International Network for Social Network Analysis
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Sunbelt XXXI: Abstracts and Contact Information for Registrants
### Abstracts
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In 2003, the North Carolina Division of Public Health (NC DPH) introduced a hospital-based public health epidemiologist (PHE) program to help protect and improve the public’s health in North Carolina in numerous ways, including providing local health departments (LHDs) and NC DPH with a dedicated point of contact within hospitals. The detection and monitoring of communicable diseases and disease syndromes represents one of PHEs primary responsibilities. This research explores the considerable range of public health surveillance systems and informational resources used by PHEs and their partners to monitor and detect communicable diseases, including hospital-based information systems and national and state surveillance systems. The varying degree of access and information among PHEs, LHDs, and other stakeholders represents a critical intersection in public health surveillance. Using survey data about surveillance system usage and qualitative data gathered during face-to-face interviews, this analysis applies a two-mode network and systems-based approach to examine the relationship and patterns of interaction among PHEs and their partners to better understand surveillance-related activities. Specifically, this analysis examines the flow of information between “layers” of the public health surveillance system and identifies interdependencies among stakeholders related to surveillance reporting and monitoring, including an analysis of brokerage patterns.

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<td>A Comparison Of Immigrant And Non-immigrant Personal Networks: Preliminary Results From The 2010 Chicago Area Study</td>
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This report presents early results from the survey component of a multi-year, multi-method and multi-level research project addressing Latino immigration in Chicago suburban communities. Our larger project proposes that individual attitudes and community political debates about immigrants and immigration are shaped in part by the architecture of personal social networks. We surveyed residents of four suburban Chicago communities that have experienced rapid Latino immigration in recent decades, using a slightly modified version of the GSS network name-generator module. We added two questions to the existing name-interpreters: whether the alter was born in the U.S., and whether the alter resides in the respondent’s town, in the Chicago area, elsewhere in the U.S., or in another country. This allows us to build regression-based models that compare immigrants and non-immigrants in terms of personal network size and composition, e.g., ethnic heterogeneity, proportion kin, and proportion from the same geographic locale. Existing research tells us much about how an individual’s demographic traits are related to these outcomes, but less is known about whether being an immigrant is also related to these outcomes, or whether foreign birth interacts with the well-known demographic effects. We interpret the results in terms of their implications for trajectories of Latino political power, the rise of transnationalism, and mobilization about various local immigration policies, both restrictive and welcoming.
Health practitioners generally turn to peers as the sources of information, and are under influence of powerful social figures. The choice of information source is impacted upon by factors, including the expertise of the informant, accessibility, and the cost of getting information. This study is a social network analysis to understand how the staff of one health department in Ontario turn to peers to get help incorporating research evidence into practice. Three networks of information-seeking, recognition of expertise, and friendship were developed for around 170 staff. Information-seeking and recognition of expertise networks were mainly clustered based on the organizational divisions. Considering various broker roles in the network, we developed a 4-level hierarchy for information-seeking in the department: At the bottom, there are a majority of front-line staff who have a limited circle of information sources and friends. In each division there are local information sources, who are not necessarily connected to the higher levels. At the border of divisions, there are project specialists and some managers who are the sources of information for their local peers, and also turn to the higher level. And at the top, there is the the office of the Medical Officer of Health, bridging the divisions. Using the QAP regression analysis, the most important predictors of information-seeking were recognizing the source as an expert, and being friend. Among the homophily factors, the only significant variable was the similarity in the highest degree earned.

One of the major functions of social networks (including massive online social networks) is information dissemination. The information includes scientific knowledge, news, announcements, and even unconfirmed rumors. Information can be propagated by the network members along the natural connections in written, oral, or electronic form. The decision to forward or not to forward a piece of information is made by an individual network member, the sender, based on certain intrinsic considerations, which are not normally externalized either by the sender or by the recipient. Further, the information may be evaluated by the recipient and can be used as a basis for positive or negative feedback. We propose a family of game theoretical models of the information forwarding and feedback mechanisms that take into account the personalities of the sender and the receiver, such as their perceived knowledge, trust, and desire for popularity, and the aggregate parameters of the social network. The first model describes a one-directional diffusion mechanism: from one sender to one receiver, with a possibility of the receiver giving the feedback. In the second model, we allow full duplex communication between two peer actors. Finally, the third model describes a one-directional multicast with one sender and multiple receivers having different personalities. To the best of our knowledge, this is the first attempt to model information dissemination in terms of the mathematical game theory.
**A Measure Of Acuity Of Structural Hole Perception**

| Soltis, Scott M.; Borgatti, Stephen P.; Mehra, Ajay |
| Knowledge Networks |
| Measures, Structural Holes, Brokerage, Cognitive Social Structures, Cognitive Networks |
| THURS.AM1 |

A number of studies suggest that an ego network rich in structural holes confers certain advantages to ego. However, some of the benefits of structural holes may be realized only if ego is aware of the holes – otherwise they may go unexploited. However, individuals vary in their awareness of the structural features of their ego network. In this paper, we present a measure of the extent of congruence between the structural holes in a person’s perceived ego network and the holes in the actual network around them. We illustrate the measure on a number of empirical datasets.
## A Mixed-method Approach To Subgroup Identification

Weare, Christopher; Lichterman, Paul

Qualitative and Mixed Method Network studies

Mixed Methods, Community Detection, Civil Society

SAT.AM1

We combine ethnographic and social network methods to identify subgroups within the large field of organizations that address housing problems in Los Angeles. The formation of, maintenance of, and interaction between subgroups concern many scholars of civil society, informal organizations, and scientific innovation, to name just a few relevant areas of research. Yet there is little consensus on how to define or use the notion “subgroup.” Existing literatures treat it in terms of multiple dimensions: 1) instrumental exchange relations that connect actors, 2) affective bonds or the salience and strength of ties between members, and 3) culture affinity, or the degree to which member share common cultural values. Currently, different methods for identifying subgroups within a social network produce different results, and social network data typically cannot address all of the dimensions of belonging. We propose an iterative, mixed-method methodology. Ethnography is used to investigate organizational style—a concept that denotes different, patterned ways that members draw boundaries, sustain bonds with other members, and value or devalue speech. Organizational styles are then used to improve network-based subgroup mappings. In turn, the improved subgroup mappings are employed to extend the predictive power of ethnographic observations which otherwise remain more limited. In this way we begin to reconstruct relations between subgroups across an entire field.

## A Multi-theoretical, Multi-level Model Of High Tempo Collaboration In An Online Community

Keegan, Brian; Gergle, Darren; Contractor, Noshir

Collaboration, coordination and cooperation

ERGM/P*, Multilevel Analysis, Wikipedia, Affiliation Networks, Expert, Co-authorship Network

SAT.AM2

The coauthorship of Wikipedia’s breaking news articles operate in a volatile information environment without centralized authority. We use the literature on emergent groups such as disaster response teams and knowledge sharing in online communities to construct a multi-theoretical, multi-level model of high tempo, online collaboration. By applying exponential random graph models (ERGMs) to an affiliation network of Wikipedia articles about airline disasters, we examine how endogenous attributes such as the task characteristics of articles created immediately following an event and editors’ expertise interact to alter the exogenous coauthorship structure. Our analysis suggests editors’ expertise and contribution history influences their propensity to collaborate on breaking articles more than the properties of the article or other collaborators. These results have implications for understanding how expertise mediates team assembly in high tempo contexts absent central coordination and how individual level decisions to contribute affect macro-level coordination structures.
A Network Approach To Pattern Discovery In Spell Data
Fitzhugh, Sean M.; Butts, Carter T.; Pixley, Joy E.
Qualitative and Mixed Method Network studies
Methods, Life Course, Data Exploration, Pattern Detection, Activity Patterns, Interval Graphs
SUN.AM1

Applying Butts and Pixley’s (2004) structural representation of life history data, we illustrate an approach to identifying population-level patterns using a network framework for representing actors’ participation in multiple, simultaneous spells, or activities with specified start and end points. We apply this approach to traditional life history data using the Vietnamese Life History Survey (Hirschman et al.: 1991) and a novel case using organizational spell data. The simple life history graphs we utilize are based on coterminousness of spells—periods during which an actor engages in multiple spells at once. Spell overlaps affect each spell in a meaningful way—an effect not present if each spell occurs separately. As such, treating spells as a vertex set and coterminousness as an edge set yields meaningful insight into an entity’s activity patterns. A graph comparison of each entity’s spell intersection network with others in the population yields discovery of noteworthy differences in actors’ life activity patterns. We illustrate this method of pattern discovery in spell data with multiple types of actors—individual and organizational—to demonstrate the distinctions which emerge when utilizing such comparison. We then perform subsequent analyses to examine clustering and path dependence uncovered by this method.

A Network Perspective Of Organizational Culture: Relationships Between Simmelian Dyads And Culture Formation
Franczak, Jennifer L.
Networks and Culture
Simmel, Social Network Theory, Corporate Culture
SAT.AM2

This paper utilizes social network theory to better understand the formation of organizational culture. Organizational culture encompasses a range of factors that pattern social interaction in an organization, including formal practices, rituals, symbols, values and norms (Deal and Kennedy, 1982; Pettigrew, 1979; Schein, 1985). A key issue in the organizational culture literature is how to have an effect on cultural change in organizations. Because culture is manifested and created within social interactions (Jelinek, Smircich, Hirsch, 1983), social network perspectives will help better clarify how culture is embedded within an organization. Building on Krackhardt and Kilduff (1990, 2002) research, this paper will develop several working propositions on the relationship between the transmission and formation of culture in organizations and the existence of Simmelian tied dyads in an inter-organizational network. In this manner, this research seeks to develop a testable approach that will inform a better understanding of the relationship between social structure and culture formation within an organization.
### A Novel Hybrid Egocentric-archival Network Characterization Approach Using Cell Phones To Identify Bridging Actors In A High Risk Hiv/sti Network In India: The Secunderabadi Men’s Study (sms)

**Schneider, John A.; Kapur, Abhinav; Oruganti, Ganesh; Schumm, Phil; Laumann, Edward O.**

**Social Networks and Health**

**HIV/STD, Communication Technology, Cell-phone Network**

**SUN.AM1**

The SMS aims to address at least three limitations of basic network research: respondent bias, inability to accurately characterize attribute characteristics of bridging network members and deficiencies in archival network data by applying a newly developed hybrid network measurement algorithm using cell-phones and a name interpreter. This hybrid approach was developed to characterize social and sexual network structure. We developed a low-cost application that utilizes a cell-phone SIM card reader and associated software to allow for tie/alter identification from respondents’ cell phone contact lists. With privacy protections in place, we are able to unambiguously link contact lists of all sampled participants to generate an “augmented” network, that is, network tie information for respondents plus tie information for all other actors, including non-sampled actors. Name interpreter data of sampled participants then provides complementary tie/alter attribute information. Linking cell phone contact lists from sampled participants combines archival and egocentric network data collection allowing for measurement of ties between actors with confidence and through survey data, tie attributes and actor health behavior characteristics. We apply this approach to men who have sex with men who were recruited using Time Location Cluster Sampling from 21 cruising areas in Secunderabad, India. Data from the first 53 participants has yielded a linked cell-phone network of 3894 actors, 7.1% (277) of which are shared between at least 2 study participant cell phone contact lists. 42% (1883) of the ties were between MSM and 29% (253) of the actors with high centrality were married. Additional data will be presented and discussed.

### A Piece Of Cake – How Social Norms Govern Organization In The Community Of Dutch Cake Bakers

**Moser, Christine; Groenewegen, Peter; Huysman, Marleen**

**Qualitative and Mixed Method Network studies**

**On-line Communities, Knowledge exchange, Social norms**

**THURS.AM2**

Recent research shows that professionals exchange knowledge via online communities. However, the question of how communities are governed in the absence of formal regulations and hierarchies remains lingering. We propose that social norms replace traditional organizational control mechanisms. We conducted semi-structured interviews with members of one online community to find out which social norms prevail within their community. SNA, using community posts for whole-network analysis and data from interviews for ego-network analysis, was used to learn more about informal leaders in the community. Finally, we performed longitudinal content analysis on community posts, to see how members enacted the social norms. We found that the norms support, sociality, knowledge sharing, and structure governed this particular community. Furthermore, there was a strong understanding about leadership, although no explicit hierarchy was installed. Within the core community two groups could be distinguished: artists, who featured a high in-degree centrality; and experts, who featured a high out-degree centrality. Finally, social norms not only governed community organization, but also served to protect community knowledge. Findings are important for online communities, as they show that efficiency and order is more important to communities than previously assumed. They point out research directions concerning possibilities for entrepreneurs who seek knowledge in a potentially global network.
A Proposal For A Network Science Revolution Through Angle Measurement And Visualization

Martinez-Garcia, Orlando I.

Visualization

Measures, Network Dynamics, Triads, Geometry, Network Visualization, Dyadic Analysis

WED.PM2

Classical Network Analysis methodology has focused on mapping nodal and directed or undirected edge relations of power based on their size, form, length, color and closeness. However, I have noticed a common omission that has been generalized within the field of network science: the measurement of angles and their visual representation as they evolve from single nodes to dyads and triads as basic kernels for larger networks triadic dynamics as networks get larger. The existing literature exploits triads focusing on the role of the node and giving weight to the edges without using an elemental geometric principle, angle measurement. In that process, network graphs loose a spatial-time sequence dimension that triadic relations represented through their angle measurement based on power or strength of things being measured would generate through different triangles that entangled together, would produce more rigorous, faithful and holistic structural models and maps. I will develop perspectives on why angle measurement is a better tool for multidimensional weighted relationship graph and why angle measurement in triads would be revolutionary in network topology and visualization.

A Revisited Social Network Analysis Using Author Co-citation Data

Kim, Hyunjung

Knowledge Networks

Citation Networks, Social Network Analysis, Citation Analysis

THURS.AM2

This study will be an extension of a previous research on author co-citation using social network analysis. The research examined the social network of scholars in the field of Communication by analyzing author co-citation patterns. A matrix containing the number of documents cited by pairs of authors is used for social network analysis of scholars on the editorial board of Journal of Communication, one of the journals published by the International Communication Association (ICA). Author co-citation data is retrieved from Social Science Citation Index (SSCI) and UCInet is used to analyze the data and to create a network map of the scholars, which helps to visualize the knowledge structure of the communication field by identifying groups of authors who are more central than others. In addition, the research tries to find out if there are any factors, such as author’s educational background, current affiliation, or subject specialty, influencing the knowledge structure. The previous study used author co-citation data collected until 2008, so this study will be used to compare the current author co-citation pattern with data from the previous research to see if there’s any change over time.
A Social Network Analysis Of Tsimane’ Market Integration

Schultz, Alan F.; Tallman, Paula S.; Monteban, Madalena; Bond, Megan; Goldstein, Ruth; Bernstein, Alissa

Overlapping Personal Networks

Whole Networks, Personal Networks, Egonet, Overlapping

SAT.AM1

The Tsimane’ of lowland Bolivia live relatively egalitarian lives but are beginning to face increasing integration into markets and the corollary threat of growing inequalities. These inequalities may be reflected in the social structure of Tsimane’ communities. This project used a social network approach to understand the variable distribution of market integration within and between communities. There were two phases to this process. First, three respondents within a community were asked to evaluate the ties between all unique pairs of community members. I examine the extent to which these assessments agreed and combined them into one whole network. In the whole network those that were on the periphery of the network were individuals with higher market integration. For a second study, I conducted 29 Egonet interviews across two villages, half the respondents provided 25 alters and half 8 alters. I combined these personal networks into one whole network using the overlap of names and personal attributes. My analysis will show how these overlapping personal networks reflect the whole network structure of the communities and common alters on the periphery and between the villages.

A Social Network Perspective On The Quantity Theory Of Money: A First Exploration

Dekker, David

Networks and Economics

Economic Networks

FRI.PM2

Social network theory has much to offer in bridging the micro-macro gap in economics. This paper explores some ideas about possibilities to link macro-economic variables to social network structures. Specifically, attention is focused on the implications of degree distributions in trade networks on the velocity of money variable in the monetarist Quantity Theory of Money. Velocity is defined as distance over time, and velocity of money is the average frequency a monetary unit is used in a given time unit. In network terms the “average frequency a monetary unit is used” (v) translates into the walks with average length v. In this paper it is argued that it matters for economies through what structures walks are traversed. A walk of length v that includes 2 nodes has different economic implications than those that include v+1 nodes. Furthermore, walks of money often are dependent on the trade network structure, i.e. v-step links and 1-step links are dependent and a function of degree distributions. In economic terms this implies that micro individual relational behavior (1-step linking) has a direct effect on the (macro) quality of the velocity of money.
A Structural And Linguistic Approach To Social Roles: An Examination Of Im/politeness And Influence In Online Health Management Communities

Mastarone, Ginnifer

Words and Networks - Roles, Health, Methods
Social Influence, Social Media, Health, Politeness Theory
FRI.PM1

Social networking sites such as Dailystrength.org represent online communities where patients and caregivers engage in health management. Within these communities, social influence serves as a mechanism for carving the identity, information practices and norms of the community. Structural theories of influence rest on arguments regarding the relationship between social structure and information flows. Particularly, the role of Influentials within diffusion networks has come under scrutiny in the literature (e.g. Watts & Dobbs, 2007). However, the sole analysis of structural positions does not take into account linguistic processes that are used to decrease social distance, manage identity and define hierarchal roles within online communities. Furthermore, the analysis of im/politeness strategies outside of the context of the social network does not accurately represent the relational attributes of individual and group identity management. Therefore, a community-based model of im/politeness must be developed to reflect the relational discursive patterns between actors. In this paper, I theorize that an actor’s politeness tactics coupled with their structural positioning provides a more holistic explanation of why particular actors assume certain social roles (e.g. brokers, marginals) within the health management network. I examine message board and blog posts hosted on Dailystrength.org for politeness strategies as well as identify social roles through social network analysis. I expect that this research will contribute to our understanding of community formation and leadership within online health communities.

A Study On The Synchronization Of World Stock Markets Via Network Analysis

Choi, Seungil

Networks and Economics
Minimum Spanning Trees, Synchronization, Stock Markets
FRI.PM2

In the progress of the recent global financial crisis, we have seen an increased synchronization of world stock markets. With the correlation data among major stock indices, we construct the minimum spanning trees over time and analyze the dynamics of these minimum spanning trees. First, we ask when any noticeable increases in returns synchronization of world stock markets occur. Second, we ask if there were any noticeable changes in network indicators preceding a financial crisis. Third, can we explain any effects of the G20 on the synchronization of world stock markets via network analysis? Different from previous studies on the synchronization of stock markets with GARCH models, this research applies network analysis to explain the characteristics of global stock market synchronization.
### A Technique For Analyzing Ergm Behavior Using Bernoulli Graphs

Butts, Carter T.

**Exponential Random Graphs**

Graph Theory, Exponential-family Random Graph Models, Analytical Methods, Asymptotics, Spatially-embedded Networks, Stochastic Processes

The use of discrete exponential families has revolutionized the modeling of networks with properties such as heterogeneity and/or complex dependence among edges. Such exponential-family random graph models (or ERGMs) constitute a general language for describing distributions of networks, and are increasingly widely employed both within and beyond the social sciences. While the generality of the ERGM framework is appealing, few techniques other than simulation have been available for studying the behavior of models with non-trivial edgewise dependence. Random graph models with independent edges (i.e., the Bernoulli graphs), on the other hand, are well-studied, and a large literature exists regarding their properties. Here, I demonstrate a method for leveraging this knowledge by constructing families of Bernoulli graphs that bound the behavior of general ERGMs in a well-defined sense. By examining the behavior of these Bernoulli graph bounds, one can thus analyze many properties of the associated ERGMs. Several applications of this method to the study of complex network models are discussed, including the identification of models that avoid asymptotic degeneracy and robustness testing for large-scale network models based on geographical covariates.

### A Text And Network Analysis Of Natural Resource Conflict In Sudan

Van Holt, Tracy; Johnson, Jeffrey C.

**Words and Networks - Natural Language Processing, Conflict**

Structural Equivalence, Affiliation Networks, Conflict, Action And Structure, Web Content Analysis, Africa

Many theories of the causes of societal conflicts concern competition over scarce resources. Natural resources—oil, agriculturally based commodities, and ecosystem services—appear to be among the sources of conflict among ethnic groups in Sudan. We use automated text and social network analysis of Sudan Tribune data to test this proposition by examining the extent to which 1) environmental concepts that are reported in the Sudan Tribune are linked to conflict as opposed to possible non-environmental causes, and 2) whether structurally-equivalent groups have similar conflict patterns. Finally we discuss the utility of this approach for building associational models of this kind from newspaper and other textual sources.
A Two Mode Personal Network Method For Creating Categories Of Knowing

McCarty, Christopher; Bernard, H. Russell; Fazito, Dimitri

2-Mode Networks
Two-mode Data, Personal Networks

SAT.AM1

The network scale-up method (NSUM) is a way to estimate the size of hard-to-count populations, such as IV drug users. NSUM is a two-step process that first involves the estimation of personal network size for individual respondents. There are two methods for estimating network size – the back estimation method and the summation method. The summation method relies on respondent estimates of the number of people known in mutually exclusive and exhaustive categories of knowing, preferably in the language of the population of interest. We will present the results of four pilot projects in Thailand, Rwanda, Brazil and the U.S. where respondents were first asked to free-list ways people know each other in their native language. Respondents then listed 30 people they knew, and for each of the 30 people evaluated whether the categories of knowing applied. By creating a union of these 30 matrices we can see which categories are linked by co-use across the 30 respondents. We will present a protocol for using this approach to develop categories in the language of the respondent.

