, attention and/or autism spectrum disorders, personal peer-network structure and the support offered by peers have relationships to quality of life that warrant further investigation.

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The structure of voting rights in listed companies pre and post a fine of EUR 3.25m

Large asset management companies hold voting rights in many listed companies. Today such companies are sometimes even the largest single investor. Financial regulations require to disclose the voting rights as soon as these surpass certain thresholds. We compare what can be learned about the BlackRock group of companies pre and post a fine of EUR 3.25m, the largest fine that BAFIN has ever imposed in Germany.

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Classification’s new clothes. A fruitful concept for network analysis?

Classifications order the social world into categories. Why would a paradigm following an anti-categorical imperative make use of this concept? This presentation links the sociology of classification to a network perspective. I will argue that the classification approach provides valuable insights in the relation between cognitive, moral and structural aspects of networks. I will give three preliminary reasons. First, classifications are embedded in social structure and social organization. They are product of a mutual influence through interaction and (cognitive) reference, be it qualifying products or positioning goods, the acquirement of taste or, ethnical categorization. Second, classifications are central aspects and coordinates for social action. They generate choices and selections and structure action. The resulting attachments/detachments are interrelated by semantic references. Moral attitudes, choices offered and selections made can be conceptualized as semantic coordination networks. And third, epistemic practices of classification are very powerful type of ties.

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Composition and Structure of Personal Networks as Influencing Factors of Social Resources and Political Attitudes of Democratic Cooperation

The works of Robert D. Putnam (re-)ignited a discourse about the influences of civic virtues and social capital on the quality of democracy. In a tocquevillian tradition Putnam praises the rich, but declining, U.S. American system of voluntary associations as the „schools of democracy“. Building upon that idea, this study aims to seek for less institutionalized sources of democratic and civic virtues, by focusing the structure and composition of personal networks of individuals. Following definitions of social capital that entail a structural and a normative part, the study focuses on both, (1) social relations that form networks in which (2) trust and norms of reciprocity are learned and shared. Additionally, the distinction between the social capital of a political system and the personal social capital discussed by Hartmut Esser draws a connection between the structural personal social capital and the normative system level capital. The theoretical discussion leads to two research questions: Are there certain configurations of social contacts that benefit the development of social trust? And which civic virtues come along with differently patterned personal networks? To address both questions, data from the German General Social Survey 2010 a representative cross section of the German population is used (N=2.827). Egocentric network analysis is conducted and combined with items on generalised trust, reciprocity and political attitudes concerning policy matters and stipulations of community and solidarity. Cluster analysis on the basis of structural and compositional measures of ego-centric networks is used to explore four different network types. Correlational analysis is applied to differentiate the relation between the different types of structural embeddedness and items representing civic and democratic virtues.

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Determinants of network accuracy, a social cognitive approach

The degree into which actors have an accurate understanding of their network is influenced by several factors and can be a valuable resource. Organizations accurate about their own network position and that of other organizations in the network are better able to maximize their benefits from the network and subsequently enhance their position within the network. Besides looking at different effects of network accuracy, one also can ask the question why accuracy levels differ in the first place. Essentially, it are individuals, as members of organizations, assessing these accuracy levels. However, individuals differ in their ability to accurately perceive their environment in general and their social network in particular. Differences between accuracy levels are partially explained by individual social cognitive factors. The implication of stressing the characteristics of individuals when studying the determinants of organizational network accuracy is that we need to take a micro perspective. As a consequence insights and results from social psychology research and social network research need to be combined as they are complementary, even though so far this happens rarely. In other words, this study argues that there is too little attention in inter-organizational network research for social cognitive differences between individuals such as differences regarding social perceptions, motivations even though one can expect that these node differences at least partially explain differences in network accuracy at the inter-organizational level. Furthermore, most research taking individual factors into account deals with social (personal) networks. However, we do not know yet whether and to what extent these cognitive individual factors have similar effects on accuracy levels studies at the inter-organizational network level as well since the latter networks tend to consist of less cohesive ties as compared to friendship networks. In this study, we systematically investigate inter-organizational network accuracy effects of a number of carefully selected social cognitive factors such as need for cognition, need for achievement, extraversion, self-monitoring, and positive affectivity. For this research, we gathered data at students within a second-year bachelor course in the Netherlands regarded as organizational members because they are part of organizational teams playing a game. Initial results show that there appears to be different impacts of the five cognitive factors included in the model and the level of network accuracy. In short, in this study we develop a better understanding of social cognitive differences affecting the level of inter-organizational network accuracy. This research will contribute to the field of inter-organizational network accuracy by providing a micro foundation for accuracy levels at the inter-organizational level.
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Matthew Weber (Rutgers University)