Accelerating Returns To Science

Wasko, Molly

Applying Social Network Analysis to Clinical and Translational Science in four CTSA Institutions

Scientific Networks, Academic Networks, Performance

SAT.AM2

Panel Session Title: Applying Social Network Analysis to Clinical and Translational Science in Four CTSA Organizations. Accelerating the rate of scientific discovery from the bench to the bedside is one of the critical areas of investment for improved human health. At the University of Alabama at Birmingham, we are using social network analysis to map our network of scientists to identify how investments in translational science through our Center for Clinical and Translational Science facilitate, accelerate and transform science. We take a unique approach to applying social network analysis as a means for evaluation and assessment of performance of the center. The purpose of this research presentation is to share knowledge related to our assessment activities and gain feedback from the INSNA community on new directions.
**Actor Heterogeneity In Dynamic Influence And Selection Models**

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SAT.PM2

In the context of stochastic actor-oriented models, actor heterogeneity poses the two inferential questions of what actors are different and with respect to what effects they differ. Conditional on a specific choice of model and a subset of effects for which the homogeneity may be relaxed, a Bayesian latent class inference scheme takes actor heterogeneity into consideration. To guide us in the choice of model specification we propose to use diagnostics for detection of heterogeneity. These aim to ascertain presence of heterogeneity for actors and if some actors are extreme; and, what aspects of the evolution the actors are heterogeneous with respect to. For a base-line model score-based methods and case-deletion approaches are available to us. A selection of fitted models may then be tested against each other and goodness of fit measures used to assess latent class homogeneity and separation.

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**Affiliation Networks And Adolescent Problem Behavior**

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FRI.AM2

Research suggests dense social networks within collectivities protect against antisocial behavior among youth in part by increasing aggregate levels of social control. Studies also emphasize the importance of connections to social institutions in fostering access to resources and adolescent socialization. While theory and research suggest that aggregate social cohesion and institutional affiliations may protect against problem behavior and adverse outcomes, most conventional sampling techniques and questionnaires preclude the construction of objective measures of collective (e.g., school or neighborhood) network properties. Using data from Add Health, we compare the effects of aggregate measures of affiliation-based network density (students connected to school activities) and friendship network density on a host of individual outcomes across 113 schools in the US. Multilevel models of substance use, violent victimization, delinquency, sexual activity, depression, and school attachment reveal significant effects of both aggregate density measures after controlling for individual covariates, ego network density, and wave 1 controls. In addition, affiliation network density was more strongly associated with a number of outcomes than friendship network density. We discuss the utility of this new measure for research on problem behavior and its potential for capturing neighborhood-based affiliation network density with clustered random samples.
Alliance Building In Civic Networks
Diani, Mario
Networks, Collective Action and Social Movements
Alliances, Collective Action, Political Networks, Interorganizational Networks, Voluntary Associations
THURS.AM1
In this paper, I draw upon data on inter-organizational relations in two British cities to explore alliance building between civic organizations. My analysis develops in three different steps. First, I chart the extent of alliances in which civic organizations are involved, and discuss how the amount of resources controlled by civic organizations and their focus on local rather than national or broader agendas may affect their involvement in networks. Second, I look at the factors that actors perceive as most relevant at facilitating or preventing alliance building. Finally, using QAP regressions, I evaluate how similarity and dissimilarity on a number of properties as well previous involvement in networks affect the chances of dyadic relations between civic organizations.

An Actor-oriented Model Of Obesity, Physical Activity, And Screen Time
Shoham, David A.; Lamberson, PJ; Steh, David; Tong, Liping
Social Networks and Health
Adolescents, Homophily, Siena, Physical Activity, Peer Influence, Obesity
FRI.PM1
Recent studies have investigated the "contagion" of obesity within social networks, yet critics have questioned the ability of these models to distinguish peer influence from homophily. One promising alternative approach is the actor-oriented model developed by Snijders et al. By simulating network and behavioral dynamics according to various rules, then fitting the resulting patterns of network and behavior change to empirical data, the actor-oriented model yields parameter estimates for behavior that are adjusted for network selection (including homophily), and vice-versa. We used data from the National Longitudinal Study of Adolescent Health with 1 year of follow-up, restricted to a racially homogeneous high school with complete network data (N=635; mean out-degree=4.0). Three obesity-related measures were investigated for homophily and peer influence (average similarity with peers): body mass index (BMI, mean=22.9 kg/m2 at baseline), screen time (mean=15.0 hours/week); and a physical activity score (PA, range 0-9; mean=3.8). R-Siena was used for estimation; significance was defined as p<0.05. Significant parameters were estimated for homophily on BMI, but not on screen time or PA. However, very strong and significant effects were estimated for peer influence on BMI and screen time, but not for physical activity. We conclude that while homophily is present for BMI, homophily is unable to explain away peer influence on BMI or screen time.
**An Agent-based Approach To Evaluating The Performance Characteristics Of Regression For Distinguishing Longitudinal Network Effects: Pragmatic Lessons**

Iwashyna, Theodore J.; Hutchins, Meghan; Gebremariam, Cham; Lee, Joyce M.

**Empirical Large-N Networks**

Homophily, Agent Based Models, epidemiology, Influence

SUN.AM2

**Background:** Using panel data to evaluate network effects on populations has grown in popularity, particularly the use of GEE models at the dyadic level, incorporating lagged effects, to distinguish homophily from network influence. Objective: A regression can be seen as a test attempting to discern the underlying structure. We evaluated the measurement characteristics of the GEE approach. Methods: We developed an agent-based model (ABM) with network influence on an observable characteristic and/or homophily in network formation on that characteristic. We repeatedly simulated a panel of data with the ABM, then analyzed it using the GEE. We examined the sensitivity and specificity across 1,000 separate simulated populations for each condition. Results: (1) If the underlying population had secular trends in the observable characteristic, GEE models without control for such trends will report statistically significant network homophily and influence even when there are no such effects in the underlying population. (2) If the underlying population had network influence, the GEE models were able to detect this with 100% sensitivity. In 9% of cases where there was not network influence, the network influence coefficients were still statistically significant, independent of homophily. (3) The GEE models had no ability to distinguish situations in which homophily was present from situations in which it was not. Conclusions: GEE models show promise, but have clear limits.

**An Agent-based Simulation Of Relational Mobility**

Lu, Philip S.

**Simulation and Agent Based Models**

Culture, Agent Based Models, Network Models, Psychological Network Theory, Relational Mobility

FRI.PM1

Cross-cultural psychologists have suggested that differences in behavior among societies may be influenced not only by actor preferences, but also by the dynamics of social network structure. Compared to individuals in the United States, Japanese individuals are more likely to disclose less personal information to those in their networks (Schug, Yuki, Maddux 2010), choose conforming strategies (Yamagishi, Hashimoto, Schug, 2010), and exhibit less homophily with those in their social networks (Schug, Yuki, Horikawa, Takemura 2009). In these studies, researchers attribute these differences to the the concept of relational mobility, or the opportunities to drop and form new connections in a network. In this study, I present a network simulation model where agents take on a variety of friendship formation strategies. I show that the rate at which connections are formed and dropped is more dependent on the initial network structure than on individual desires for new connections. The results support the idea that cultural differences may be based on structure, not individual preferences.
An Exercise Of Political Power Or Religious Freedom: An Analysis Of Blog Networks Of The “ground Zero Mosque”

Yang , Aimei ; Self, Charles
Communication Networks
Communication, Communication Networks, Religion, Political Networks, Blog Networks, Online Networks
THURS.PM2

In the August 2010, national attention was intensified by an issue evolving around the attempt of a group of Muslim-Americans who planned to build an Islamic community center (the Cordoba House project) close to ground zero in lower Manhattan. The earliest news coverage of the Cordoba project appeared in December 2009, and received rather scarce attention. Five months later, after the New York City community board approved the project unanimously, the case was blogged by an anti-Islam blogger with sensational title and soon the blog attracted considerable number of followers. The issue was intensely covered by media and became a political issue. The configuration of hyperlink networks can reveal deep information about the landscape of certain issues in a society. Based on social network theories and a review of the relationships between religious and political issues, a set of research questions were proposed to guide the analysis of the blogs network involved in the discussion of the ground zero mosque issue. We also examined what structural factors of the network influenced the discussion pattern within this network and what features of centered blogs highly correlate with their emergence as hubs from nodes. A sample of relevant blogs was identified using the search function of the Blogosphere Ecosystem. These blogs were coded with their authorship, political affiliation, religious affiliation, the number of ingoing/outgoing hyperlinks and other features of blogs. The structure of the network was analyzed and the correlations of blogs’ attributes and their structural positions were calculated. Findings and implications were presented.

Analyses Of A Multi-layered Network Based On Transaction And Joint-patent Application

Inoue, Hiroyasu
Innovation, Diffusion, and the Adoption of Technology
Innovation Networks, Multiple-network Studies, Transaction Networks
THURS.PM1

Many firms these days, forced by increasing international competition and an unstable economy, are opting to specialize rather than generalize as a way of maintaining their competitiveness. Consequently, they cannot rely solely on themselves, but must cooperate by combining their advantages. To obtain the actual condition for this cooperation, a multi-layered network based on two different types of data was investigated. The first type was transaction data from Japanese firms. The network created from the data included 961,363 firms and 7,808,760 links. The second type of data were from joint-patent applications in Japan. The joint-patent application network included 54,197 nodes and 154,205 links. These two networks were merged into one network.
### Anxious Solitude And Social Disinterest In Adolescent Friendship Development: A Short-term Longitudinal Social Network Analysis

Findley, Danielle; Sijtsema, Jelle; Ojanen, Tiina

**Poster Session**

Adolescents, Social Network Analysis, Friendship, Social Withdrawal

SAT.PM3

Social withdrawal has negative implications for number and quality of friendships. However, unlike anxious forms of solitude, recent research suggests that non-fearful preference of solitude (social disinterest) is relatively benign in social development. In the present study, we examined the effects of anxious solitude and social disinterest on the characteristics of adolescent friendship networks with the expectation that the former would be related to relatively more negative friendship characteristics (e.g., unpopularity as a friend). Furthermore, selection and influence effects were explored with respect to both variables. Social network modeling (SIENA; Snijders et al., 2007) is used to examine the effects of anxious solitude and social disinterest on friendship selection and social influence patterns of 504 Finnish adolescents (12-14 years) across 3 time points. The networks consisted of friendship nominations within the 7th and 8th grade levels at school. Self-reported social withdrawal variables (α = .85) were used as individual level covariates in the analyses. The preliminary findings support our overall hypothesis. Furthermore, it appears that similarity in adolescent friendships is driven by social selection and influence effects with respect to both forms of social withdrawal. Further analyses to examine effects of each construct on friendship development will be conducted.

### Applied Social Network Analysis: Using Social Network Analysis As Part Of An Edumetric Process In Interprofessional Teamwork

Cott, Cheryl A.; Guilcher, Sara; Ryan, David P.

**Sports, Teams and Networks**

Sports, Teams, networks

SAT.PM2

We describe a knowledge-to-practice initiative in which social network analysis was used in an edumetric process to enhance interprofessional teamwork in primary care health teams. Edumetrics refers to the process of using research data as part of the educational process in order to stimulate a process of reflection amongst participants and to help them to develop a set of actions/goals to address issues raised by the data. Measurement becomes more explicitly measurement and education. Members of participating primary care teams (e.g. family physicians, nurse practitioners, social workers) completed a questionnaire consisting of a measure of team functioning plus social network data on two ties with other members of the primary care team (refer to each other; exchange information with). Each team received a summary report of their team functioning scores and two sociograms (one per tie) with an analysis of their team's centrality, network density, strength of ties, and reciprocity for each tie. Following receipt of the report, each team participated in a reflective exercise whereby they developed a set of actions/goals to address the issues raised in the report. Ninety-one primary health care teams participated in the study. Of these 42 (46%) had a sufficiently high response rate to allow completion of the full social network analysis. Common issues that arose were lack of engagement of non-traditional primary care staff, multidisciplinary rather than interdisciplinary team functioning, and few cross referrals. We highlight how we used social network data to reach these conclusions and their impact on team development activities.
Are Idle Hands The Devil’s Playground? Identifying Deviant Individuals And Their Networks Using Blau Space Modeling

Genkin, Michael; Brashears, Matthew E.; Suh, Chan
Criminals, Gangs, Terrorists, and Networks
Terrorism, Software, Covert, Dark Networks, Blau Space, Network Tracing
SAT.PM1

How can individuals who engage in underground criminal activities be located when they are mixed together with a non-deviant population? We describe the preliminary results of an effort to locate persons engaged in criminal and socially sanctioned activities in the National Longitudinal Study of Adolescent Health (Add Health) data by modeling the structure of competition between deviant and non-deviant activities in a dynamic Blau Space. This represents an important extension of McPherson’s (1983) ecology of affiliation framework and demonstrates the compatibility of this approach with the study of deviance. Challenges and possible solutions to theoretical and methodological problems of Blau Space modeling will be discussed. Particularly, we will describe a way to merge Blau Space analysis with an overlapping ties approach. We also present a new software tool, called BlauGraph, which offers a new way to visualize networks and automate the identification of the most important structural parameters defining association. In combination, these new techniques and software tools provide new avenues for the identification of criminals, terrorists, and other members of Covert Social Networks (CSNs) when only incomplete information is available. The work not only suggests applications for substantive real-world problems, but offers deep insights for network theory more generally.

Are Small Social Networks Associated With Syphilis Infection?
Gandhi, Anisha D.; Weir, Sharon S.; Li, Jing; Chen, Xiang-Sheng
Social Networks and Health
Friendship Ties, Public Health, China, Social Networks
FRI.AM1

Social isolation has been recognized as a potential risk factor for poor health outcomes, including sexually transmitted infections. However, having a large social network of persons with a higher prevalence of sexually transmitted infections may increase the risk of infection by increasing exposure to STIs. The relationship between social ties and odds of syphilis infection was explored using data collected from October 2009 through February 2010 at venues identified as places to meet new sexual partners in urban Guangxi, China. Using time-location sampling of these venues, data were collected through interviews with 519 female workers who did not report engaging in sex work in the past four weeks and were willing to undergo a rapid syphilis test. Social networks reported by participants (defined by the number of friends in the same city) were generally large (range 0-800; mean 56.7; median 22). The weighted syphilis prevalence was 3.01%. Having a small social network (less than 10 friends) was associated with a positive rapid syphilis test (OR 3.65; 95% CI 0.97, 13.82). Elevated odds of syphilis infection for those with a small social network were persistent after controlling for age, education and number of recent sex partners (OR 1.78, 95% CI 0.51, 6.07). Though the small number of positive tests limits the ability to detect significant associations in this sample, these data suggest that social network size may be an important correlate of sexually transmitted infection independent of other individual risk factors.
Are You Getting What You Came For? Evolutionary Mechanisms In Online Social Support Communities

Chewning, Lisa V.

Online Social Networks

Social Support, On-line Communities, Social Networks On The Web, Social Network, Evolution

THURS.AM1

Online communities, like in-person communities, provide support, information, and social capital to members. Unlike in-person communities, online communities are not geographically bound, and can be social networks of individuals bound by common interests or needs (Wellman, 1997). Thus, online communities can provide a venue through which individuals can establish networks of social support, or “relationships that provide individuals with actual assistance or that embed individuals within a social system believed to provide love, caring, or sense of attachment to a valued social group” (Hobfoll, 1988, p. 121). Previous research (Monge, Heiss, & Margolin, 2008) has studied network evolution in terms of the interaction of populations and the overall environment as populations within a community compete for resources. However, as the incentive to join online communities, as well as the parameters of the environment, differ from in-person communities, the evolution of online community networks may differ from those of in-person communities. Thus, this paper seeks to understand the mechanisms behind the organization and evolution of social networks in online communities. This paper analyzes the evolution of an online community for parents of children with disabilities over a one-year period. By tracking the interaction of community members created by commenting on individual threads, this paper provides longitudinal data detailing the evolution of the network structure. Conclusions from the data will further understandings of both social support networks and network evolution in online platforms.

Assessment Of Centrality Measure Across Social Network Software

Wang, YuFei; Murphy, Philip J.; T.Cuenco, Karen

Centrality Measures in Social Networks

Methods, Software, Centrality

WED.PM1

Social network analysis software development has been increasing and so has the range of analyses that are available. Because no one program incorporates the full range of analytic approaches, a common solution is to use two or more software packages to address a given analytic need. In the process, basic network measures may be generated through different platforms that vary in their calculations. Careful checking and comparison of these software outcomes has not been conducted systematically and leaves the analyst vulnerable to discrepancies that affect inference and propagate erroneous conclusions. To understand the magnitude and character of variability present among these network packages, we examine the most basic building-blocks of algorithms in network analysis: measures of centrality. Specifically, we are interested in how and in what ways (normalized) degree, closeness, betweenness, and eigenvector centralities and their variants correlate or covary between programs. These measures are assessed using both one-mode and two-mode network biologic data across eight popular analysis software, including Pajek, ORA, UCINET, igraph, and others. Time permitting, we also assess global measures such as clusterability and the impact of centrality variation on subsequent community structure algorithms, when available. With this research, we characterize the issues that are introduced when we move our analytic work from program to program.
### Asset-based Community Building Networks And Adaptive Capacity
Kapucu, Naim

**Organizational Networks**
Social Capital, Adaptive Capacity, Interorganizational Networks, Partnerships, Local Networks

SUN.AM1

This presentation focuses on inter-organizational networks and adaptive capacity among nonprofit, public, and private organizations in Central Florida. Adaptive capacity is a function of the degree to which social institutions (e.g., government, civic institutions, and the private sector) possess a culture that empowers communities and that translates this into decisions, behaviors, and actions that support community-led initiatives. The presentation will specifically focus on network formation and sustainability among 42 community-based nonprofit organizations and their networks with other cross-sector organizations identified as part of asset mapping for the Strengthening Communities Fund (SCF) project in Central Florida counties. SCF project participants were surveyed at the beginning of the project and toward the end of the project to determine the changes in the network. Based on the initial survey, the project team intervened with different methods and incentives to increase effectiveness of networks and building relationships among the partner organizations. The research uses UCINET software program in analysis of the network data. The research is timely and critical as the funding focuses on economic recovery and nonprofits role in it in a distressed part of Central Florida counties.

### Association Between Friendship Networks And Physical Activity Among Adolescent Girls From 8th Grade To 11th Grade
Saksvig, Brit I.; Wu, Tongtong; Valente, Thomas W.; Rohm Young, Deborah

**Adolescent Friendship Networks**
Adolescents, Physical Activity, Longitudinal Social Network

THURS.AM2

Social support and peer and parental influences are critical factors that are associated with adolescent physical activity (PA). However, few studies actually examine the influence of adolescent friendship networks on PA over time. The present study will examine the following research questions, 1) is an adolescent girl’s PA similar to that of her friendship network; 2) is there an association between a participant’s change in PA from 8th to 11th grade and the change in PA of her network; and 3) is social position associated with physical activity and change in PA. We will also compare social selection versus social influence effects on PA over time. Participants were 451 girls who participated as 8th graders in the Trial of Activity for Adolescent Girls (TAAG) study from six middle schools in Maryland. Participants completed a network questionnaire when they were in the 12th grade which listed the names of girls from their 8th grade class who had also participated in TAAG. Participants indicated how well they knew each girl (best friend, friend, or knew a little) retro-actively for 11th grade and 8th grade. In both the 8th and 11th grades participants completed a series of measures which included wearing an accelerometer for 7 days, height and weight, and physical activity behavior questionnaires. The mean age of participants was 16.9 and they were ethnically diverse (49% White; 19% African American; 13% Hispanic/Latino; 19% other). Results from this study could help in targeting interventions to increase PA among adolescent girls.
Association Of Social Networks, Psychosocial Factors And Physical Activity Of Adolescents
Huang, Sheu-jen

Adolescent Friendship Networks
Adolescents, Network Survey, Gender, Public Health, Social Network Analysis, Behavioral Networks

The main purpose of the study was to explore the relationship of background factors, peer social networks, psychosocial factors, with physical activity of the adolescents. The subjects were 232 first- and second-year junior colleges students in Taiwan with 92.8% response rate. The data were collected with a close-ended questionnaire. The main findings were as follows: Boys were more physically active than that the girls. Basketball and jogging were the items engaged most by the boys; walking and ladder-climbing were for the girls. The position that the adolescents were on the social networks could influence their physical activity. The participants in a small group composed of single gender engaged in less physical activity than those who were in mixed-gendered groups and non-group members. Those who were in an all-female small group had least amount of physical activity. The participants who were in an active physical activity social networks, perceived higher benefit, higher self-efficacy, and lower barrier with physical activity engaged in more physical activity. The variable that had significant explanatory powers on physical activity was physical activity-related peer social networks with other variables controlled. Key Words: adolescent, social networks, psychosocial factor, physical activity, gender composition of social networks

Balancing Risk And Security: The Density And External Connections Of Insurgent Networks
Everton, Sean F.; Roberts, Nancy

Criminals, Gangs, Terrorists, and Networks
Inter-organizational Networks, Dense Networks, Insurgencies, External Connections

Social movement scholars have long recognized that in the absence of sufficient resources, insurgent movements are unlikely to mobilize regardless of the intensity of their grievances or their opportunities (perceived or actual) to do so (McAdam 1999; McCarthy and Zald 1977). In a follow-up to a paper that we presented at last year’s Sunbelt conference, which focused on organizational ties, this paper examines particular resource we believe is essential to the emergence and mobilization of successful insurgent movements: the regional network that binds these insurgencies together. Specifically, we argue that insurgencies are more likely to emerge and sustain their efforts if they are locally dense and regionally connected. We believe that insurgencies are necessarily dense at the local level for two reasons: recruitment occurs primarily through strong ties (Lofland and Stark 1965; Passy 2003; Sageman 2004) and network density encourages loyalty and discouraging defection through the appropriation of solidary incentives (McAdam 1999) and the monitoring of behavior (Granovetter 2005). Thus, we expect them to exhibit higher levels of network density than do non-insurgent networks (H1). Regional connections are seen as necessary because they link local insurgencies to distant parts of the social structure (Granovetter 1973), which provides them with access to important resources such as information, training and external financing. Nevertheless, we believe that too many external connections increases security risks for insurgencies; thus, we expect the relative number of their external connections to be lower than those of non-insurgent networks (H2). We test these two hypotheses using a unique social network dataset collected on South East Asian insurgent and non-insurgent groups from 2004-2010.
**Bayesian Set Models For Two-mode Data**

DuBois, Christopher; Smyth, Padhraic

Mathematical and Statistical Network Models

Two-mode Data, Statistical Models

SAT.PM2

Two-mode networks are a natural representation for a large class of relational data, including those involving co-appearance, affiliation, and non-dyadic events. One example is email communication, where multiple recipient emails are easily represented as hyperedges in a two-mode network of emails and participants. This contrasts many current analyses where data are coerced to be strictly dyadic. In this work, we present a statistical model for two-mode network data that assumes individuals belong to (possibly overlapping) sets, where actors in each set tend to co-appear. In this way, our model provides a natural means for directly modeling hypergraphic events, such as multi-recipient email. With the Davis Southern women dataset as an example, we illustrate using parameter estimates for exploratory data analysis. We apply the model to email data and evaluate its predictive accuracy on a missing data task.

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**Behavioral Contagion In A 100 Million Person Online Social Network**

Fowler, James H.; Bond, Robert M.; Fariss, Christopher J.; Jones, Jason J.; Settle, Jaime E.; Sohn, Yunkyu

Online Social Networks

Diffusion, Social Influence, Innovation, Social Networks, Behavioral Networks, Clustering

FRI.AM1

Scholars disagree about how contagions—of ideas, innovations, consumer trends, or health behaviors—start and spread. Theoretical work suggests several models through which network structure and tie characteristics affect the diffusion of a behavior. The “strength of weak ties” hypothesis suggests that when a single contact is sufficient to spread a behavior, networks with “small-world” topologies diffuse a social behavior more thoroughly and rapidly than highly clustered networks because long ties allow the behavior to move to other areas of the network more quickly. Conversely, the “complex contagion” hypothesis suggests that the redundant ties in dense, tightly connected networks provide social reinforcement for adoption, which are more conducive to efficient and effective contagion. We test these models of contagion using data from over 100 million users of the social networking site Facebook and examine the dynamics of influence in the adoption of both real world behaviors, online behaviors, and the spread of political rhetoric. Our work is a significant improvement on previous attempts to characterize dynamic influence in networks because we both demonstrate contagion in a real world social network and explore whether there are different contagion patterns for different types of behaviors.
## Birds Of The Feather Flock Together 2.0: Is There A Personality Based Homophily?
**Dolgova, Evgenia**

**Social Networks and Demographics**

**Homophily, Tie-strength, Personality**

WED.PM1

The similarity-attraction paradigm predicts that people tend to build up relationships with similar others. Abundant evidence exists for homophily (interaction with similar others) based on age, sex, education, prestige, social class, tenure, function, religion, professional affiliation, and occupation (Brass, 1985; McPherson & Smith-Lovin, 1987; Ibarra,1992, 1993). However, homophily based on personality traits has not yet been investigated. We suggest that people with similar personality traits would develop stronger relationships that overtime would lead to development of homogeneous cliques. This paper investigates the effects of similarity and complimentarity along Five Factor Model personality dimensions on tie strength, cooperation intensity, trust and conflict. 420 reciprocal ties among 320 students in workgroups are examined. Controls include age, gender, nationality and familiarity. The results extend existing research on antecedents of network structure by emphasizing the role of personality in social tie formation.

## Bridging And Clustering In Adolescent Networks: Relationships To Adolescent Smoking

**Lakon, Cynthia M.**

**Social Networks and Health**

**Networks And Health, Adolescents, Public Health**

FRL.PM1

Various structural and positional network characteristics, which may act jointly with peer influences and emotional support transmitted in adolescent friendship networks, may confer risk or protection for adolescent smoking. Occupying a bridge position in a network may play a critical role in the diffusion of peer influence and emotional support in relation to adolescent smoking. Bridge persons can broker influence between densely connected and disparate network regions. As weak ties linking these highly connected areas, bridge persons may facilitate or inhibit the flow of influence and support between the groups they connect. Clustering is also of interest as individuals who comprise these groups may be homogenous on such key attributes as their substance use behavior, and exposure to norms and social influence. Hence, the present study examines whether bridging and clustering act synergistically with peer influence and emotional support in relation to adolescent cigarette smoking. Using a multilevel modeling approach, this study will utilize data from the National Longitudinal Study of Adolescent Health.
**Bringing Personalized Ties Back In: Their Added Value For Biotech Entrepreneurs And Venture Capitalists In Inter-organizational Networks**

Pina Stranger, Alvaro; Lazega, Emmanuel

Organizational Networks

ERGM/P*, Inter-organizational Networks, Multiplexity, Knowledge Transfer, Biotechnology, Venture Capital

FRI.PM1

Using a unique dataset collected in France among Biotech entrepreneurs and their venture capital investors (VCs), we measure the added value of personal relationships at the interorganizational level. Our analyses show that when two entrepreneurs share a personal collaboration tie or a personal friendship tie with a VC investor, the probability that they will have an advice tie and thus exchange tacit knowledge increases significantly. We confirm the importance of this kind of social embeddedness in the Biotech industry where personalized ties – as opposed to institutional and contractual relationships – at the inter-organizational level had not yet been examined systematically. Our results suggest that strategies of personalization of exchanges are vital for inter-organizational learning. These strategies help entrepreneurs with access to resources, with participation in knowledge building and with co-orientation of activities in this industrial sector.

**Bringing The Actor Back Into The Network: Examining The Relative Validity Of Actor Attribute-adjusted Networks On Team Performance**

Murase, Toshio; DeChurch, Leslie A.

Sports, Teams and Networks

Team Performance, Teams, Group Structure

SAT.PM2

Much research on social networks focuses on the strength and pattern of ties, assuming that actors contribute uniformly to the patterning of networks. We empirically examine the appropriateness of this approach by examining the relative predictive validity of socio-cognitive networks calculated with and without actor attribute adjustments based on status and influence. We advance and test the core idea that in bounded team and multiteam networks, attribute-adjusted network calculations lead to better predictions of network effectiveness than do standard calculations. Consider two, 6-person teams with the same degree of communication density. In one team interactions mainly occur among high status members whereas in the other team, interactions occur between high and low status members. The resulting density scores fail to account for the status differential of the actors and in doing so, constitute deficient operationalizations of density. Thus, using unadjusted scores may lead to inaccurate inferences of network structure-network effectiveness relationships. These ideas are demonstrated in a sample of 120, 6-person networks performing a laboratory team task. Power and influence-related attributes are assessed and used to adjust network indices such as density and structural holes. We then compare the efficacy of these adjusted indices of cognitive, affective, and behavioral socio-cognitive networks to non-adjusted indices in predicting the performance of team networks. Discussion and future directions will be provided.
Fifty years of research in political psychology have documented systematic differences in the cognitive styles of actors at different points in the political spectrum (Jost et al, 2003). Political extremes differ from both the political center and from each other in their tolerance for ambiguity, openness to experience, and other aspects of “mental rigidity.” This research reveals two tendencies: individuals on the extremes tend to be more rigid than those in the middle, and those on the right tend to be more rigid than those on the left. We propose that these differences extend to the processes political actors use to form homophilous and heterophilous ties. Because those high in mental rigidity should be more sensitive to dissenting views, we predict that the above relationships between political ideology and mental rigidity will in turn lead to different levels of homophily and heterophily for liberals, conservatives and moderates. As a consequence, we expect the social networks that underlie political action to systematically differ in density and closedness between different points in the political spectrum. We test these predictions by examining the large-N Twitter communication networks formed around four distinct kinds of actors: Senators, Congressmen, national news sources, and major think tanks. We conclude by discussing the implications of these findings for the construction and stabilization of political opinion.
**Causal Directional Influences Of Social Mechanisms And Language Processes: The Socially Situated Ways African Muslim Refugee Women Understand And Utilize Health Information**

Nimmon, Laura E.

Qualitative and Mixed Method Network studies

Social Support, Dynamic Network Analysis, Meaning Networks, Culture, Immigration, Discourse Analysis

SAT.AM1

There is a significant social dimension to health literacy, but no study to date has investigated whether or how social support can moderate the effects of health literacy on individual health and health service use. This study draws on a social theory of literacy and posits that literacy can be best understood as a set of social practices that can be inferred from literacy events. This research is concerned with understanding the health literacy events of 10 African Muslim refugee women in Vancouver, and describing associated practices, while exploring how social networks structure these health literacy practices. Drawing on year-long ethnographic data, and using social network analysis, I use dynamic network analysis to map concepts such as social cohesion and solidarity; each which are associated with language processes that create, for example, identity. It is through discourse that identity is principally formed, which is displayed in the way individuals use language, and the way that they interact with people. This emphasizes the situated nature of language and that language identities are performed in the doing rather than reflecting prior sets of fixed options. In this presentation, I will illustrate how an interplay of discourse analysis and social network analysis can act to examine how network related phenomena such as identity, temporality, social support, cultural flows, social exchange, knowledge brokering, and cultural capital structure the health literacy practices of African Muslim refugee women.

**Centrality And Hierarchy In A Networked Organization**

Mo, Guang Ying; Dimitrova, Dimitrina; Gruzd, Anatoliy; Hayat, Zack; Mok, Diana; Wellman, Barry

Academic and Scientific Networks

Centrality, networked organization, hierarchy

FRI.AM2

Positions in social networks are usually discussed with two concepts: centrality for horizontal positions and hierarchy for vertical positions, at two levels: subgroup level and group level. This study aims to elaborate the relationship between centrality and hierarchical positions within networked organizations. Empirical studies of bureaucratic organizations show that people who have higher status usually know more people at higher status rather than those at lower status, both within the subgroup and across subgroups. Studies of structural holes claim that the marginal members always function as bridges between subgroups. Based on these findings, this study raises two hypotheses: (1) If higher formal position plays a central role at group level, it serves as bridge between subgroups, thus a lower degree of centrality at the subgroup level; (2) If lower formal position has marginal position at group level, it does not serve as bridge across subgroup, thus a higher degree of centrality in subgroup. To test the hypothesis, we surveyed 120 collaborators in 32 projects in the Graphics, Animation and New Media (GRAND) Network of Centres of Excellence. The results show that in networked organizations, the relationship between centrality and hierarchical position changes. The hypotheses were not supported. Higher formal position in projects is correlated to a higher level of centrality at both subgroup level and group level. This finding suggests that those at higher formal positions are key persons in networked organizations because their connections enable collaboration within and between projects in GRAND.
### Centrality, Structural Holes And Status: Examination Of Preferred Tie Alteration Strategies In A High Tech Firm

Halgin, Daniel S.; Gopalakrishnan, Gopakumar; Borgatti, Stephen P.

Intra-O rganizational Networks and Job Performance

Communication Networks, Tie decisions, Knowledge exchange, Tie formation strategy

**THURS.PM1**

This paper investigates preferred tie alteration strategies of 70 employees in a multinational high technology company. Preferred tie alterations include forming new ties and strengthening or weakening existing ties. Strategies for such alterations might include the goals of increasing one’s centrality, creating structural holes, and improving one’s reputation (via being connected to high status others). To identify such strategies in this setting, we analyze both respondents’ actual networks and their preferred networks (e.g., “Who would you like to develop a stronger relationship (interact more) with in order to be more effective at work?” and, “Who would you like to interact with less in order to be more effective at work?”). We compare differences across gender, role, geography, and organizational tenure as well as examine whether tie alteration strategies are associated with individual work performance (as determined by supervisor evaluations).

### Characterizing Power Elites By The Evolution Of Power Structures

de Salabert, Arturo; Pentland, Alex; Cebrián, Manuel

Elite networks

Historical Networks, Cohesion, Centralisation, Co-evolution, Elites, Modelling

**THURS.AM2**

Elites and power structures have attracted the interest of sociologists and political scientist for decades. However, most of the studies so far have been either qualitative or speculative, and focused on small samples of data or limited time spans. The few quantitative studies available are mostly based on statistical analysis of aggregated political groups. Use of aggregated data makes it difficult to gain an understanding of the fine-grain power interdependencies among political actors. This is a critical limitation because power elites, if they exist, must be mediated by tangible networks of individual influence. We present a network theory approach to the study the evolution of the power structure in Spain over a period of 53 years (1939 to 1992). Our data contains the full set of appointments and reappointments of highly ranked officials. This data set is especially interesting both for its considerable length and coverage, and because it includes three radically different political situations: a 37-year dictatorship, a 6-year transition, and the first 10 years of democracy. These different situations serve the function of external control variables in our study. Our approach is inspired by the seminal work on matching, vacancies, and mobility by Harrison White, although with a novel approach by which we uncover the power structure by constructing the network of co-movements, i.e. politicians that traverse together though the space of possible appointments (the ‘power space’) are assumed to be connected. This allows us to identify hidden relationships both at the scale of groups and individuals, and to gain a fine-grained understanding of the power struggle along the different periods. Finally, a network model for the evolution of power structures is constructed (with realistic parameters extracted from dataset), where we explicitly prohibit the emergence of elites. We compare it with the real data, and dramatic differences are found. This is evidence that the behavior of power groups in centralized organizations has distinctive, characteristic, and non-egalitarian patterns that can be measured from observable public information. We show that the existence of hidden power groups can be detected without any prior knowledge of the human relationships and that, surprisingly, the power structures are not necessarily driven by the highest and most visible positions. The study also shows how quantitative network parameters can be produced to measure the level of elitism/egalitarianism in an organization based on the observation of simple individual behavior.
**Chop And Change: Radical Creativity Through Co-memberships In New Collaborations**

van den Born, Floor; Yong, Kevyn

**Centrality Measures in Social Networks**

Organizational Behavior, Creativity, Co-membership ties

WED.PM1

Group creativity is enhanced by social network positions that provide access to non-redundant knowledge (Guimera, et al., 2007). As centrality is associated with deep expertise (Audia & Goncalo, 2007) centrality may “entrench” thinking which limits exploration and the discovery of new possibilities (Dane, 2010). However, this does not account for examples of central groups that continuously produce radical creativity. We theorize that long-standing expert groups whose members engage in new collaborations deal better with entrenched thinking. They produce more radical creativity than expert groups whose members mainly connect with other long-standing expert groups. To test this hypothesis, we collected data on 325 professional jazz ensembles in NYC. We measure creativity by content-coding critics’ reviews of the jazz group’s music albums. Analysis supports the hypothesis that jazz ensembles whose members continue to (re)engage with collaborators in newer groups are more likely to receive critical reviews appreciating their radical creativity then groups whose members mainly collaborate in long-standing groups. Our findings extend research on creativity by showing that network centrality can produce radical creativity. Although previous research emphasizes the positive impact of novices or outsiders on group creativity (Choi & Thompson, 2005), our findings indicate that an ensemble’s radical creativity enhances when its members cause fluctuation around the focal group.

**Clusters, Isolates And Betweenness: Mapping The Political Talk On Twitter**

Himelboim, Itai; McCreery, Stephen; Smith, Marc

**Poster Session**

Visualization, Twitter, Political Networks, Social Media

SAT.PM3

This study applies social network analysis to explore political talk on Twitter. NodeXL was used to collect messages and relationships among users who posted tweets, based on four keywords that are expected to reflect political controversies: Obama, Tea Party, DNC, and GOP (500 users per keyword). The ratio of isolates – those users with zero in- and out-degree–were first measured as an indicator of users’ connectivity, and consequently their exposure, to others who discussed these issues. Next, retweets and mentions were examined to evaluate conversational aspects of political talk on these issues. Clusters were identified to examine cross-ideological exposure. Last, individuals with high betweenness centrality were identified to explore the type of twitter accounts that bridge distinct clusters in the networks. Findings suggest that Twitter political talk is hardly conversational. On average, only two of three users were connected to the network on a given topic. About a third of the messages were retweets of other messages. Only one of ten messages mentioned another user or replied to another message, and very few messages were stated as questions or answers, suggesting more “talk” and less “conversation.” Furthermore, conversations were highly polarized, as political talk on Twitter created distinct liberal and conservative clusters. Twitter accounts of media organizations were often found to bridge these polarized clusters.
Coalitions in Exchange Networks: Some New Research

Bonacich, Phillip F.; Bienenstock, Elisa J.

Mathematical and Statistical Network Models

Exchange, Coalitions

FRI.PM2


Co-evolution Model For Dynamic Social Network And Behavior

Tong, Liping; Shoham, David; Cooper, Richard

Mathematical and Statistical Network Models

Exponential Random Graph Model, EM Algorithm, Co-Evolution Model, Actor-Based Stochastic Modeling, Continuous Behavior Variable, Longitudinal Social Network

SAT.PM2

Individual behavior, such as screen time, physical activity, and eating habit, can be strongly influenced by the behavior of their friends. Meantime, the choice of friends can also be influenced by the preference of their behavior. To study the interdependence of social network and behavior, Snijders et al. has developed the actor-based stochastic modeling (ABSM) methods for the co-evolution process, which turns out to be useful when dealing with longitudinal social network and behavior data when behavior variables are discrete and have limited number of possible values. Unfortunately, since the evolution function for behavior variable is in exponential format, the ABSM can generate unrealistic results when the behavior variable is continuous or has a large range. To realistically model continuous behavior variable, we propose a co-evolution process so that the network evolution is based on an exponential random graph model and the behavior evolution is based on a linear model.
The issue of securing effective inter-agency collaboration and coordination has been a main topic in the study of governance and network analysis (Christen et al 2001; Carwile 2005; Perry 2005). Like other systems, the hurricane response system is the composite of interactions of various organizations. Those interactions can be structured in many different ways and styles, and types of interaction depend on shared goal of participating organizations and limits from surrounding environments. From the content analysis of newspaper articles, I analyzed that almost 80% of requests for resource allocation in response to Hurricane Katrina have not been appropriately answered in a timely manner or not responded at all. There are many possible explanations for this failure, such as the lack of effective communication, resources, and experienced personnel for advanced leadership. In this analysis, I approached this issue through the perspective of organizational cognitive capacity in receiving, processing, and delivering information in highly complex and networked hurricane response systems. If core organizations in the system could not process information properly and timely, then it would lead the cascade of failure and eventually the entire collapse of network. Contrary to that, if core coordinating organizations could manage critical information effectively, the performance of entire hurricane response systems would improve significantly. As a theoretical framework, I used Bowtie model that features the ‘fanning’ function of core organization in the network (Comfort, 2006). This central processing unit ‘fan in’ information from other organizations and integrate, analyze, and interpret. Then this processed information ‘fan out’ to the relevant agencies that use the information to make adjustments in their specific operations informed by the global perspective. But the problem is if there are too many workloads for this central organization, its capacity for conducting fanning function will be depleted and it cannot operate as it is expected to do. The purpose of this study is i) to define the cognitive capacity of core organization in response to hurricanes, ii) to identify the changes in network performance when I virtually increase or decrease cognitive capacity of core organization, and iii) to develop policy implications to manage networked governance for effective emergency management. To analyze and measure the role of cognitive capacity, I adopted research methods of i) the content analysis of newspaper articles, ii) social network analysis, and iii) multi agent-based computational simulation. Using these methods, this study will explore how to design an emergency management system.
Collaborating Through Networks: The Role Of Teacher Social Capital In Student Standardized Testing Performance

Edinger, Suzanne K.; Edinger, Matthew J.