Research Network and Organizational Affiliations of Pharmaceutical Scientists

The research networks between pharmaceutical companies have, to a great extent, been studied from an inter-organizational perspective, but not much is known about how scientists work together within and outside of their focal organization. In this study, the research network of a large multinational pharmaceutical company was examined to understand the types of relationships that exist between scientists within and outside of organizations, and how the age, location, type, and size of the scientists' organizational affiliations influenced the formation of research ties between scientists in the network. Preliminary results indicate that scientists affiliated with older and larger organizations are more likely to create research ties, but that geographical distance and difference in organizational form (non-profit/profit) decreases the likelihood of the tie formation. The results also show a tendency for transitivity between the scientists, suggesting that they utilize the weak ties created by colleagues to their advantage.

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Quantifying Uncertainty in Dynamic Network Models fit to Egocentrically Sampled Data

Dynamic network models have manifold applications, but inference often suffers from challenges of data availability. In epidemiology, in particular, of interest is not just the presence of relationships of interest but their timing, yet the data available are often limited to egocentric views of the network process at a single time point, albeit with additional, often censored and truncated, information about duration of extant and recent ties. One practical approach to fitting dynamic models to these data is to find what the dynamic network model parameters had to have been in order to induce, in the long run (i.e., its equilibrium), the network with properties implied by the egocentric data: a form of generalized method of moments estimation (GMME). Although this approach has yielded promising results, prior work has left open the question of estimating the uncertainty (e.g., standard errors) associated with the resulting parameter estimates. In this work, we address this issue by leveraging similar design-based inference results for exponential-family random graph models (ERGMs) to obtain estimates of uncertainty for parameters obtained via this GMME on the equilibrium distribution of the network process. We demonstrate its use via application to egocentrically sampled sexual partnership network data.

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Scientific collaboration dynamics in a national scientific system

The goal of the presented research is to identify the key factors driving collaboration and the main differences in collaboration behavior across scientific fields and disciplines. To achieve this, two theoretical approaches to modelling network dynamics are combined: the small-world model and the mechanism of preferential attachment, also known as the process of cumulative advantage. Stochastic-actor-based modelling of co-authorship network dynamics uses data for the complete longitudinal co-authorship networks for the entire Slovenian scientific community from 1996 to 2010. With the analyses we confirmed the presence of clustering (one of the two dimensions of small-world model) in all fields and disciplines. The preferential attachment is found far more complex than a single global mechanism. There were two clear distinctions regarding collaboration within scientific fields and disciplines. One was that some fields had an internal national saturation inhibiting further collaboration. The second concerned the differential impact of collaboration with scientists from abroad on domestic collaboration. In the natural, technical, medical, and biotechnical sciences, this promotes collaboration within the
The impact of co-authorship and other factors on scientific productivity and excellence of researchers

Studying factors that contribute to scientific productivity and excellence of the researchers concerns all researchers who want to work and survive in modern scientific world. It concerns not only researchers but also policy makers, founders and other stakeholders who basically run modern science. To study factors that could stimulate the publication productivity and scientific excellence as evaluated by national research agency we used data of complete scientific bibliography of all Slovenian researchers having a research ID in the Slovenian Research Agency. These factors are: 1) processes of research collaboration of each researcher, 2) allocation of financial means for R&D, and 3) differences on external R&D evaluation procedures among scientific disciplines. Two response variables (publication productivity and publication excellence) were analyzed separately using multilevel regression models with information on affiliation to research field, several network and demographic characteristics measured on the level of each researcher and fragmentation of R&D funds measured on the level of scientific disciplines. Semi-continuous distribution of response variables slightly complicated the use of methods but enabled us to respond to four different research questions: which factors influence publication of the at least one scientific contribution, which factors influence the productivity, which factors contribute to publish the first excellent publication, and what makes a scientists the best scientists.