Education, knowledge and learning networks

Social Capital, Collaboration, Education, Performance, Advice Network, Knowledge exchange
SUN.AM1

Current educational policy emphasizes homogeneous student achievement. In this operating environment, both student learning and teacher performance are frequently evaluated using standardized test results. Many teacher attributes, such as education or years of experience, impact student test performance. However, these attributes are insufficient to ensure positive student outcomes: teachers must be able to apply their knowledge and supplement it when necessary. Contextual factors, such as the relationships that teachers foster with their colleagues, play an important role. Resources derived from the network of relationships in a social unit, or social capital (Nahapiet & Ghoshal, 1998), allows teachers to access advice that will improve teaching practices and provide important social support. Social capital has been linked to improved team and individual performance in a variety of work contexts (e.g., Reagans, Zuckerman, & McEvily, 2004). However, we know relatively little about either the factors that facilitate or inhibit the development or utilization of social capital or the mechanisms that underlie the social capital-performance relationship. In our pilot study of 66 teachers in two suburban Virginia elementary schools, we found that teacher sense of efficacy predicted teacher ego-network density in an academic advice network which then predicted variance in student grades. We also found that climate for supervisory support predicted school academic advice network density, teacher brokerage position in the academic advice network, and teacher out-degree centrality in a non-academic advice network which then predicted mean SOL scores. Data collection is ongoing.

Collaboration And Competition In Post-merger Network

Lee, Chang Kil

Collaboration, coordination and cooperation

Collaboration, Competitive Ties, Public Organizations
FRI.PM2

The paper examines how network structure affects collaboration in post-merger network among ministries in government. The data was collected from an archive data on exchanged documents among ministries and a questionnaire to public servants in merged ministries in 2008. The network structures as independent variables include the gap of centrality between ministries which may represent authority, cohesion, and competition measured by structural equivalence. The degree of collaboration as the dependent variable is divided into two viewpoints: ego and alter. The result of QAP analysis shows that pre-merger collaboration is significantly related to cohesion while post-merger collaboration is significantly related to competition. Also, the effect of interaction variable between cohesion and competition on collaboration is found significant with larger coefficients. This result possibly implies the existence of ‘competitive cohesion’ or ‘cohesive competition’ in the middle of the two. In other words, merger may improve collaboration through competition among ministries rather than through authority or cohesion. This implies paradoxically that competition among ministries might be introduced in order to improve collaboration.
**Collaboration And Productivity In Network Organization**

Hayat, Zack; Dimitrova, Dimitrina; Gruzd, Anatoliy; Mok, Diana; Wellman, Barry

Academic and Scientific Networks

Communication Networks, Productivity, Co-authorship Network, Collaboration Network

THURS.PM1

There have been a large number of studies that analyze the correlation of properties between authors and their co-authors. These studies mainly examined the synchronic correlation between the properties. The diachronic correlation of properties, e.g., the correlation between preceding co-authorship activities and current collaboration patterns, has not yet been sufficiently studied. Previous studies have found that working with previously established ties can facilitate the process of communication and knowledge exchange. Thus, this study tries to clarify whether there are any connections between the collaborator’s preceding activities, manifested in co-authorship patterns, and their subsequent collaboration patterns. The data for this study is based on the collaborative relationships among 120 collaborators in Graphic, Animation, and New Media (GRAND) Network of Centers of Excellence. In order to explore the correlation between co-authorship and current collaboration within GRAND, we correlated the (1) co-authorship network of the researchers involved in GRAND, and (2) the communication patterns that exist among GRAND researchers. Based on our preliminary data analysis, we can see that researchers who co-authored a paper in the past have higher chance to work together again, and to communicate more with one another. Those findings are then discussed within the context of their potential implication for the study of scientific collaboration productivity.

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**Collaboration During Knowledge Construction: The Communicative Structure And The Discursive Processes Underlying Virtual Team Collaboration**

Rajan, Prashant; Kisselburgh, Lorraine

Words and Networks - Organizational Communication, Team Dynamics

SAT.PM2

We have conceptualized and operationalized collaboration within small groups of up to eight members as a function of the dyadic communication within teams. Data was collected on the observed and reported communication within three design teams (N=21) performing tasks in virtual and collocated learning environments. Discursive networks were constructed from the synchronous team discourse. Perceived communication networks were constructed using survey data on reported frequency of communication between team members. Network analysis was used to compare the structure of the reported and observed communication networks. We were able to obtain a heuristic measure for the validity of the subjective coding scheme employed during quantitative content analysis by comparing the observed and reported communication networks. Results from analysis of synchronous discursive networks indicate that collaborative processes may occur even in the absence of participation equity. Furthermore, apparently similar discursive structures reveal distinct collaborative and non-collaborative patterns.
### Collaboration For Collective Action: An Ergm Analysis Of A Community Organizing Network

Tesdahl, Eric A.; Speer, Paul W.

**Networks, Collective Action and Social Movements**

**Collective Action, Interorganizational Networks, Community Networks, Prosocial Action, Collaboration Network, statnet**

**THURS.AM1**

Community organizations involve citizens in affecting change on issues of local concern. While they are much more localized than social movements, the two are intimately related in that community organizing groups are frequently the building blocks, components, or local chapters of broader social movement efforts (Fisher & Shragge, 2007; Dreier, 2007). Globalizing economic trends that move decision-making away from local to state, national, and supra-national arenas have made community-based organizations especially aware of the need to collaborate with one another in order to expand their work beyond the neighborhood context (Orr, 2007). For the current study, we analyze records of collaboration for a one-year period among 28 organizational members of a faith-based community organizing network in a mid-sized US city. Of particular interest are the factors associated with collaboration between organizations coordinating collective action at the metropolitan level. The analysis is carried out by means of an exponential random graph model within the statnet analysis package (Handcock, et al. 2003) to determine the relative import of several factors suggested by the multi-theoretical multi-level model (Contractor, Wasserman, & Faust, 2006). These include endogenous factors relating to network structure (transitivity, reciprocity, and centralization) as well as several exogenous factors including size of organizational membership, and contact with professional organizing staff.

### Collaboration Within And Across Teams: Leadership Forms And Network Structures

DeChurch, Leslie A.; Doty, Daniel; Murase, Toshio; Jimenez-Rodriguez, Miliani; Seely, Peter; Sanz, Elizabeth

**Sports, Teams and Networks**

**Leadership, Multilevel Analysis, Team Performance, Group Structure, Social Cognition, multiteam systems**

**FRI.PM2**

Organizations are restructuring into collaborative work systems because they offer the ability to address complex problems by combining expertise distributed across business functions, knowledge specialties, geographic locations, and organizational boundaries. Often times the goals these systems face are complex and multifaceted requiring multiple distinct teams to coordinate their efforts and compile information for decision making distributed across a network of teams. The current study explores the structural contingency theory prediction that collaboration is a function of alignment between the form of leadership and structure of communication network. Ideas were tested in a sample in 80, 6-person networks tasked with performing a laboratory pc-game-based humanitarian aid task. Leadership form and communication network structures were manipulated, and effects on socio-cognitive networks, teamwork processes, and multiteam effectiveness examined.
There is increasing evidence that organizational systems capable of addressing the complex problems inherent in natural resource management are likely to be decentralized, polycentric, multi-level systems comprising multiple layers of nested enterprises where “collaboration and learning are key, including epistemic communities, boundary organizations, policy networks, and institutional interplay” (Berkes & Turner 2006). This doctoral research is exploring these themes through examination of collaborative processes in a case study in the Sierra Nevada region of Northern California. The CABY region is a cross-watershed planning region identified as part of the California State Water Plan programme on integrated regional water management (IRWM). As such it transcends jurisdictional, hydrological, institutional and socio-economic boundaries. Within the CABY region, as well as the IRWM planning process for which CABY was formed, multiple collaborative processes have emerged at local, watershed and cross-watershed levels and scales, involving diverse stakeholders, issues, goals, drivers and operational structures, within a highly complex State water management infrastructure. Water management has been identified as especially sensitive to scale issues exemplifying “fundamental issues and dilemmas of scale in...governance” (Moss & Newig 2010). The CABY-region case study offers an opportunity to explore the nature of ‘multi-level, nested and polycentric governance’ (Ostrom 2008) in-situ, and analyze these processes in the context of adaptive governance of natural resources. The research to be presented is underpinned by theoretical and methodological perspectives derived from social network, stakeholder and institutional analysis, exploring whether the emerging governance systems have the capacity to steer the complex and dynamic relationships between human-natural systems in order to respond adaptively to change and uncertainty. Such systems will involve: “…individuals, organizations, agencies, institutions at multiple organizational levels...[where]...systems often self-organize as social networks with teams and actor groups that draw on various knowledge systems and experiences for the development of a common understanding and policies” (Folke et al 2005). It involves analyses of the institutions, stakeholders and social/policy networks involved in the multiple collaborative processes operating with the CABY hydro-region. In the context of the focus on multi-level, nested, polycentric governance, characterized by both vertical and horizontal links and overlaps, it is especially concerned with issues of scale (i.e. jurisdictional, institutional, geographical spaces), boundary interactions and barriers, and the emergence of collaborative, self-organizing ‘fuzzy and overlapping’ (Davis and Carley 2008) network structures and processes. In viewing the CABY-region as a complex adaptive system (CAS), the research focuses on aspects of particular relevance to CAS including: diversity, heterogeneity, asymmetry and redundancy (e.g. actors, institutions, functional roles, knowledge systems and resource characteristics); processes of self-organization; adaptive learning (e.g. social learning, monitoring, (re-) evaluation). It examines the ‘ecology of games’ (Lubell 2010) that stakeholders enter into and within which they develop relationships, share resources and enact influence in order to promote interests and make rules. In this way the collaborative networks and clusters within the CABY region, which form the local, self-organizing mechanisms from which decisions, rules and policy outcomes emerge during ‘multiple, interdependent and rule-structured games’ (ibid p229), will be identified, explored and analyzed.
Collaborators Or Friends: Longitudinal Analysis Of Behavioral And Performance Outcomes Of Social Ties In Academic Science

Kiopa, Agrita

Academic and Scientific Networks

Dynamic Network Analysis, Academic Networks, Hierarchical Models, Friendship Ties, Ego-centered Networks, Advice Network

THURS.AM1

Social capital theory suggests that people invest in one another to gain future access to valued resources. In the academic setting, getting sound advice on career development, as well as substantive feedback on research can be important in navigating and progressing in an academic career. However, whether individuals actually gain the resources embedded in their networks depends on their strategic action as well as on the willingness of their contacts to share these resources. For example, some may feel more comfortable turning for assistance to individuals with whom they have social ties, and may feel socially obligated to give advice to friends when assistance is needed. Drawing from a national and longitudinal NSF-funded study of academic scientists, this paper examines the personal advice-network ties of academic scientists and seeks to understand how perceived friendship with their colleagues influences advice-seeking behavior. In particular, it predicts that those ties where friendship is present will affect scientists’ behavior in systematic ways and will result in more resources and better career outcomes, then those ties that are professional only. Preliminary findings show that friendship is present in about one third of scientists’ advice ties regardless of gender. Assistant professors have fewer friends in their advice networks than do more senior faculty, and native-born US citizens have more friends in their advice networks than naturalized US citizens and foreign nationals. Further, findings show that while friendship encourages advice seeking behavior and results in more mobilized resources from these network ties, its effect on career outcomes varies by its type.

Combining Governance And Structure: The Effectiveness Of Dutch Crime Prevention Networks

Mannak, Remko S.; Cambre, Bart; Raab, Joerg

Organizational Networks

Qualitative Approaches, QCA, Inter-organizational Networks, Whole Networks, Interorganizational Networks, Public Organizations

FRI.AM1

The study investigates the relationship of network structure (network integration and external control), network context (resource munificence and stability) and network governance with network effectiveness. The model of Provan and Milward (1995) on the effectiveness of designed and goal directed inter-organizational networks is hereby extended and tested on the basis of 39 networks in the area of crime prevention (Safety Houses) in the Netherlands. Ten cases are analyzed in depth through document study, interviews, observations and a survey among network participants. For the other 29 cases, semi-structured interviews were conducted with the network managers. The data for all 39 cases was analyzed using crisp-set Qualitative Comparative Analysis (csQCA). Results show two different configurations of network effectiveness. Effective networks have been in existence for at least 3 years, show a high degree of stability and are centrally integrated. In addition, they either have considerable resources at their disposal or have been set up with a network administrative organization. The results therefore confirm core insights by Provan and Milward’s earlier study but show that financial resources can be compensated by administrative resources (or vice versa). Results also indicate that inter-organizational networks need considerable time before they can function effectively.
**Comparative Analysis Of Classroom Interactions Using Relational Event Models**

Pierski, Nicole M.; DuBois, Christopher; Butts, Carter T.; McFarland, Dan

Network Dynamics
Hierarchical Models, Dynamic Networks, Relational Events, Classroom Behavior, Conversation

THURS.PM1

Modeling social network dynamics in small groups is a topic of continuing substantive and methodological interest. The relational events framework (Butts 2008) is a family of statistical models for sequences of interactions, allowing them to be parametrized in terms of behavioral mechanisms (e.g. participation shifts, homophily, preferential attachment, etc). Here we present a hierarchical extension of the relational events framework to explore how these mechanisms vary across observed sequences. We employ this framework to model interactions in 632 classroom sessions using data collected by McFarland (2001). Our analyses show that basic conversational mechanisms such as participation shifts and recency effects are reliable predictors of student interaction across settings, with some quantitative variation associated with contextual covariates such as course content. Further implications for the use of hierarchical models for comparative analysis of social interaction are also discussed.

**Comparing Beta Centrality And A Modified Degree Centrality**

Neal, Zachary P.

Centrality Measures in Social Networks
Measures, Centrality, Power, Monte Carlo Simulation

WED.PM1

Much attention has been focused on developing methods of assessing centrality and power in networks. A class of measures that rely on eigenvectors has become widely adopted both in academic research and commercial applications. These measures allow centrality to be defined recursively, where one node's centrality depends on the centralities of those to whom it is connected. However, the use of eigenvectors imposes some potentially restrictive limitations on such measures (e.g. unidimensionality, single component), and requires a level of computational complexity that can obscure their conceptual underpinnings. In this paper, I compare the dominant eigenvector-based measure known as beta centrality to a set of computationally simpler and conceptually clearer measures of centrality and power that are based only on a node’s alters’ degree centrality. These alternative measures are subject to fewer limitations, while their equations are direct translations of Bourdieu’s definition of social capital and Emerson’s definition of power into mathematical form. These measures are compared using Cook’s experimental exchange networks, Padgett’s Florentine families network, and 100,000 simulated networks. The results suggest that the beta centrality and modified degree measures yield nearly identical centrality and power scores when the assumptions of beta centrality are met. When these assumptions are not met, the modified degree measures appear to yield scores that more closely match theoretical expectations. The potentially wider applicability of the modified degree measures, compared to beta centrality, is discussed.
### Comparing Local Configurations In Social Networks

**Faust, Katherine**  
*Network Methods, Configurations, Multiple-network Studies, Network Comparison*

This paper considers the related issues of characterizing local structural properties in social networks and systematically comparing these properties among different social relations. Here, local structural properties are characterized as departures from baseline expectations in conditional uniform random graphs. Comparisons are illustrated using a pool of social networks measured on different animal species and relations. Results suggest limitations to notion of network “motif” when applied to many social networks and raise questions about both the substantive contents of social relations and their measurement.

### Comparison Of Sexual Mixing Patterns For Syphilis In Endemic And Outbreak Settings

**Doherty, Irene A.; Adimora, Adaora A.; Muth, Stephen Q.; Serre, Marc L.; Leone, Peter A.; Miller, William C.**  
*Sex Networks, Public Health, Mixing, syphilis, assortative*

**BACKGROUND:** In a largely rural region of North Carolina during 1998-2002, syphilis outbreaks occurred, tied to crack cocaine use and exchange of sex for drugs and money. Sexual partnership mixing patterns are a characteristic of sexual networks that relate to transmission. **METHODS:** Using contact tracing data collected by Disease Intervention Specialists, we estimated Newman assortativity coefficients and compared values in counties experiencing syphilis outbreaks to non-outbreak counties, with respect to race/ethnicity, race/ethnicity and age, syphilis disease stage (primary, secondary, early latent), and 4 node degree measures including social/sexual contacts, infected contacts, sex partners, and infected sex partners. **RESULTS:** Individuals in the outbreak counties had more contacts and mixing by the sex partner degree was disassortative in outbreak counties and assortative non-outbreak counties. Mixing by syphilis disease stage was assortative in outbreak counties, it was disassortative in non-outbreak areas. Partnerships were relatively discordant by age, especially among older White men, who often chose considerably younger female partners. **CONCLUSIONS:** Whether assortative mixing exacerbates or attenuates the reach of STIs into different populations depends on the characteristic/attribute and epidemiologic phase. Examination of sexual partnership characteristics and mixing patterns offers insights into the growth of STI outbreaks that complement other research methods.
Conflict, Transactive Memory Systems, And Team Innovation: A Social Network Approach

Hood, Anthony C.; Bachrach, Daniel G.

Sports, Teams and Networks
Conflict, Teams, Innovation, Asymmetry

Extant research on the effects of intragroup conflict on group performance has provided inconsistent results. These inconsistencies highlight the limitations of traditional theoretical and empirical approaches to the study of intragroup conflict. Thus, in a departure from traditional research which views conflict as an aggregation of individual member perceptions of overall group dysfunction, the present study incorporates a social network approach to reframe and test conflict as a type of social network based on dyadic conflict exchange relationships. Specifically, the study builds on and extends conflict research by examining the social structural properties of four types of conflict networks; task conflict, relationship conflict, asymmetric task conflict and asymmetric relationship conflict. Further, the group-level information processing construct, transactive memory systems (TMS), is explored as a mediator of the relationship between the four types of conflict network density and team performance and innovation. Initial results from a lagged, team based study of 132 teams engaged in a complex, global business simulation indicate that higher performing teams had less dense task conflict networks than lower performing teams. Additionally, task conflict network density explained significant incremental variance in team performance over traditional task conflict measures. The theoretical and practical implications of this research for the study of intragroup conflict, teams, and innovation are discussed.

Contending Parties: A Logistic Choice Analysis Of Inter And Intra-group Blog Citation Dynamics In The 2004 Us Presidential Election

Almquist, Zack W.; Butts, Carter T.

Network Dynamics
Dynamic Network Analysis, Dynamic Networks, Blog Networks

The 2004 US Presidential Election cycle marked the debut of Internet-based media such as blogs and social networking websites as institutionally recognized features of the American political landscape. Particularly significant was the credentialing of selected blogs as officially designated media sources for purposes of covering the major political party conventions, an act which gave particular legitimacy to two contending groups of partisan blogs (one credentialed for the Republican National Convention (RNC) and the other for the Democratic National Convention (DNC)). Using a longitudinal sample of all DNC and RNC-designated blog citation networks (sampled at six hour intervals for approximately four months) from Butts and Cross (2009) we are able to test for the influence of various strategic, institutional, and balance-theoretic mechanisms – as well as exogenous factors such as seasonality and political events – on the propensity of blogs to cite (i.e., hyperlink to) one another over time. Capitalizing on the temporal resolution of our data, we utilize an autoregressive network regression framework to carry out inference for a logistic choice process closely related to the actor-oriented framework of Snijders (2001). Using a combination of deviance-based model selection criteria (e.g. BIC) and simulation-based model adequacy tests akin to Hunter et al. (2008), we identify the combination of processes that best characterizes the choice behavior of the contending blogs.
Cooperation Dynamics In Networks Cued By Nodal Structural Attributes

Chiang, Yen-Sheng

Collaboration, coordination and cooperation

Simulation, Evolution, Cooperation, Exponential Random Graph Model

SAT.AM2

There is an emergence of research in physical sciences on how cooperation evolves in complex networks. In all the models, actors occupy the nodes, play the prisoner’s dilemma game with network neighbors, and adapt behavior in reference to local network neighborhood. Actors’ decision of cooperation or defection in the game, however, is independent of network structure. To relax the assumption, I introduce a new model of cooperation dynamics in networks wherein an actor’s decision-making is cued by the structural attributes of nodes. In the model, cooperators follow some rules that govern whether they should cooperate or defect depending on a selection of network structural properties, such as betweenness, clustering and degree, of the nodes they and their neighbors occupy. Simulating the evolution of cooperation across a variety of networks shows that conditional cooperators who are selective in the recipients of their cooperation based on the information of nodal attributes can be selected for in evolutionary dynamics.

Cooperative Interactions In Four Therapeutic Communities: A Network Time Series Analysis

Warren, Keith L.; Doogan, Nathan J.; Hiance, Danielle L.; Moody, James

Collaboration, coordination and cooperation

Game Theory, Siena, Cooperation, Time-series Networkks, Substance Abuse, Group Treatment

SAT.AM2

Therapeutic Communities (TCs) are residential facilities for substance abusers and criminal offenders in which mutual aid between peers is the fundamental mode of treatment. As part of treatment, residents affirm peers for prosocial actions. An understanding of the way in which these affirmations are exchanged may shed light on mechanisms of cooperation that operate in TCs. This study draws on electronic records of 353,294 affirmations exchanged between 6,115 residents of six units located at four corrections-based TCs between 2001 and 2008. Records included sender, receiver, and date of the affirmation. Two of the units were female only and four were male only. The records were treated as a directed social network and analyzed using the RSiena network time series analysis program. Because of the length of the time series and the occasional occurrence of missing data a total of 53 two-week long time series of daily networks were taken and separately analyzed. The results were combined using the Siena08 meta-analysis program. Results indicate a tendency toward reciprocity ($B = .56, se = .03$) and transitivity ($B = .52, se = .03$) and away from three-cycles ($B = -.12, se = .01$). Indegree popularity, the tendency to give affirmations to those who have recently received them, was statistically significant ($B = .04, se = .006$). A modest homophily effect ($B = .13, se = .02$) was apparent and residents were more likely to affirm those who entered the TC at a similar time ($B = .83, se = .10$). These results suggest that both reciprocity and reputation within the group drive the exchange of affirmations between TC residents. The evidence of hierarchy may reflect variation in willingness among residents to send affirmations.
### Cooperative Networks: Mathematics, Models, Metrics, Meaning, And More

**Arney, Chris; Peterson, Elisha; Arney, Kristin**

**Mathematical and Statistical Network Models**

| Network Performance, Cooperation, Algorithms, Simulation Game, Social Network Theory, Modelling |
| FRI.PM2 |

Since social networks lie at the core of the economic, political, and social fabric of the 21st century and many of the connections in these networks are in the form of cooperation – entities working together to achieve a common goal, cooperation is an important factor in network analysis and design. Cooperation is particularly significant in social contexts, or whenever a group of entities must work together in some capacity. So how does this complex web of relationships and collaborations of diverse entities work? What are the metrics for cooperation and its network value and meaning? This paper reveals the role of mathematics as a tool to study these questions about cooperative networks and presents an emerging “Subset Team Game Theory” for understanding the fundamental principles, relationships, and metrics of these phenomena. With suitably defined cooperation metrics and our framework of cooperation space, one can discuss the competitive and altruistic value of individual contributions to the network. We include several concrete examples that illustrate how our Subset Team Game methodology can be applied to specific networks and discuss why altruism is a key factor in network effectiveness. Our framework hopes to lead to the development of the science of cooperation, which utilizes our network theory to measure system performance and properties of various cooperative networks. The framework of cooperative game theory sets the context of our Subset Team Game Theory where nodes are considered players and their cooperative/competitive approach helps to determine their contributions (altruistic or selfish utility) to the network’s performance. We use modeling and simulation of network applications to enable us to build the frameworks and tools and follow that with data collection to enable analysis and theory development. In particular, we look at geometric networks (humans, robots, hybrid teams), informational networks (pursuers, evaders), communication networks (information flow, language), and graphic networks (connections) -- all from the point-of-view of cooperation of network components.

### Creativity Networks In The Videogame Industry. The Sony Playstation Case.

**Pedon, Francesca; Zamarian, Marco**

**Organizational Networks**

| Team Performance, Core/periphery, Creativity, Videogame Industry |
| SUN.AM1 |

This paper aims at understanding the mechanisms regulating the production of creative results within the video-game industry. This industry is characterized by products which typically are generated by a process recognized as “creative” by the reference community and described as the result of “talent” and “intuition”. However, we claim that these results are social in nature as they are the fruit of collaboration between teams of highly specialized individuals taking specific roles in their small communities. They contribute thanks to the exchanges of information occurring across team and firm boundaries. We use an original dataset integrating several open access on-line sources and that includes the population of games produced and distributed in Europe for the Sony Playstation console in the time frame 1995-2002. This translates into about 1215 projects that reached completion produced by the work of around 300 hundred companies employing more than 20000 thousands individuals. We will concentrate on this segment of games as it was characterized by constant improvements in the quality of games, despite a substantial invariance of the hardware. By means of network analysis tools and longitudinal econometric techniques we show how high-quality games, as assessed by the specialized press, are typically generated by teams of developers and publishers occupying specific combinations of positions within the dynamic network of ties that characterizes the industry. These topological characteristic of teams are strong predictors of performance even when controlling for relevant individual traits, such as technical role, experience and firm affiliation.
## Cross-network Analysis

**Hellsten, Iina**

**Cross-network Analysis: Words and Networks** - **Natural Language Processing, Conflict Communication Interorganizational Networks, Semantic Networks, Word Cooccurrence Networks**

**WED.PM2**

The paper suggests new theoretical and methodological approaches to the analysis of communications across networks, and presents first results of pilot studies on the public debates on bird flu and global warming. The aim is to shift the focus from the analysis of communications within social systems (such as the sciences and the mass media) and the related communication networks, into the analysis of mutual influences and co-evolution of cross-system and cross-network communications. While semantic co-word maps (e.g. Leydesdorff & Hellsten, 2005) show the networks of co-occurring words within a set of text documents on a specific issue, they do not allow for the analysis of the cross-network communications between the different sets of documents, published in scientific journals (the sciences) and newspapers (the mass media), for instance. How different systems and the related networks communicate with each other has remained under researched in network analysis. Hellsten (2003) has proposed cross-reference analysis to scrutinize how a set of organizations refer to each other on their Web-based text documents during the public debate on genetically modified foods in the late 1990s. The results showed a highly asymmetrical cross-referencing. Monsanto never referred to the main NGOs that were continuously referring to the company. The cross-network analysis, presented in the paper, builds upon and combines the semantic co-word maps and the cross-reference analysis. The results open up new theoretical and methodological approaches to the analysis of communications across networks.

## Cross-scalar Institutional Arrangements: The Articulation Of Bolivia’s New Forest Governance Regime In The Amazon Region

**Kowler, Laura F.**

**Cross-scalar Institutional Arrangements: The Articulation Of Bolivia’s New Forest Governance Regime In The Amazon Region**

**THURS.AM1**

Bolivia is considered one of the most progressive cases of decentralized forest governance yet its mixed outcomes highlight the major challenges of designing a legitimate and effective forest governance system. While scholars attribute this variation to the lack of accountability mechanisms between local governments and their constituents, this research critically reflects on Bolivia’s polycentric forest governance system in which decision-making authority does not reside at any single level, but is held at multiple levels. In this research, I will use a social network approach to understand the role of public forums or deliberative decision-making spaces at the meso level in engaging relevant actors in cross-scalar coordination and information flow around issues of natural resource governance. Whole network data is used to understand how the structural properties of actors through horizontal and vertical linkages relate to the information flow and coordination between the meso and micro levels. Ethnographic methods involving semi-structured and unstructured interviews will be used to capture local community and social movement representation in these forums. Feedback from the meso to the micro and macro levels will be examined using text-based analyses, namely semantic network analysis. The theoretical debates about the influence of democratic accountability mechanisms on decentralized governance and the legitimacy of decision-making processes are central to this work.
Cross-sectional Approximations To Separable Temporal Ergm Parameters

Carnegie, Nicole B.; Hunter, David; Goodreau, Steven M.

Network Dynamics
Dynamic Networks

There has been a great deal of interest recently in the modeling and simulation of dynamic networks. One promising model is the separable temporal ERGM of Krivitsky and Handcock, which treats the formation and dissolution of ties in parallel in each time step as independent ERG models. However, the computational burden for fitting these models can be substantial, particularly for large, sparse networks. Fitting cross-sectional network models, while still a non-negligible computational burden, is much more efficient than the full dynamic fit. In this paper we show that an analytic adjustment to the cross-sectional network parameters based on the mean duration of relationships is an adequate approximation to the dynamic parameters for sparse networks with relationships of moderate duration. We consider a variety of cases: Bernoulli formation and dissolution of ties, dyad independent formation and Bernoulli dissolution, dyad independent formation and dissolution, and dyad dependent formation models.

Cumulative Properties Of Elementary Dynamic Networks

Gulyas, Laszlo; Khor, Susan; Legendi, Richard; Kampis, George

Network Dynamics
Dynamic Networks, Dynamic Network Analysis, Centrality, Dynamic Networks, Clustering, Degree distributions

In this paper we create different elementary dynamic network models as an attempt to study the baseline properties of networks changing in time (i.e., dynamic networks). Our goal is to understand the inherent properties brought about by the changes themselves (such as in degree distributions), and to develop elementary models of these processes, similar in kind to the classic models for static networks (e.g., Erdos-Renyi, Watts-Strogatz and Barabasi-Albert). Focusing on edge dynamics, we define 3 dynamic versions of "Erdos-Renyi" models, one of which can also interpreted as a dynamic Watts-Strogatz network model, and we consider a variety of dynamic "Preferential Attachment" versions. Working with dynamic networks (either collecting longitudinal samples of networks or trying to model the evolution of networks over time), we have to realize that sampling always involves an act of aggregation (thereby cumulating interactions that happened in a certain time window into one single static network instance). This issue is unavoidable, but poorly studied. Therefore, we pay special attention to the choice of the selected cumulation time window and its effect to aggregated network properties (density, diameter, degree distribution, clustering, etc.).
**Data Collection Methods For Hard To Reach Networks: The Promise And Limitations Of Cognitive Social Structures**

Siciliano, Michael D.; Ertan, Gunes; Yenigun, C. D.

**Collecting Network Data**

**Sampling, Data Collection, Cognitive Social Structures**

THURS.PM1

Network researchers tend to rely on snowball sampling or respondent driven sampling to gather data on hard to reach or hidden networks. This study provides an alternative approach, which seeks to produce an accurate network based on aggregating the cognitive social structures of a subset of network members. The study utilizes multiple aggregation methods across several cognitive social structures to wash away the errors of omission and commission common in any single individual’s perception of the network. We utilize four existing datasets that contain cognitive slices for every member of the network. Random samples of sizes ranging from 2 to 11 individuals are drawn repeatedly from each dataset and the cognitive slices for each sample are combined through aggregation methods to produce a distribution of consensus networks. The consensus networks are then correlated with the actual network through QAP to provide an average accuracy and level of variation for each sample size. Correlation with whole network measures such as clustering, density, distance, centralization, and small worldedness are provided. The study compares the rank ordering of whole network measures in the five true networks versus the cognitive consensus networks. On a nodal level, correlations between the rank ordering of individuals based on nodal network measures are compared with the actual network. The results have implications for data collection in both hidden and accessible networks.

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**Definition And Application Of A New Weighted Clustering Coefficient**

Canright, Geoffrey S.; Engø-Monsen, Kenth

**Analyzing Network Data**

**Network Analysis, Clustering Coefficient, Weighted Links, Weighted Networks**

FRI.PM1

In previous work we have proposed a novel definition for a weighted clustering coefficient. The new "triangle-based" definition (CCW) for weighted clustering coefficient is a straightforward generalization of the triangle-based one for the binary case; but it has the interesting property that it varies between 0 and infinity (rather than between 0 and 1). We will offer some explanation and illustrative examples for the two extreme cases (CCW => 0 and CCW => infinity). In addition to the theoretical discussion we will also offer applications of the new clustering coefficient to social network data, based on mobile telephone records. We will investigate how the new clustering coefficient behaves as compared to other weighted clustering coefficients, across different mobile networking services.
Dense Collaboration Networks And Centralized Communication Lead To Better Wikiprojects

Nemoto, Keiichi; Gloor, Peter A.

Words and Networks - Organizational Communication, Team Dynamics
Communication Networks, Team Performance, Wikipedia, Social Network Analysis, Co-authorship Network, Collaboration Network

In this project we examine the collaborative behavior among Wikipedians participating in WikiProjects (WP) to investigate what collaboration patterns predict WP success. WPs are used to explicitly group and manage a family of topics within Wikipedia. They are a resource to help coordinate and organize the writing and editing of those articles. Wikipedia editors, who share a common interest in a specific topic or group of related topics, can explicitly form a virtual team by putting their names on the project page. We looked at two types of collaboration networks. The first is the co-authorship network: we create a network of editors working on the same article within a 4-week time-window. The second is the communication network: a link is made if one of the members puts a note on the talk page of another member of the project. To measure the success of the project, we use the fraction of high quality articles compared with all articles within the scope of the WP. Our preliminary results indicate that the members of a successful project appear to be densely connected through the co-authorship network and highly centralized in their communication network. On the other hand, the members of less successful projects have low-density co-authorship networks and a very sparse communication network. It therefore seems that a WP whose members are highly connected and with centralized leadership do better work than unconnected editors with decentralized leadership.

Descriptive Methods For Assessing Network Change

Borgatti, Stephen P.; Dekker, David J.

Network Methods

Network Dynamics, Evolution, Change

Today we have many powerful methods for statistically examining change in networks, such as the Snijders et al Siena model. However, there is still room for simpler models. For one thing, if one simply wants to know the change trajectory of some property, such as density, Siena gives too complex an answer. E.g., if the density of your network increases linearly from .05 to .10 to .15, the outdegree parameter in Siena will (quite correctly) be negative, as it is saying the network has a strong tendency to not have ties. But the user might have preferred an indicator that the network was increasing linearly in density. For another thing, while Siena allows you to test node level hypotheses (e.g., good looking people tend to attract incoming ties), it doesn’t give you node-level scores that could be used as variables in other analysis (e.g., a tendency to increase structural holes). More generally, a framework is presented for measuring the consistency of network changes with node-level behavioral strategies such as increasing in betweenness or reducing ties to smokers.
Designing Policy Tools For Building Disaster Resilience In Rural Communities
Demiroz, Fatih; Khosa, Sana

Organizational Networks
Inter-organizational Networks, Resilience, Disaster Response
SAT.AM2

Disasters such as Hurricane Katrina and four hurricanes that hit Florida in 2005 left unfortunate and unpleasant memories which continue to remind policy makers and researchers about the vulnerabilities of communities to natural disasters. Managing different phases of disasters requires physical, social, and intellectual capacities which are varying qualities and characteristics in all communities. Rural communities usually suffer more from vulnerabilities compared to urban areas since they have less population density, lower income, and relatively lack the know-how for handling disasters. Building resilient communities is a widely discussed approach to eliminating vulnerabilities and minimizing effects of disasters. Resiliency within communities can be defined as how well individuals and communities can adapt to changed conditions caused by disasters. This definition includes a various aspects of a community including interorganizational network connectedness of governmental and nongovernmental institutions, economic capacity, and social capacity. Community agencies and their degree of connectedness, collaboration, and partnerships with each other help in building adaptive capacity against disasters. This research examines a case of recent floods in Lake County, in Florida. The study focuses on functions of interorganizational networks for predicting the level of resilience in the county. Network analysis tools are used for identifying the collaborative network structure.

Determinants Of Transnational Social Support - A Multilevel Analysis Of Ego Centered Networks Of German Migrants In Great Britain
Herz, Andreas

Social Influence and Support
Social Support, Migration, Transnational Networks, Multilevel Analysis, Ego-centered Networks, Online Survey
SAT.PM1

Networks of migrants often show a high level of transnationality, as migrants stay in touch with relatives and friends in the country of origin and other countries. Both, local and transnational ties generate various kinds of social support. Literature shows that the supportiveness of ties is related to the characteristics of ties as well as the network, in which ego is embedded. E.g. more accessible alters (frequent contact and living nearby) provide more social support whereas ties in bigger networks are less likely to provide support. So far little is known about parameters for the provision of social support in transnational ties and networks. Therefore this paper focuses on the transnationality of ties (crossing national borders) and personal networks (proportion of transnational ties) for the explanation of social support. It analyses personal network data from an online-survey of German migrants in Great Britain. Multilevel logistic regression models are applied, in which the unit of analysis is the tie between ego and the alter and the dependent variable is whether this tie provides social support or not. Characteristics of ego, the ego network’s composition and structure, the tie between ego and the alters are considered regarding the association with the probability of provision of social support between alter and ego.
Direct And Indirect Negative Ties And Individual Performance
Marineau, Joshua; Labianca, Giuseppe; Kane, Gerald
Intra-Organizational Networks and Job Performance
Performance, Negative Ties
THURS.PM1
Social ledger theory (Labianca and Brass, 2006) argues that the liability of a negative tie on an individual’s outcomes decreases with increasing social distance. In this study we challenge that proposition and argue that negative ties will sometimes be of benefit and sometimes a liability, depending on social distance. We draw insights from social network-related theories (social resources theory, tertius gaudens theory, and balance theory) to make arguments on how negative ties might relate differentially to in-role performance at three levels of network analysis that capture different aspects of social distance: 1) an individual’s direct ties (social distance of one); 2) their third party ties (e.g., having a positive tie to a person with a negative tie, or social distance of two), and 3) the individual’s position within the entire network of ties within the organization (all direct and indirect positive and negative ties of any social distance considered simultaneously). We found that direct negative ties were detrimental, but being a third party to a negative tie was beneficial for individual in-role performance.

Disambiguating Age, Gender And Skill: An Exploration Of Online Chat Among Mmog Players
Foucault Welles, Brooke; Shim, Kyong J.; Ratan, Rabindra; Kennedy, Tracy; Rousse, Thomas H.
Online Social Networks
Communication Networks, Gender, On-line Game, Age, Computer Mediated Communication
THURS.AM1
We examine a chat network of 5878 players of the Massively Multiplayer Online Game (MMOG) Everquest 2 to identify differences in chat behavior across age groups (young, middle, and older adults) and genders (male, female). Typically, age and gender-based comparisons of Computer-Mediated-Communication (CMC) behavior are complicated by differences in Internet experience and technical skill across groups. By examining chat among experienced MMOG players, we avoid these confounds. Results of a multivariate analysis of variance (MANOVA) reveal main effects for age on number of chat partners, brokerage tendency, average message length, and chat frequency, such that younger players are more likely than older players to exchange many short messages with many chat partners who are relatively unconnected with one another. Main effects for gender on overall chat frequency and average messages per chat partner suggest that women are more likely than men to chat and to exchange more messages with each chat partner. Significant interaction effects suggest that number of chat partners and chat frequency decline dramatically as men age, but remain fairly stable for younger and middle aged women. These results are consistent with previous findings from studies conducted with less experienced Internet users, and suggest that differences observed across ages and genders may not be based on technical skill (as previously suggested) but instead on age and gender-based communication preferences.
Discovering Jewish Networks

Kadushin, Charles

Friendship networks

Ego-centered Networks, Ethnic Identify Networks

For a minority such as Jews, their social networks are critical in maintaining their identities and formal affiliations. Nevertheless, survey network questions about Jews have been limited to “How many of your best (or close friends) are Jewish?” Instead, we introduce the methods of the General Social Survey (GSS) to investigate the network of the key friends and relatives of young Jews in a long term panel study. This approach, new to Jewish studies, will show the extent to which Jews and non-Jews are linked in the interpersonal environment of respondents; the settings in which they met; the extent to which friends and relatives are known to one another and the influence of this network, if any, on the Jewish interests and practices of the respondents. The GSS method will be compared with the more traditional method of asking what proportion of your friends are Jewish.

Discretion Within The Constraints Of Opportunity: The Structure Of Homophily In A Formal Organization

Kleinbaum, Adam M.; Stuart, Toby E.; Tushman, Michael L.

Social Networks and Demographics

Communication, Homophily, Gender, Structure, Email Invitation

The principle of homophily is perhaps the most robust empirical regularity describing the structure of social relations. While we know that homophily results from both individual preference and uneven opportunity, there is little empirical research describing how these two mechanisms interact to affect the structure of intra-organizational networks. We argue that formal organizational structure and geography delimit opportunities for interaction, but that within the constraints of business units and offices, actors have discretion to choose their interaction partners. We test these arguments using a unique dataset of organizational communication, consisting of millions of e-mails exchanged among thousands of employees in a large IT firm. Consistent with this theory, results show a significant difference-in-differences between the interaction rates between same-sex dyads within business units and within offices than between them. Furthermore, we find that these main effects are driven by men, but that women communicate differently: they seek out interactions with other women outside their own business unit or office through functional channels. These findings have important implications for research on homophily, gender and formal and informal structure in organizations.
Disruptive Life Events And Social Network Dynamics: The Case Of “first Timers” With Mental Illness

Perry, Brea L.; Pescosolido, Bernice A.

Network Dynamics
Ego-centered Networks, Dynamic Networks, Mental Health, Health

THURS.PM1

Disruptive events and transitions, such as the onset of serious illness, trigger social network change, but relatively little is known about how dynamic patterns unfold. Sociologists suggest that routine, gradual change punctuated by more cataclysmic shifts in the face of major events describe social network dynamics. Drawing on the Network Episode Model (Pescosolido 1992), we develop a set of hypotheses about the nature of social networks in the initial and later stages of a health crisis. Using data from the Indianapolis Network Mental Health Study, we compare patients’ social networks at the time of diagnostic labeling and over a three year period to a representative sample of individuals in the community. Findings suggest that social network dynamics may be a function of changing needs and resources as people with psychiatric disorders and their core supporters learn to jointly manage illness. As individuals progress through the treatment career, less broadly supportive ties drop out of their extended networks, while a core safety net remains relatively intact, suggesting that functionality may drive social interaction in times of crisis.