Social background, networks, and prematurely dissolved training contracts

The premature dissolution of training contracts is an important indication of problems in the matching process in vocational education. Despite improving labour market conditions in Saxony-Anhalt and Thuringia in recent years the resolution rates are slightly increased. In the present study the importance of various factors for premature dissolutions of training contracts is examined, focusing on the influences of the family background and of the social network. A primary survey in vocational classes in Halle (Saale) and in South Thuringia forms the data base for the analysis. There are over 1,100 questionnaires from 72 vocational classes. The studies show the influence of the horizontal and vertical stratification of society, the latter mainly affected by the previous education of trainees.

Exploring the egocentric networks of hybrid organisations: How Central American NGOs bridge knowledge gaps in development assistance for renewable energy

Off-grid renewable energy technologies are expected to play an important role in enabling the creation of low-carbon development pathways for poor rural communities across the developing world. Governments, development agencies, private enterprises and non-governmental organisations (NGOs) engage in international development assistance for off-grid renewable energy technologies for which they rely on the work of local renewable energy organisations linking international technology providers to rural end-users. With business-like operations and value-driven objectives these local organisations tend to be hybrid organisations combining features of for-profit social enterprises and non-profit organisations. They are frequently embedded in various cross-sector alliances and play a key role in technology transfer and promotion, market building and the delivery of off-grid renewable energy projects in remote rural areas. Little is known about how these important intermediary organisations acquire and manage the various forms of both technical and non-technical knowledge needed to...
institutionalise low-carbon development pathways in poor rural contexts, and what kind of inter-organisational relationships help them to assist in the sustainable adoption of renewable energy technologies. This paper reports the methodology and results of an in-depth comparative study of the egocentric networks of six renewable energy organisations in Central America. The study enquired into how these organisations co-evolved with an emerging renewable energy sector, and what inter-organisational relationships they developed to advance their operations and knowledge bases. Detailed qualitative data of the entire egocentric network of each of the six organisations were collected using the software package VennMaker and then triangulated with qualitative interviews, observational records and project documents. Using a vector graphics editor, a tool was created for the visual analysis of network configurations and multiplex relationships. A stepwise comparative analysis focussed on both knowledge flows and the quality of relationships enabling such flows. The analysis illuminates how these hybrid intermediary organisations try to navigate a complex organisational environment heavily influenced by the aid industry; how they can integrate various operational models; and how they deploy distinct strategies for bridging knowledge gaps. The paper makes three contributions. First, it presents an innovative research design and methodology for the qualitative analysis of multiplex relationships in ego-centric networks of organisations embedded in multiple alliances. Second, the paper shows how through an in-depth analysis of multiplex relationships in egocentric networks, insights can be gained about what forms of knowledge can be transferred or created in different kinds of inter-organisational relationships. Third, the paper contributes to an emerging literature on how new organisational forms co-evolve with emerging markets for clean technologies, and the role cross-sector partnerships can play in this process.

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Diffusion of innovation through network from stakeholders management perspective

The growing perception that different type of stakeholders could affect the success of an enterprise encourage researchers to more seriously address various aspects of stakeholders management, and it is now widely viewed to be a key component of an enterprise's strategic vision. Building robust relations with different types of stakeholders could potentially be the key difference between success and unsuccessful strategy implementations due to different absorption of new capabilities of stakeholders prioritization and control. Up until now, a more traditional view of stakeholder relationships was rooted in resource-based view and other strategic management theories, which ignored the system of relations inherent in stakeholder interactions with the company and with each other. As various methods and approaches of stakeholders' analysis have been developed, we see more potential in SNA approach because it allows us to explore stakeholders’ relationships as an interconnected system. This paper reviews and brings together research on the application of SNA for stakeholder interests’ coordination. As an electrical power industry is a basic sector of the Russian economy with high level of innovativeness, we decided to explore the mechanisms of stakeholder interactions and find factors of successful strategy implementation. Using the SNA approach allows for an enriched understanding of the nature of resources flow distribution between stakeholders. This paper addresses the question of how interactive network structure may affect the effectiveness of the company strategy.

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Communication Power, Political Power and Discourse Coalitions: Who Rules the Media Debate on Climate Change in the United States?