Divergences In Perspectives And Knowledge In Networks: The Difference Between Test Persons And Network Scientists And Their Consequences

Stegbauer, Christian ; Rausch, Alexandre

Network Theory

Network Theory, Cognitive Social Structures, Cognitive Networks

FRI.AM2

Social networks are often aggregated from the ego-networks of a number of interviewed persons. From these data social researchers conclude the courses of action and the agency of the respondents. But this approach has one drawback: nobody except the scientist knows the whole structure of the investigated network. Actions based on the structural position in a network are influenced by their knowledge horizons concerning the relations among the alters around them and positions these actors belong to. In the presentation it will be stated that these differences are crucial to an interpretation of hypotheses drawn from the analysis of accumulated personal networks. Some theoretical considerations concerning the divergent perspectives of "the actor" and "the external observer" will be discussed and demonstrated by means of an empirical study of social relations in a school class. The difference between the classical accumulation of ego views on the one hand and the individual knowledge of the relations among the surrounding alters on the other hand is shown by contrasting the cognitive social structure of the participants with the aggregated network which is known only by the researcher.
### Dyadic Reciprocity And The Emergence Of Degree-assortativity In Weighted Social Networks

Toroczkai, Zoltan; Hachen, David; Lizardo, Omar; Strathman, Anthony; Kim, H; Wang, Cheng

**Agent-Based Models and Multi-Agent Systems**  
**Network Dynamics, Network Mechanisms, Agent Based Models, Real World Networks, Weblogs, Mixing**  
**THURS.PM2**

Social networks are characterized by the fact that they exhibit positive degree correlation. This is in contrast to most non-social networks which tend instead to display disassortative mixing by degree. In this paper we propose a simple agent-based simulation model that generates levels of degree-assortativity comparable to those observed in human social networks using a set of minimal dyadic mechanisms of tie selection and tie dissolution based on the reciprocity of weighted links. In our model, weighted reciprocity (the difference in volume of communication going from one actor to another within the dyad) provides the criterion that agents use in deciding whether to keep or dissolve a tie. Analysis of the model’s dynamics reveals that positive degree-assortativity regime emerges as a natural outcome of the decentralized attempts of agents to minimize non-reciprocity within their immediate neighborhood. This emergent equilibrium is robust to variations in initial conditions and also reproduces degree distributions that are characteristic of human social networks. We introduce a new quantity, which we label the total energy of the system that is useful in quantifying the total expected relationship volatility in the network. In our model, regimes that exhibit positive degree correlation are ones that minimize the system's total energy whenever agents prefer reciprocity in their local neighborhood.

### Dynamic SNA Via Text Mining Of An Online Corpus With Alchemy And Gephi

Levallois, Clement; Smidts, Ale; Wouters, Paul  
**Innovation, Diffusion, and the Adoption of Technology**  
**Dynamic Network Analysis, Text Mining, Word Cooccurrence Networks, Gephi, Neuromarketing, Alchemy**  
**THURS.PM2**

Research question: Is it possible to reveal the social, institutional and semantic networks supporting a technological innovation by looking at the public online text record? Data: Records of all webpages citing “neuromarketing” (blogs, personal and institutional websites, online newspapers and magazines, etc.). Harvested in 2009, contains 4500+ documents, 10Gb large. Methods: Html pages have been pre-processed with Alchemy to retain ascii text only. A human coder (man-hours: 320) and Alchemy were used to tag a number of fields: date, type of source, names cited in the document, organizations cited in the document, brands cited in the document. Preliminary analysis is conducted with Lexico3, Voyeur and Lingpipe. From here we select key actors, organizations and concepts and trace their co-occurrences through time in the corpus. These 3 datasets are imported in Gephi (dynamic network visualization) and further analysis is performed with Gephi and UCINET. Results: By considering the evolution of these 3 networks (social, institutional and semantic) extracted by text-mining, we identify key features of a technological innovation: - Are the main players in neuromarketing academics or business persons? How do they cluster? - What industries make use of neuromarketing, and do they relate to the same neuromarketing labs? - How did the public opinion regarding neuromarketing evolve since 1999?
**Dynamics Networks As Exchange Of Heterogenous Information**

Berea, Anamaria; Tsvetovat, Maksim

**Networks and Economics**

eendogenous network, heterogeneous information, information interdependence

FRI.PM2

Economic theories of information focus on the peculiarities of information as an economic good and on asymmetric information problems in a market setting, treating information as a homogeneous good. This paper treats information as a heterogeneous agent from a person’s subjective perspective and uses social network analysis and marginal cost-benefit analysis to discover and interpret interesting emergent topologies. The analysis is performed on a bi-modal network of people and information employing a bottom-up approach with respect to ego-networks of people and a top-down approach with respect to information embedding. The information agent is analyzed under its’ semantic dimension and represents both nodes in the interdependence network and edges in the people network. In order to do this, a clear distinction between “noise” and “meaningful information” has to be made. The rules of edge creation and destruction follow the basic economic rules of exchange. One important finding is that the embedded network of information can significantly alter the strength of the edges in the network of people, regardless of the initial topology.

**Dynamics Of Friendship Networks And Academic Performance: A Comparison Between Two Student Cohorts Before And After Education Reform In Taiwan**

Chang, Ming-Yi; Snijders, Tom; Wu, Chyi-In

Friendship networks

Adolescents, Multilevel Networks, Selection And Influence, Friendship Network

WED.PM1

For adolescents in Taiwan, in their junior high school years, to advance to a better high school for the diploma, students have to be competent enough. This is assessed by the Entrance Exam. In the past, exam stress brought lots of educational and adaptation problems for pupils. An educational reform was implemented in order to mitigate the stress of education competition. To examine how this reform has affected students' social and academic lives in junior high schools, this study tests whether it has changed the pattern of co-evolution of friendship networks and students' academic performance. The data consists of 2534 adolescents in 41 schools from two different youth panel datasets collected before and after the educational reform in Taiwan. Actor-oriented models, as implemented by RSiENA, will be used to answer the research questions. Further discussions will be provided about the effects of education reform in Taiwan.
**Dynamics Of Scientific Collaboration Networks**

Groenewegen, Peter; Birkholz, Julie M.; van der Bunt, Gerhard; Groth, Paul

**Network Characteristics**

Dynamic Network Analysis, Co-authorship Network, Actor-based Models, Collaboration Network

**Evolution of scientific research can be considered as a dynamic network of collaborative relations between researchers. Collaboration in science leads to social networks in which authors can gain prominence through research (knowledge production), access to highly regarded field members, or network positions in the collaborative network. While a central position in network terms can be considered a measure of prominence, the same holds for citation scores. Causal evidence on a central position in the network corresponding to prominence in other dimensions such as the number of citations remains open. In this paper collaborative patterns, research interests and citation counts of co-authoring scientists will be analyzed using SIENA to establish whether network processes, community or interest strategies lead to status in a scientific fields, or vice versa does status lead to collaboration. Results from an analysis of a subfield of computer science will be presented.**

**East-west Networks Of Multi-lateral Scientific Cooperation In Europe**

Alexandrov, Daniel; Ivaniushina, Valerie; Roll, Gulnara

**Academic and Scientific Networks**

Scientific Networks, Academic Networks, International Networks, Cooperation, Collaboration Network

**Our paper is focused on emerging patterns of network structure of scientific collaboration in a long-term European program. We work with INTAS projects database containing information on 2300 collaborative projects that brought together 13000 teams from 33 countries. The network structure is multilevel: team– institution – country. As there were 10 rounds of competition, we can observe evolving network structure. INTAS existed from 1993 to 2005 as a European Union program promoting cooperation between scientists in the former Soviet Union (FSU) and the European scientific community. The projects covered fundamental and applied research in all fields of exact, natural, social and human sciences. INTAS supported only multi-lateral collaborative research projects. According to the rules, in one project there had to be at least four teams: two from different institutions of FSU (preferably, but not necessary from different FSU countries) and two teams from different EU countries. On the level of teams it is nearly impossible to discern network structure as teams are identified by PIs, and PIs are changing, while institutional ties often remain stable. On the level of institutions one can see stable structure of networks emerging through several rounds of grant competition. There is a major difference between research areas: in physics and chemistry the networks have higher density and centralization than in life sciences and social sciences. On the country level networks have typical core/periphery structure that is stable and across all disciplines and all rounds of competition. Core composition is slightly different for different scientific fields, though four main players are always in the core (Russia, Germany, UK, France).**
**Eating Disorders In The Social Web: An Ego-network Analysis Approach**

Tubaro, Paola; Casilli, Antonio; Fraissé, Christèle; Masson, Estelle; Mounier, Lise; Rouchier, Juliette

Online Social Networks

Data Collection, Ego-centered Networks, Mental Health, Online Survey, Online Networks, Health advice network

THURS.AM1

The recent upsurge of online websites, blogs and forums advocating anorexia nervosa and bulimia nervosa (“pro-ana” and “pro-mia”) challenges health practitioners and policy makers. While glorifying eating disorders as a lifestyle and even a choice, the authors of these websites often provide fellow sufferers with distinctive forms of emotional and practical support, and may thus have appeal to many. The proposed paper presentation is part of a larger project addressing the role of online and offline social networks in the spread and maintenance of eating disorders, through a sociological comparative study of anamia subjects in France and the United Kingdom. Emphasis is on the impact on health and nutrition of computer-mediated communication networks relative to face-to-face social interactions. The paper focuses on the fieldwork methodology, dataset construction and preliminary results. An online survey, due to be in the field shortly, invites users of ana-mia websites to provide information on their online and offline personal networks as well as their health-related advice network, together with control questions on their eating behaviours, health status and IT usage. Network information is elicited through a computer-based participant-aided sociogram drawing tool, through which respondents represent the entire set of their relationships to others as they see it, and obtain an optimised visualisation at the end. The well-acknowledged appeal of network visualisations is used here to improve survey experience and —indirectly— to enhance data quality. The survey is then followed by in-depth interviews, to be held via computer-assisted videoconference tools, to better understand the reasons underlying relational and health behaviours.

**Edge Discovery In A Large Social Network**

Blair, Jean R.; Horton, Steven B.

Empirical Large-N Networks

SUN.AM2

We investigate the social network defined by records maintained by the American Contract Bridge League (ACBL) on successful tournament play by ACBL members. Specifically, we consider the graph \( G = (V(G), E(G)) \) where the vertex set \( V(G) \) represents ACBL players who won masterpoints in certain bridge events, and the edge set \( E(G) \) represents partnership information implied in the records. Because the resulting graph is extremely large, smaller graphs representing a portion of the data are considered. Once the implied partnership information is extracted from the records, the resulting graphs are analyzed by considering accepted social network analysis metrics. This talk will describe the raw data, discuss methods used to extract partnership information, describe the results of our analysis of the resulting graphs, and discuss areas for future research.
### Efficient Structures For Innovative Social Networks

**Lovejoy, William S.; Sinha, Amitabh**

**Innovation, Diffusion, and the Adoption of Technology**

Simulation, Network Analysis, Innovation Networks, Group Communication, Core/periphery, Information Search  
**WED.PM1**

| What lines of communication among members of an organization are most productive in the early, ideation phase of innovation? We investigate this question with a recombination and selection model of knowledge transfer operating through a social network. We find that ideation is accelerated when people in the organization dynamically churn through a large (ideally the entire population) set of conversational partners over time, which naturally begets short path lengths and eliminates information bottlenecks. Group meetings, in which the content of conversations is available to all for consideration, are another way to learn in parallel and accelerate the ideation process, although for complex problems they may not offer significant advantages over the best decentralized networks. The idealized core-periphery graphs emerge as an important family on the time-cost efficient frontier. New sociometrics for the analyses of innovation processes emerge from this investigation. |

### Elbirt Technologies Software Suite - The Next Generation In Data Visualization And Analysis Using Network Analysis Methodology

**Elbirt, Benjamin S.**

**Poster Session**

Intonation, Visualization, Animation, Longitudinal, Software, Semantic Networks  
**SAT.PM3**

| This poster presentation will provide an overview of the latest software to be released by Benjamin Elbirt. The software demonstrations include ET-V 1.0, USNAA 1.0 and M2C 4.0. ET-V 1.0 is the latest visualization, animation and intonation application that replaces the Jacob’s Ladder (Elbirt, 2005 & 2009a & 2009b) software line. The software has been completely rebuilt with the latest JOGL (2.1), updated to use XLS and XLSX files (Microsoft Excel) and includes many new features that improve the overall display and performance. M2C 4.0 is the latest Matrix to Coordinates conversion program that uses the latest MDSJ (Brandes & Pich, 2007) and a customized Procrustes rotation algorithm for longitudinal analysis. Inputs include pairs or matrix, text delimited or XLS/XLSX files. Outputs are in XLSX files and include various calculations and formats including ET-V. USNAA 1.0 is a co-occurrence semantic text analysis application that uses network measures to create token (word) clusters (Elbirt, 2010) for improved semantic network outputs. The software will also calculate various measures of centrality, generate rotated coordinates (M2C functionality) and output ET-V content files for easy use in ET-V. All software will be presented on a laptop with a poster for overview definition. Examples will be shown using data generated from 2001 through 2010 Sunbelt abstracts. |
### Embeddedness In Affiliation Networks

Tutzauer, Frank

2-Mode Networks

Statistical Models, Embeddedness, Two-mode Networks, Affiliation Networks, Hypergraphs

An affiliation network consists of actors and events. Actors are affiliated with each other by virtue of the events they mutually attend. Every affiliation network has a representation as a bipartite graph, where an edge is placed between an actor and an event only if the actor attended that event, and also as a hypergraph, where the events correspond to the vertices of the hypergraph and actors are defined by subsets of vertices, i.e. by the events they attend. By examining these subsets, we distinguish between differing levels of embeddedness in the network. At one extreme, we might have an actor who attended many events, but none of these events were attended by any of the other actors in the network. Such an actor would show up in the hypergraph as a subset having an empty intersection with each of the other subsets. Even though this actor might be of high degree (in the bipartite graph), in no reasonable interpretation would this actor be considered highly embedded in the affiliation network, at least not in the sense of having shared events with other actors. At the other extreme, we might have an actor defined by a collection of events, all of which were attended by another actor(s). In the hypergraph, the first actor would be a subset of the other actor(s), and we would feel justified in claiming that this actor is as embedded in the network as one possibly can. Most actors will be between these extremes, with some events being shared by varying others, and some not. In this paper, we introduce an embeddedness measure based on the cardinality of the largest set-theoretic intersection between the actor under consideration and all other actors in the network, and we show its cumulative distribution function to be conveniently expressed as a difference of binomials.

### Emerging Networks Of Online Social Support

Walker, Kasey L.; Mills, Carol B.

Qualitative and Mixed Method Network studies

Social Support, Online Networks

Networks of social support are a ubiquitous feature of positive human interaction. Findings have consistently shown that individuals with adequate social support tend to have better relationships and less stress, and tend to be more physically fit and live longer than individuals with low levels of support. Social support, however, is no longer solely the province of face-to-face relationships; online social support can be an integral part of support seeking and provision. While there has been a great deal of research concerning online social support, some fundamental questions remain concerning its content and structure. This research seeks to answer those questions through the use of both content analysis and social network analysis. We followed one online depression-support group for one month. During this month there were 104 streams with a total of 631 coded posts. Initial results contradict assumptions about face to face support that place a high premium on emotional support and long-lasting, densely connected networks. Our findings indicate that informational support is the most common form of support, even given in response to requests for emotional support. Furthermore, the networks are brief and sparsely connected. The manuscript then discusses the implications of these findings for understanding both face to face and online social support.
Entrepreneurship And Local Embeddedness: An Empirical Study On Emerging Countries Mne Branches

Giuliani, Elisa; Gorgoni, Sara; Marin, Anabel; Rabellotti, Roberta

Organizational Networks

Inter-organizational Networks, Innovation Networks, Entrepreneurship, Ego-centered Networks

FRI.AM1

The aim of this paper is to investigate the relationship between the entrepreneurship of MNEs’ subsidiaries and their degree of embeddedness in the local context. The paper focuses specifically on the subsidiaries of MNEs from emerging countries localised in advanced countries. In spite of a flourishing literature on corporate entrepreneurship at the subsidiary level, the literature exploring the relationship between subsidiaries’ entrepreneurship and their embeddedness in local innovative networks is still scant. This paper aims at filling this gap. First, we investigate the relationship between subsidiaries’ entrepreneurship and their degree of embeddedness by asking whether more entrepreneurship implies more embeddedness. The search for and access to extra-corporate knowledge requires taking the risk of using alternative sources of knowledge. Thus, subsidiaries that privilege access to extra-corporate knowledge are likely to be more risk-taking and proactive than those relying mainly on intra-corporate knowledge sources. We also investigate the distinctive features of the innovation networks formed by the entrepreneurial subsidiaries relative to the ones developed by non-entrepreneurial subsidiaries. Are the networks formed by entrepreneurial subsidiaries larger? Do they have a particular structure and involve several diverse actors? Local embeddedness is analysed by looking at both (1) the size and structure of the ego-network of the subsidiaries; and (2) the characteristics and diversity of the actors in the network. We draw on original primary data collected from the total population of subsidiaries of MNEs from emerging countries, as well as to a control group of subsidiaries of MNEs from advanced countries in the Italian and German industrial machinery sector. The interviews are based on a semi-structured questionnaire allowing both a qualitative and a quantitative analysis. The quantitative analysis combines ego-network analysis and standard multivariate statistics.

Examining Public Discourse And Its Impact Through Network Analysis

Stephens, Kimberlie J.; Zhao, Ying; Fann Thomas, Gail

Communication Networks

Text Analysis, Semantic Networks, Discourse Structure, Stakeholder Interaction, Political Participation, Public Space

FRI.PM1

Public participation is an increasingly important aspect of the democratic process. As non-government organizations, private business and individual citizens seek out ways to be involved in regulation development, government agencies need to understand how to incorporate such participation into their rulemaking routines. This paper uses the case of the United States Coast Guard (USCG) and its attempt at establishing permanent live-fire zones for training on the Great Lakes. Semantic networks were developed from all the public USCG communication surrounding this event and the transcripts of almost 1,000 public comments submitted by citizens and organizations who participated in the comment period. Networks were generated using a program called Collaborative Learning Agents (CLA) which conducts Lexical Link Analysis (LLA) on text based documents. Networks for each stakeholder group and the USCG were analyzed over time to understand how relationships between the USCG and stakeholder discourse changed. Results show that stakeholder discourse developed into a large number of network cluster themes almost immediately upon opening of the comment period. Coast Guard discourse, conversely, remained in only a few cluster themes until after the public comment period closed. Supplemental qualitative analysis of the documents suggests that the dynamics observed in the network analysis were due to the failure of the Coast Guard to engage with the public in the areas of public concern. This contributed to the increasing negative public opinion and ultimately to the failure of the live-fire initiative.
Experimental Evidence For Peer Effects On Adolescent Cigarette Smoking And Social Network-based Interventions

An, Weihua

Social Networks and Health

Adolescents, Smoking, Experiments, Peer Effects, Social Network-based Intervention
FRI.AM1

This study addresses a classic question in social networks and health: whether and to what extent peers affect a person’s attitudes and behaviors regarding cigarette smoking. Studying peer influence has a long root in sociology, which can be traced back to Durkheim, Simmel, Mead, Blumer etc. As far as cigarette smoking is concerned, many studies have identified peer influence as one of the most important risk factors and found strong correlations of smoking behaviors among peers. But it is very difficult to identify and estimate peer effects using only observational data due to problems like selection, reflection, simultaneity, confounding, etc. In this study, using a large sample of middle school students (around 100 classrooms and 6,000 students are involved) in China, coupled with ascertainment of network structure within these schools (e.g., selecting students who are central in the social networks and choosing student groups rather than individuals students as intervention targets), I conducted a novel social experiment with a partial population design involving providing social network-based interventions that aim to accelerate the diffusion of desirable attitudes and behaviors regarding cigarette smoking. I expect that this work will not only provide experimental evidence for peer effects on adolescent cigarette smoking, and shed light on fundamental sociological questions, such as group identity, social cohesion, and norm formation, but also help develop more effective smoking prevention programs. The contributions of this study are threefold. It is the first study, according to the author’s best knowledge, that provides experimental evidence for peer effects on cigarette smoking. It is also the first study that makes the distinction of peer effects under control from peer effects under treatment and provides experimental estimates for both of them. Another and more important contribution is that it is among the first group of studies, if not the first one, empirically evaluating whether opinion leaders are more influential in terms of spreading positive attitudes and behaviors toward cigarette smoking among adolescents. The results of such an evaluation have important implications for designing more effective tobacco control policies.

Exploring Trends In Friendship Segregation In Middle And High School

Grewal, Elena T.