Communication Power, Political Power and Discourse Coalitions: Who Rules the Media Debate on Climate Change in the United States? Analyses of media content often equate visibility in the media with power or political influence. Communication power is assumed to translate into political power. This paper takes a network approach and argues that it is not the visibility of individual actors or frames but rather, the strength of discourse coalitions formed around shared policy beliefs that predict political influence. Using the Discourse Network Analyzer and network analysis software, I examine over 1400 statements on climate change in two national newspapers in the United States. Distinct discourse coalitions are mapped by looking at how organizational actors, engaging in the debate in various ways, form links between each other. The approach is based on the assumptions of Advocacy Coalition
Framework which claims that major policy change is driven by competing political coalitions that are based on shared policy core beliefs. I find that on the aggregate level, actors and frames favoring climate change mitigation get more media space than anti-mitigation actors and frames. The dominance of individual anti-mitigation actors or frames, therefore, does not explain why the US has been reluctant to take on ambitious mitigation positions in domestic policy or international negotiations. But, by taking a network perspective and looking at more normative beliefs, the so-called policy core beliefs, the picture changes. Beliefs related to climate science and the relationship between economy and the environment are areas of high conflict that divide actors into opposing pro-mitigation and anti-mitigation coalitions. The anti-mitigation coalition, glued together by shared beliefs about the uncertainty of climate science and the other the protection of environment, is led by the Republican Party and is the biggest individual coalition. It includes influential domestic interest groups and forms a denser network than the pro-mitigation network which is divided into two distinct discourse coalitions, the second emphasizing validity of climate science and the other the protection of environment. The latter is led by the Democratic Party and international actors, the previous by United Nations. The network perspective thus seems more apt at reflecting the political outcome in the US. It is, therefore, the strength of the entire network clustered around particular policy core beliefs rather than the visibility of individual actors and frames that translates into political power. The results demonstrate the utility of discourse network analysis in examining policy debates in the media, and the Advocacy Coalition Framework, in identifying political coalitions.

Ivan Kuznetsov

Conflict network as mediator of voice expression

Scholarly interest in effective communication on different organizational levels rises rapidly over last decades and appears as highly multidimensional subject (Strutzenberger & Ambos, 2013). One of ground theories in this communicational domain is employee voice, which explains not only positive communication, but includes analysis of every aspect of employee’s expression of suggestions, ideas, information about problems, issues or other concerns based on complex decisions of whether to speak up or remain silent (Morrison, 2011). However most voice studies examine antecedents and consequences of this prosocial behavior without taking into account network features of this interaction (Pauksztat, Steglich, Wittek, 2011). The network conceptualization, nowadays, is the only approach that allows distinguishing voice targeted on different members of organizational communication, highlights reasons of this behavior that lurk in strength of informal ties, existing trust and desire to solve employee thoughts of how to improve organization. Taking into account the multiconstruct essence of concept we decided to include in our research influence of conflict network, which is vital in evaluating every possible aspect of employees decision whether to speak up and to whom and further evaluation of effectivenes of this upward and lateral communication (Simons, Peterson, 2000; Detert et al., 2013) and should be considered as integral part of voice expression. The purpose of this study is to reveal possible intersections between different intraorganizational networks, based on aspects of employees’ thoughts expression, capabilities to improve existing problem-solving practice and its influence on organizational engagement indicators. Data is being collected at various Russian mid-size companies which are based in Moscow.

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Norwegian gender quota and dynamics of board networks

Norway introduced a 40% gender quota on corporate boards in 2003 with a transitional period until 2008. It requires that at least 40% of both genders should be represented on all Norwegian public limited companies’ (PLC) boards. Since 2003, the average percentage of female representation in PLC’s boards increased from 5% to 40%. I investigate, how this reform changed the statistical properties of the network of directors and the network of firms created by interlocking directorates. I analyze the effect of gender on the structure of these networks and I examine the structural differences between male and female ego-networks. I analyze whether new female directors tend to be rather "token women" without many ties outside of the firm, or powerful "golden skirts" sitting on many boards with many ties. I also examine the impact of percentage of female board members on the firms position in the network. The gender quota was aimed to counter the pattern of recruiting board members only from the male talent pool. I investigate whether this quota succeeded in eliminating this pattern and whether there are