Adolescent Friendship Networks

Adolescents, Homophily

WED.PM2

This paper uses data from the National Longitudinal Study of Adolescent Health (Add Health) to explore how friendship segregation changes over time from 7th to 12th grade. The paper measures homophily by the percent of same-race friendship nominations. Then, regression models predict homophily using the percent of same-race students in the grade as well as grade, to determine the whether homophily increases as grade increases, controlling for the proportion of same-race students in the grade. The paper finds that students in higher grades experience greater racial homophily. The paper then looks at whether school characteristics predict homophily, and finds that southern schools are more homophilous, but does not find an interaction between southern schools and the trend across grades.
Exploring Knowledge Transfer In Virtual Communities Of Practice: An Empirical Test In Medical Settings

Zappa, Paola

Network Dynamics

Networks And Health, On-line Communities, Scientific Networks, Knowledge Transfer, Actor-based Models, Strong Ties

WED.PM2

What explains the survival of virtual communities of practice over time? In order to address this question, this paper focuses on the ability of virtual communities to promote knowledge transfer processes among members. Therefore, it tests two rival hypotheses: virtual communities are shaped by a tendency toward interaction among similarly knowledgeable peers vs. cooperation among different actors, according to a division of labor based on expertise. This paper aims at making three contributions on the topic. It controls for the effect of various sources of heterogeneity among actors on the propensity to take action. It explores the role played by the diversity and strength of ties in the knowledge transfer process. Finally, it verifies the hypotheses on an empirical setting in which virtual communities are still at an experimental stage of development. Data are collected from the Italian rare cancer network (RCN), a stable cooperation among 130 oncologists on resolving complex diagnoses and testing experimental treatments. We consider all advice seeking actions undertaken by the users since January 2004. We moreover collect field data on the clinical performance of each physician, which we assume as a measure of effective knowledge transfer. Using stochastic actor-based models we then examine the co-evolution of network structure and actor performance.

Exploring The Potential Benefits To Social Network Research By Integrating Qualitative Activity Systems Analysis

Yamagata-Lynch, Lisa C.; Cowan, John

Qualitative and Mixed Method Network studies

Qualitative Approaches, Distributed Teams, Adults

SAT.AM1

This session will explore the potential benefits to social network research from the coordinated use of activity systems analysis and social network analysis for understanding complex human interactions. Our goal in this session is to introduce the methodological compatibility between activity systems and social network analyses then explore the benefits for using them in mixed methods research. These two methods are an optimal match in research because activity systems analysis can help explain why and how individuals engage in individual or collective activity within their community and how they influence the environment (Engeström, 1987, 1993), while social network analysis captures the structure of the connections between individuals in an activity and the relationship of this structure to the activity (Hanneman and Riddle, 2005). Taking a mixed methods approach with these analyses techniques can provide social network researchers with unique perspectives at the individual, group, and social levels regarding how activities and social interactions influence one another and the environment. We will center this discussion surrounding a data set from a National Science Foundation Opportunity for Enhancing Diversity in Geoscience grant (award number 0703541).
### Exponential-family Random Graph Models For Weighted Networks

**Krivitsky, Pavel N.**

- **Exponential Random Graphs**
- **ERGM/P**, **Weighted Links**, **Transitivity**, **Exponential-family Random Graph Models**, **Weighted Networks**, **count data**

SUN.AM1

Exponential-family random graph models (ERGMs) provide a principled and flexible way to model and simulate features common in social networks, such as propensities for homophily, mutuality, and friend-of-a-friend triad closure, through choice of model terms (sufficient statistics). However, those ERGMs modeling the more complex features (i.e. those which do not assume independence of dyads) have, to date, been limited to binary data: presence or absence of ties. Thus, using ERGMs to analyze weighted networks, such as those in which counts of interactions or measurements of relationship strength were observed, has necessitated dichotomizing them, losing information. In this work, we generalize ERGMs to weighted graphs. Using the concept of reference measurements, we describe a rigorous yet intuitive framework that retains many of the inferential and interpretability properties of the binary case, and discuss additional issues and caveats that emerge. Focusing on modeling counts, we introduce terms that generalize and model common social network features for count data, while avoiding degeneracy. We demonstrate these methods on a commonly analyzed dataset whose weights are counts.

### Extending Measurements Of Opportunity Structures With Tetradic Substructures In Multilevel Networks

**Lazega, Emmanuel; Jourda, Marie; Mounier, Lise; Lazega, David**

- **Analyzing Network Data**, **Blockmodeling**
- **Scientific Networks**, **Social Capital**, **Multilevel Networks**, **Performance**, **Advice Network**, **Interorganizational Networks**

SAT.AM2

This paper extends network measurements of opportunity structures by contributing to research on multi-level network analysis and by exploring the articulation of inter-individual and inter-organizational networks. Following a ‘linked-design’ approach, we look at the specific value of potential, indirect ties that can be added to members’ observed social network via their organization’s inter-organizational network. We measure the extent to which, and the conditions under which, this “augmented” social network provides more social capital to members than their observed inter-individual networks. Our dataset is derived from an empirical network study of the French field of cancer research. The data includes and combines inter-laboratory networks, inter-individual networks within the “elite” of French cancer researchers in that system, and performance variations (impact factor scores associated to these researchers’ publications) measured at the individual level.
### Extracting Leadership And Influence Metrics From Social Networks Derived From Meeting Transcripts

Broniatowski, David A.

Text Analysis, Bayesian Methods, Social Network, Leadership

SAT.PM3

The role of leadership in group decision-making is not well-understood. Computational social science methods and topic models in particular, may be applied to analyze transcripts of different group decisions. This paper analyzes leadership behavior by the committee chairs in the U.S. Food and Drug Administration. The output of the analysis is a set of directed social networks that reveal different engagement strategies utilized across meetings.

### Extracting Subpopulations From Large Networks

Zhang, Bin; Krackhardt, David; Krishnan, Ramaya; Doreian, Patrick

Network Methods

Methods, Network Analysis, Clustering, sub graph

FRI.AM1

Until recently, collecting network data of a substantial size was a challenge, limiting much of our research to analyzing relatively small networks. Now, however, with the help of new information technologies, we find ourselves basking in very large data sets. Their large size has outstripped our ability to perform even rudimentary analysis on the networks as a whole. One solution to this problem is to extract a connected subgraph from this large network and analyze its properties as a stand-alone subpopulation. In this paper, we propose a method for extracting subpopulations that maintains two desirable properties: 1) that it is efficient (so that it scales well), and 2) that it is effective at extracting a subgraph that is relatively self-contained (i.e., that it has more ties within it than it does to nodes outside the subgraph). We develop a method for such extractions, called "Transitive Closure and Pruning" (T-CLAP), and compare it to two other popularly used community detection algorithms in the literature -- Newman's community detection algorithm and Clauset's community detection algorithm. We find that T-CLAP and Newman's algorithm both are effective, but that Newman's algorithm is orders of magnitudes slower than T-CLAP. We find that T-CLAP and Clauset's algorithm are both very efficient and scale well, but that T-CLAP is superior to Clauset's algorithm in terms of returning effective subpopulations that would be useful to study.
Extraction And Validation Of Socio-technical Network Data About The Sudan From Text Corpora
Diesner, Jana; Carley, Kathleen M.
Words and Networks - Natural Language Processing, Conflict Methods, Text Analysis
WED.PM2

In 2005, the Government of Sudan and the Sudan People's Liberation Movement (SPLM) signed a Comprehensive Peace Agreement. In 2011, Southern Sudan will hold a referendum regarding its independence from Northern Sudan. Network data representing interactions in this socio-technical system during this six year time period can help us to understand the development of culture and conflicts in this region. Since such data is hard to collect through classic methods such as surveys, we use Relation Extraction methods to approximate network data from publically available news coverage on Sudan. We will report on how we utilize theoretically grounded, lexicalized features and feedback loops with subject matter experts to adjust our relation extraction technology to this domain. This technology uses a model that we trained via supervised machine learning, the classifier used for that are Conditional Random Fields. We will present our results from analyzing the retrieved socio-technical network that comprises tribes, issues and resources.

Eyetracking Of Network Visualizations
Zenk, Lukas; Smuc, Michael; Windhager, Florian
Visualization
Visualization, Organizational Change, Intra-organizational Networks, Visual Analytics, Network Visualization, Eyetracking
WED.PM2

A picture is worth a thousand words and visualizations are of utmost importance in social network analysis to better understand complex patterns of relationships. Visualizations are often used to gain an overview of collected data or to present results of empirical studies. In the context of organizational network studies, the visual exploration of data provides also insights for involved persons to reflect their communication behaviour. But how do people look at network graphs? What are their eyes doing when they explore such visualizations and how do they achieve insights by visually working through the relational webs? In the course of the research project VIENA (Visual Enterprise Network Analysis), we studied various longitudinal networks in a university department. Accordingly, we visualized selected networks and how they changed over time. In front of an eyetracker, we presented the visualizations to involved persons of the department and analyzed how they observed their networks. In this presentation we will show the first results of this experiment.
Failing To See Or Failing To Seize Opportunities To Build Social Capital? The Role Of Neuroticism

O'Connor, Kathleen M.; Sauer, Stephen; Welser, Ted; Gladstone, Eric

Egocentric Networks
Degree Centrality, Affiliation Networks, Personality, Laboratory Experiment, Cognitive Science

Interest in how individuals shape their networks has led scholars to investigate the link between individuals' traits and their network positions. Recent work showed that the strongest trait predictor of position was neuroticism, with those higher in neuroticism having lower degree centrality in their networks (Klein et al., 2004). However, results did not explain this finding. We contend that a more precise accounting of how traits matter would help build a strong theory about the role that actors play in shaping their networks. Neurotics may take peripheral positions in their networks because they misperceive opportunities to build social capital (cognitive explanation). In Experiment 1, participants watched a video of a bar scene derived from Second Life, and described the social network depicted in the scene. Results showed that neurotics were relatively (and significantly) more inaccurate in identifying ties among actors in these networks, providing evidence for a cognitive explanation for low degree centrality. In Experiment 2, we investigated whether neurotics also were relatively unwilling to build social capital (behavioral explanation), and we did this by manipulating the barriers to entry and the rewards associated with occupying a central position. As predicted, when costs were low and rewards were high, participants chose a central spot. However, this effect failed to materialize for neurotics. In sum, both cognitive obstacles and motivational barriers prevent some (here neurotics) from taking on central positions in their networks.

Field Of Consumption: Using Network Analysis In Mapping Sustainable Practices

Bellotti, Elisa

Networks and Culture
Block Model Analysis, Sustainability, Consumption

The paper explores the possibility of using network analysis to represent the field of sustainable consumption in Italy, related to other forms of practices and to more general indicators of economic and cultural capital. It makes use of data from a survey conducted in 2005 on a statistically representative sample of the Italian population (1500 cases, aged from 25 to 74 year old, living across the country). The network is obtained by projecting the original two mode dataset (cases by variables) into a one mode matrix (variables by variables) and calculating the structural equivalence profiles for every variable. Analysis has been carried at different levels of structural equivalence: at level 0.7 we identify 19 components of size bigger than 1, which represent strongly coherent consumption practices. Lowering the value of structural equivalence to 0.3 we can see how these components get connected. Results show a space polarized around three clusters: the first referring to sustainable practices, which are linked to high economic and cultural capital; the second related to hedonistic attitudes, linked to medium cultural capital and medium high economic capital, and a lack of interest for environmental issues; the third characterised by low economic resources and a clear attitude toward saving, where sustainable practices are seen suspicious and expensive.
Finding A Cure For Crohn’s Disease - Analyzing Medical Conditions In Online Communities

Fuehres, Hauke; Gloor, Peter A.; Kaminski, Jermain; Zhang, Xue

We introduce a project trying to automatically collect information from patients of a chronic disease by analyzing online social networks. More specifically, we look at online postings of patients with Crohn’s Disease and Ulcerative Colitis by analyzing their Facebook friendship and discussion networks as well as Twitter and other online forum posts. We identified Facebook groups whose goal is to improve the lives of Crohn’s patients, or even to find a cure. This information provides valuable input to the creation process of creating a community of Crohn’s patients. The friendship network of the Facebook groups is surprisingly unconnected, even considering that we are only able to collect the links of people who have made their friends public. There are only little star networks with very short average path length of three to four. When we manually checked a few of them, the person in the center was usually somebody affected with Crohn’s disease, and the people in the periphery where their friends. This does not mean that the people in the center don’t have bridge links through friend-of-friend connections. Rather, this means that the fans of the Crohn’s support pages don’t know each other. Additionally we also did a content analysis of Facebook and Twitter, which illustrates very different medical approaches in different regions, with emphasis on specific drugs like Prednisone in the US, on diets and other drugs like Humira in the UK, and Remicade and surgery in Canada.

Finding A Needle In A Haystack: Advances And Challenges In Using Blau Space Modeling To Trace Covert Social Networks

Brashears, Matthew E.; Genkin, Michael

How can covert social networks be detected and mapped? Such networks, including terror cells, drug cartels, and human smuggling rings are of considerable interest to scholars but are very difficult to study. We discuss a three-year project funded by the Defense Threat Reduction Agency to develop methods for identifying such covert social networks. We will identify some of the theoretical challenges involved in detecting covert social networks and discuss the Blau Space model that is the foundation for our effort. Specifically, we hope to use network features such as bridge signatures and pendant status, in conjunction with Blau Space location to provide reliable indications of involvement in covert groups. We additionally present some preliminary analyses using the National Longitudinal Study of Adolescent Health (Add Health). This dataset is particularly useful for method-validation because it is highly detailed in respect to Blau Space parameters and contains information on deviant networks, thereby allowing us to check whether the deviant ties we predict correspond to actual deviant ties. While the adolescents included in this dataset are unlikely to be involved in serious covert activities, they represent a useful test case for the development of our techniques. Directions in extending our model theoretically and to other data sources will also be discussed.
### Flows Of Cultural Consecration: Who Benefits From Film Festivals?

**Jensen, Michael; Kim, Heeyon**

**Networks and Culture**

**Culture, Film, Academy Awards**

SUN.AM2

The number of film festivals has grown dramatically in the last decades. Film festivals are increasingly viewed as key mechanisms not only to promote individual films but also to promote national film industries. It is, however, not clear who actually benefits from film festivals and the cultural consecration associated with participating in and winning awards at the most prestigious film festivals, such as the film festivals Cannes, Berlin, and Venice. We use extensive data on the film industries in 20 European countries to examine the extent to which the cultural consecration associated with film festivals provides future benefits for film projects by 1) the individual film festival participants (e.g., producers, directors, actors, writers) themselves (participant spillover), 2) the individual film festival participants’ network partners (network spillover), and 3) the individual film festival participants’ home country (national spillover). We are particularly interested in how the structure of the national film networks affects leveraging individual film festival success to national film industry success.

### Following The Flow: Networked Governance In Water

**Moore, Michele-Lee**

**Qualitative and Mixed Method Network studies**

**Mixed Methods, Governance, Social Network Analysis, Innovation, Water, Cross-scale**

THURS.AM2

New actors in water governance have been emerging since the early 1990s at the global level and have self organized into the form of a network. The network has been institutionalizing certain norms about how the world’s water should be governed, particularly advocating one specific governance innovation – the creation of water governance institutions according to watershed boundaries rather than traditional political boundaries. Some scholars now claim that this is evidence of networked governance. Accepting the premise that watershed or river basin governance organizations may be connected to a global network, this paper hypothesizes that networked governance involves more than just diffusing an innovation. Using case studies of the Murray-Darling Basin Authority (Australia) and the Bang Pakong River Basin Committee (Thailand), traditional tools of social network analysis are combined with a grounded theory approach to better understand how and why river basin organizations are connected to a global network of water experts and the implications of the linkages for water governance. Results suggest that river basin organizations are highly connected, but not to a single purpose, strategically designed network. Rather, the network is complex, multi-scalar, and involves a diverse combination of resources flowing through any individual tie. Additionally, this paper cites empirical evidence to argue that “governing” in networked governance involves providing the capacity for further innovations – helping to navigate certain technical issues, legitimizing and reassuring staff in the process of significant paradigmatic and governance shifts, and motivating ongoing innovation processes.
**Formal And Informal Human Network Management In Leadership Perspective**

Kim, Dae Joong

Poster Session

Intra-organizational Networks, Leadership

SAT.PM3

Organizational human network management or one condition of leadership has not much studied, especially in public organizations. Most leadership studies focus on leader’s traits and skills, organizational situation, subordinate’s motivation, etc. However, the fact that organizational success or stable operation depends on how leaders understand the informal human network in their organization and apply the network into their formal structure has been relevantly ignored in leadership study. Based on this aspect I have analyzed a Korean national research institute I had been worked at for two years. During the period, there was one time when our leader was changed. The leader had been selected through an open competition. In addition, the new leader had a face-to-face interview with people to see where they wanted to be posted. Most of them had been rearranged to the places they hoped. However, the organization would not be stable for one year. Other conditions such as the number of employees and salary are same. If so, why? There was much more disconnection between formal and informal human network than the previous leader. This can be easily checked through the diagrams supported by social network analysis programs. On the diagrams, his predecessor has a similar pattern between formal and informal human network is not large, but the new leader does not. The discrepancy between formal and formal human network caused the organization unstable. Thus, in the future leadership studies are needed to add a study between informal human network and formal human network as a prescriptive approach.

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**Formalism And Relationalism In Social Network Theory**

Erikson, Emily

Network Theory

FRI.AM2

There is a widespread misconception in and about social network analysis that social networks are necessarily relational. In current social theory, relationalism has a specific definition. Relationalism is a theoretical tradition in sociology based in the work of the pragmatist tradition of Charles Henry Pierce, George Herbert Mead, William James, and John Dewey. It rejects essentialism, a priori categories, and insists upon the intersubjectivity of experience and meaning, as well as the importance of the content of interactions and their historical setting. Formalism, however, is based in the theoretical works of Georg Simmel. Simmel based his theory on a Kantian program of identifying a priori categories of relational types and patterns that operate independently of cultural content or historical setting. Where relationalists insist on setting, formalists seek to identify patterns that transcend setting. Where formalists seek to identify the locus of social action in patterns devoid of content, relationalists focus on the intersubjective creation of meaning and content. And importantly, formalists are engaged in a project of identifying generalizable laws of social interaction, whereas relationalists are more interested in techniques for producing historically-situated explanations. Confusion between the two research programs has generated incoherent research agendas and a widespread misunderstanding of what the field can, should, or is attempting to accomplish. In this paper, I distinguish the two theoretical strains.
### Fostering Support For Innovative Projects - The Role Of Cross Hierarchical Ties

**Aalbers, Rick; Dolfsm, Wilfred; Koppius, Otto; Leenders, Roger**

**Organizational Networks**

**Innovation Networks, Team Performance, Brokerage**

FRI.PM1

Social networks have been found to be an important driver of successful innovations, both at the individual level as well as the organizational level, and recent research has also shown effects of the networks within teams. However, innovation teams are embedded within an organizational context; they have links to other teams, departments, business units as well as hierarchical levels. While we know from the general innovation literature that a diverse project context is important for innovation success, the implications of hierarchical network relations remain unclear. Although previous research on bridging ties has advanced our understanding of innovative project performance it is not sufficient to explain the impact of new business development projects on innovative performance. By investigating the effect of cross-hierarchical ties our research fills in this gap and explores the degree to which the availability of cross hierarchical ties to a project team affects project performance. Our results are based on a multiple case study of several new business development (NBD) teams at a large European financial service provider. Our preliminary results show that high performing innovation project teams are characterized by a relatively high degree of average cross hierarchical ties among team members as compared to the less performing teams. As a result we find support for the role of cross hierarchical ties in fostering support for innovative project.

### Founder Characteristics And The Social Psychological Mechanisms Of Entrepreneurial Network Development

**Heidl, Ralph; Yao, Xin**

**Business & Entrepreneurial Networks**

**Entrepreneurial Process, Social Cognition, Founder Characteristics**

WED.PM2

Network resources have long been recognized as a critical factor influencing new venture performance. However, the relationship between social networks and venture performance is complex and multi-facetted. Different network configurations have different performance implications during the different stages defining the entrepreneurial process. Moreover, extant entrepreneurship research often assumes social network composition and structure to be exogenous (i.e., determined by factors outside the control of the entrepreneur). This assumption is unrealistic and neglects the impact of the founders’ individual preferences for and efficacy in creating, maintaining, and dissolving social relationships that can steer the venture onto different developmental paths. We address this gap by proposing a model that takes into account the social psychological mechanisms through which founder characteristics impact the evolution of a new venture’s network. Specifically, we focus on social cognitive processes that channel founder individual differences into network formation and transformation patterns. Furthermore, we discuss the performance implications of the entrepreneur’s networking preferences at different stages of venture development. In doing so we seek to integrate two largely disconnected streams of entrepreneurship research – entrepreneurial social networks and the social psychology of entrepreneurs – to inform venture performance.
<table>
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<tr>
<th>Framework For A Socio-sexual Network Study Of Young Men Who Have Sex With Men</th>
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<tr>
<td>Kuhns, Lisa M.; Mustanski, Brian S.; Muth, Stephen Q.; Latkin, Carl</td>
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<td>Poster Session</td>
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<td>Adolescents, HIV Risk, Social Network, Sex Networks, Ego-centered Networks</td>
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<td>SAT.PM3</td>
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<td>There is an alarming rate of HIV/AIDS prevalence among young men who have sex with men (YMSM), one of the few risk groups with an increasing rate of infection. YMSM experience multiple health disparities, including elevated rates of illicit drug use, exposure to violence, and mental health problems such as suicidality. Our research team has begun to gather a sample of 450 YMSM, ages 16-20, using respondent-driven sampling (RDS), a network sampling technique. The project, called Crew 450, is investigating the prevalence, developmental trajectories, and predictors of the clustering of psychosocial health issues linked to HIV. Very little is known about the basic structure and characteristics of social or sexual networks among YMSM or their influence on HIV-related risk and other clustering health issues. We have designed a network based sub-study, guided by social support theory and the growing literature on sexual network epidemiology to identify and describe the socio-sexual network structure of YMSM. Study design includes structured social and sexual egocentric interviews with a sub-sample of Crew 450 participants using participant-assisted sociograms to capture inter-alter ties via Access/Pajek to describe core network characteristics, including assortativity by degree, age and race/ethnicity and overlap between social, sexual, and substance-using networks (i.e. multiplexity). We will present the plan for the social network sub-study, the socio-sexual network interview instrument, and the data capture protocol.</td>
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<th>From Data To Model: Networks In The Sudan</th>
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<tr>
<td>Carley, Kathleen M.</td>
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<td>Network Dynamics</td>
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<td>Dynamic Network Analysis, Multilevel Networks, Text Mining, Conflict, Africa, Meta Networks</td>
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<td>WED.PM1</td>
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<td>The past decade has been a period of dramatic turmoil for the Sudan, which changes politically, socially, and economically. Using an approach that combines machine learning, text analysis, subject matter expertise and social networks an assessment of this area was done. The rise of the Dinka, the changing nature of conflict, the separation of Southern Sudan are seen through changes in the meta-network connecting political actors, organizations, political issues, and so on through time and space. Findings include increasing lines of contention, network complexity, changing brokers, and southern segmentation at the same time that there is increased desertification.</td>
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</table>
The separation of private interest and state is a high virtue in liberal democracies. In Britain, the codes of civil service were forged on the ashes of the Great Corruption of the 18th and 19th centuries where government office was purchasable. But to condense a large literature, government is limited without the cooperation of private interest in providing information and action and this dependence opens doors to influence. In recent years, attempts have been made to limit such channels through disclosure requirements. The United States has long had extensive restrictions and disclosure requirements on political donations and lobbying activity. In the UK, disclosure of politician’s private interests, donations, subsequent employment and meetings with external bodies has been only recently mandated. This study examines the interactions of business and the civil service in the UK revealed by recently published registers to detect persistent patterns of interaction. It demonstrates that large British firms, particularly the finance sector, are extensively and centrally engaged in direct lobbying of civil servants and points to an important secondary network formed when retiring politicians and civil servants are employed in industry. It is argued that these networks are much more significant communication channels than those highlighted in media portrayals of ‘cash for influence’, that they are an inevitable product of a liberal democracy, and that this raises important issues for business governance.
**G8/G20 Preparatory Process Networks: A Mixed Method Analysis Of Influence**

Abbott, Clint L.

Qualitative and Mixed Method Network studies

Mixed Methods, International Networks, Governance, Social Network Analysis, Political Networks, Policy Networks

THURS.AM2

The preparatory process for diplomatic summits has shifted over time to include a diverse range of interconnected agencies and actors. This shift has been fuelled, at least in part, by rapid globalization, new power dynamics between states and non-state actors, and a growing interest in new communication technologies. A primary aim of this paper is to examine the emergence networked forms of governance at the summit diplomacy level. Using the 2010 Canadian G8/G20 preparatory process as a case study, this paper presents empirical research and challenges involved with using social network analysis (SNA) and qualitative process analysis as tools to study networked governance. The paper demonstrates the value in mixed methods and argues that a wide array of actors, interdepartmental tensions, and trust and communication factors affect the summit preparatory policy processes. Research findings indicate that the density of the network varies greatly depending on the policy issue and the stage of the preparatory process. Also, the influence of non-governmental actors within this particular network were largely the result of both the government led mechanism used to consult “outside” groups and the emergence of temporary coalitions. The research aims to highlight the rich qualitative and quantitative data obtained through elite level interviews. Furthermore, it aims to bridge divides between the practice of governance, particularly through networks, and academic theories on global and networked governance. Consequently, the results have broader application to government departments and non-state organizations attempting to develop networked methods to improve policy development processes.

**Gaining Access To Both Email Content And Structure In Corporate Environments: A Novel Partnership Solution**

Gluesing, Julia C.; Riopelle, Kenneth R.; Danowski, James A.

Words and Networks - Organizational Communication, Team Dynamics

Organizations, Methods, Email Networks, Semantic Networks

SAT.PM2

A continuing problem in conducting network analysis in corporate environments using email is limited access to email content. While it is sometimes possible to obtain structural to-from and time stamped network data, there are often constraints related to confidentiality and privacy that restrict access to or prohibit analysis of email content. This paper describes a novel solution developed in the course of research conducted for an NSF-funded grant to study diffusion of innovation in global networked organizations. The research team formed a partnership with employees inside the corporation who collaborated in the gathering and analysis of data. The academic researchers trained the corporate collaborators to install and operate software within their secure corporate environment, to obtain voluntary consent for use of email in the study, and to analyze both the structure and the content of the email. The academic researchers served as consultant to the corporate team and received anonymized network analysis results, including analysis of sentiment and word and word pair analysis over time. The partnership approach enabled analysis of the full content of emails while preserving confidentiality and privacy and ensuring that all emails remain protected in the corporate secure environment. The university institutional review board also approved the approach. We will present the data access and analysis process, the pros and cons of the partnership approach.
Even though there exist power or limited resource game situations in organizations (e.g., manager vs. workers, workers vs. worker, and team vs. team), there are few studies about games in organizations. In addition, even if some managers or workers perceive a game situation, the game situation tends to be regarded simple; unlike their thinking, hidden, complex and dynamic games exist due to networks among them. In these respects, I try to apply both game theory and network analysis to organizations management in both theoretical and practical perspective in my paper, based on case study. Specifically, in the network-game situation I would try to show how managers or workers seek for their rationality (opportunism) in organizations, but such individual rationality (opportunism) cannot be connected with one of the causes to organizational or group efficiency, called “collective irrationality or inaction.” For this study, I first built some possible game models between an elective leader and power/resources-seeking workers, and between power/resources-seeking workers and non-power/resources-seeking workers, especially when a new elective leader comes to the public organization. In other words, I mainly focused on the case of what is called “succession situation or problem.” In my case, I found individuals seeking for opportunism in the organization in t-1 time suffer from prisoner’s dilemma in their whole organization member networks in t time. For this analysis, I used such basic network techniques as visualization, centrality, and density analysis. This study have some implication as follows: in practical perspective, this study shows that game modeling with network analysis methodologies can be more helpful for manager and organizational members to understand organizational structures among them than existing or classic game modeling approaches alone. In methodological/theoretical perspective, this study shows network approach can usefully applied in explaining N-person dynamic game over time. This study can be applied in allocation their human resources in terms of networks, not personal attributes (or traits). In future, if interpersonal relationships by team/department and among teams/departments need to be considered in this study, it will be more useful for managers to innovate or redesign their organizations successfully.
**Games And The Power Of Capturing Player Data: Using Human Computation To Investigate Belief Creation In Networks**

Landwehr, Peter M.; Spraragen, Marc; Carley, Kathleen M.

Simulation and Agent Based Models

Agent Based Models, Game, Human Computation

FRI.PM1

Recent human-computer interaction research has successfully leveraged humans’ instincts towards play by developing games that, when played, perform useful tasks for a variety of domains. Such games use humans as black box heuristics for solving problems such as folding proteins and improving internet image searches. Most of these games are united by constraining the solutions that people develop to be evaluable as empirically correct; it is possible to quantitatively compare two protein folds and determine which is better. In this paper, we describe a project to leverage human computation through gameplay to investigate how to optimally propagate beliefs in a network simulation, a task that is relatively complex and the success of which can be hard to evaluate. In the Sudan Game, players take on the role of a super-analyst, able to both look at a variety of metrics about Sudan and to engage with local opinion leaders to carry out belief interventions. If players can cause average belief homophily between two different tribes to pass a particular threshold, we consider the tribal relationship to be stable. Because of the number of possible actions available at each time step, the number of simulation replications that would be required to parse all versions of this model is computationally intensive. By collating and vetting the successful stabilizations across thousands of plays, we intend to develop a sequence of actions that could be taken to increase stability in Sudan. We describe the current state of this project, how different network models can be used to alter the scenario in which the game takes place, and discuss the broader applicability of human computation to network analysis.

**Generating Large-scale Networks From Egocentric Data**

Lee, Ju-Sung; Carley, Kathleen M.

Empirical Large-N Networks

Large-scale Networks, Distribution, Dyadic Analysis, Egonet, assortative

SUN.AM2

We propose a data-driven method for generating distributions of large-scale close-tie networks. In particular, we turn to the egocentric networks in the Social Network Module of the 1985 General Social Survey. Using maximum likelihood estimation of key properties, we generate networks whose dyadic and ego-network characteristics coincide with those of the GSS networks. We demonstrate our approach on city subsamples of the U.S. census. Since the generated networks are directly valid only on the ego-network level, we examine the range of topologies and network properties induced by both the local structures and degree of assortative mixing (or homophily) found in the data. We also explore the benefits of constraining network level properties during the generation process. Finally, we will discuss the implications and contributions of our method to the study of diffusion-related dynamics.
Generosity As A Public Good: Heterogeneous Preferences In Partner Selection Promote Opinion Diversity And Social Integration
Sohn, Yunkyu

Network Dynamics
Peer Influence, Co-Evolution Model
THURS.PM2

Although polarization of public opinion and segregation of social groups are prevalent, we rarely observe complete fragmentation of a social network. To explain this regularity, we propose a utility-based model of opinion formation and partner selection. The model allows feedback dynamics between opinions and social relationships based on individual tolerance thresholds of opinion difference. Our model differs notably from the existing co-evolutionary models in the following aspects: i) Each dyadic relationship is weighted asymmetrically; ii) Opinion change is a Markov process; iii) In an equilibrium phase, where the difference between opinions of agents holding a directed arc is lower than the tolerance threshold of the receiver, the resulting network and agents can have various topologies and opinion distributions. We investigate topological characteristics and opinion distribution of the model at equilibria when a) a homogenous tolerance threshold is allowed and b) heterogeneous thresholds are distributed over the population. In contrast to the homogeneous threshold case where networks at equilibria exhibit either complete fragmentation by opinion or form fully connected components holding a homogenous opinion, the heterogeneous setting simultaneously achieves opinion diversity and social integration by binding structurally modularized opinion clusters with each other. The topological properties of these networks surprisingly resemble those of real social networks.

Goodness Of Fit For Social Network Dynamics
Lospinoso, Joshua A.; Snijders, Tom A.

Analyzing Network Data
Statistical Methods, Dynamic Network Analysis, Siena, Goodness-of-fit, Actor-based Models, Degeneracy
SAT.PM1

We propose new statistical procedures for evaluating the goodness of fit of stochastic actor oriented models (SAOMs) for social network dynamics. Due to the unique nature of longitudinal social network data (a single observed trajectory), classic tests for goodness of fit are generally inappropriate. We develop (1) a general non-parametric test based on auxiliary features of the network like triad census counts, behavioral profiles, geodesic distances, etc., which leverages a simulated cumulative density function (2) an information criteria for comparing among likelihood based models for social network dynamics based on path integration, and (3) a series of parametric tests for model selection among nested SAOMs based on the classic asymptotic tests for composite hypotheses. We present a simulation studies to illustrate the effectiveness of these approaches, and apply them as a systematic examination to a real world dataset.
### Governing Sustainable Development: Landscaping Issue Networks On Water-energy Infrastructure Planning

Stratton-Short, Samantha R.

Policy Networks

Transnational Networks, Governance, Policy Networks, Online Networks, hyperlink analysis, Issue Networks

This paper summarises the initial findings of research being carried out on networks of organisations concerned with hydropower and water infrastructure projects in nine countries around the world. It explores issues of sustainable development through the representation of interests and connection patterns of organisations around the selected projects. These networks reveal another dimension to the stakeholder discourse exposing important dynamic relationships manifested on the World Wide Web. Using a mixed method approach the foundation, hyperlink network analysis, processed information on the connections between websites of over 1100 unique organisations. By looking at a sample of countries with different levels of national governance and resource pressures, these networks are compared to find the emerging patterns and change over a sample course of time as the debates develop in order to create a basis for analysing future networks on projects with similarly high levels of controversy around sustainable development. Surprisingly, despite the likely presence of the anti-dam advocacy network within many of these networks, they vary significantly in both composition and focus. Within the networks, notable interaction between sectors and interests can be seen, with the greatest cohesiveness between environmental interests. In order to examine these networks in the wider context of all possible stakeholder interaction some were also juxtaposed against affiliation networks based on events attended or collaborations around a project. This confirmed the absence of some of the key large private sector advocates for the projects and highlights the different modes of influence at play in different medium.

### Harnessing Social Media For Uncovering Social Networks In The Enterprise

Ehrlich, Kate; Daly, Elizabeth

Organizational Networks

Intra-organizational Networks, Social Media

As work gets distributed across organizational and geographic boundaries, social network analysis can provide important clues to individuals and managers of where expertise is located and how the work is structured. Organizational units with strong social ties foster trust and communication within the division. On the other hand, a lack of connections to outside divisions may have important implications in terms of information diffusion, cross division collaboration and knowledge sharing. However, it can be difficult to obtain data for analysis. Traditional survey methods don’t easily scale beyond small teams and can be cumbersome for repeated data collection. Alternate data acquisition methods including email, phone records, or RFID tags provide wider coverage but also introduce privacy issues. In this talk we present the results of an exploratory study based on symmetric friending data from over 10,000 users of enterprise social media software. The results revealed distinctive network patterns within and across divisional units that are descriptive of the type of work in the division. We discuss the implications of the study for methods of obtaining network data in an enterprise and for tools that could facilitate the use of network data and visualizations by individuals and managers.
**Harvard Catalyst Profiles: An Open Source Research Collaboration Website With Automated Network Discovery And Social Network Analysis**

Weber, Griffin M.

Applying Social Network Analysis to Clinical and Translational Science in four CTSA Institutions

Visualization, Software, Intervention, Automated Network Discovery, Research Networks, Organizational Structure

SAT.AM2

Harvard Catalyst Profiles is an open source, ontology-based, research networking website that we built when Harvard received its CTSA award. We created profiles for 22,000 faculty using a variety of external data sources including PubMed and ISI Thomson Web of Knowledge, and internal Human Resources and administrative databases. These profiles are linked together through "Passive Networks", which are automatically generated based on information known about investigators, such as two people being co-authors on articles, having similar interests, or working in offices that are physically close. Users can also create "Active Networks", by looking up people they know and manually describing their relationships to them, such as "collaborator" or "past advisor". Profiles calculates a variety of social network analysis metrics for individuals and for different levels of aggregation (e.g., departments and institutions) and uses these to construct numerous interactive visualizations, reports, and personalized search tools. We use SNA to guide us in allocation of CTSA pilot grant funds, to identify faculty who are not advancing in their careers, to understand gender and race inequalities, and to build interdisciplinary teams in novel ways. Profiles is used in institutions around the world, including several CTSAs. This enables us to perform federated queries and compare the structure of collaboration networks across these different sites.

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**Health As Status? Social Interaction And Inequality In And Older Adult Community**

Schafer, Markus H.

Social Networks and Health

ERGM/P*, Status, Centrality, Health

FRI.PM1

The overlap between social networks and health represents a key area of research in social gerontology, but few studies adopt a full-network design to address the topic. Set in a continuing care retirement community, this research focuses on how health is related to the discrepancies between outgoing and incoming reports of social behavior. Sociometric and health data were obtained from adults ages 74-97 (n=123). Results of an ERGM analysis show that across several dimensions of health, better health was related to a higher probability of receiving social ties, but a lower probability of sending social ties. Findings are interpreted in light of status processes which emerge in bounded social settings.
Hello Stranger – Reframing “familiar Strangers” In Light Of Location Based Services
Schwartz, Raz
Innovation, Diffusion, and the Adoption of Technology
Information Technologies, Social Networks
THURS.PM2

We see them every day all around us. They are the “familiar strangers.” Coined by Stanley Milgram in the 1977, this term depicts a common social phenomenon – a relationship between two complete strangers that recognize each other through their daily encounters in public places (such as the subway, gym etc.). Milgram claims that although these two people never communicate with each other, their relationship is real and it is based on both sides agreeing to mutually ignore each other. This study depicts the emergence of what I call the “virtual familiar stranger,” an update to the classic term, that both complies with Milgram ideas but at the same time adds to it the influence of the virtual sphere brought by location based social services. These social networks that use GPS location data from mobile devices – such as Foursquare, Gowalla, Grindr, SCVNGR and Facebook Places – encourage users to check-in to places they visit, leave tips, and see who else is around them while at the same time increase the number of familiar strangers in their surroundings. Through analyzing interviews I conducted with several of the creators and users of these services, this study redefines Milgram’s term of familiar stranger in light of location based social services and shows how the use of these services increase not only the number but also the significance of familiar strangers in daily life.

HIV Transmission Among Men Who Have Sex With Men In The United States: New Insights From Dynamic Demographic Network Models
Goodreau, Steven M.
Social Networks and Health
HIV/STD, Sex Networks, Public Health, Exponential-family Random Graph Models
SAT.AM1

I report on initial efforts to build a rich data-driven model of HIV transmission among men who have sex with men (MSM) in the United States. The model makes numerous methodological developments of interest to network reserachers over earlier transmission models for MSM: (1) it relies on the ERGM framework for both behavioral model estimation and simulation; (2) it includes two kinds of relational networks: a dynamic one for steady partnerships (using the methods of Krivitsky 2010), and a memoryless cross-sectional network for casual contacts each day; and (3) it includes feedback between vital dynamics and transmission on the one hand, and relational formation and dissolution on the other (also via the methods of Krivitsky (2010). The model incorporates numerous forms of demographic, relational, behavioral, and biological heterogeneity, parameterized from large-scale surveys of MSM in the United States. Initial results suggest that 33% of infections occur within main partnerships, far less than the 68% estimated in a recent paper (Sullivan et al. 2009). Our estimate for the proportion of infections originating with diagnosed, untreated men is high (59%). I conclude by discussing NIH’s recent initiatives to investigate combination interventions for HIV (of which this work is a part), and the resulting opportunity for network models like those presented here to play a major role in the coming years.
**Homophily And Propinquity In Social Ties, And The Consequences For Neighborhood Cohesion**

Hipp, John R.; Butts, Carter T.; Nagle, Nicholas N.; Acton, Ryan; Boessen, Adam; Marcum, Christopher

**Geographic and Social Space**

Homophily, Cohesion, Neighbor Relationships, Spatially-embedded Networks, neighborhoods

**WED.PM2**

Using early results from the Twin Communities Network Study, we explore the spatial distribution of social ties in two communities covering 13 census tracts in Southern California. There are two components to these initial results: First, we estimate the spatial interaction function of social ties by using the physical distance between ties in each ego’s network. We simultaneously estimate the effect of social distance between the respondent and the social composition of the surrounding area (based on the race/ethnicity and socio-economic status of the neighborhood) on the formation of ties. Second, we assess how the spatial distribution of ties relates to each respondent’s perceived cohesion in the neighborhood. These are preliminary results to one of the first studies with data on the spatial distribution of ego networks, allowing estimation of spatial interaction functions.

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**Homophily Networks For Large Populations: Development, Methodology And Use**

Lieberman, Steve; Everton, Sean

**Agent-Based Models and Multi-Agent Systems**

Theory, Homophily, Whole Networks, Behavior Change, Large-scale Networks, Action And Structure

**THURS.PM2**

We follow Peter Blau, Miller McPherson, and many others in positing that human behavior is best understood in terms of the complex social systems within which actions are taken, and that the representation of these social systems must make evident the endogenous structural constraints on opportunities for interpersonal contact and group affiliation. We demonstrate a theory and modeling framework for Homophily Networks— the network theoretic realization of dynamic social structures as the culmination of distributions of salient individual attributes across multidimensional space. We further demonstrate methodologies to develop representative homophily networks for very large populations (e.g., nation-states) using existing open source and freely available data. We discuss results from two studies using Homophily Networks: 1) changing social structures and group affiliation patterns in the United States across four decades using data from the General Social Survey, and 2) modern cross-cultural differences in large-scale clustering, entitativity and cohesion patterns across several large countries using data from the World Values Survey.
Hourly, Daily, And Weekly Effects On Copresence In Egocentric Networks
Marcum, Christopher S.

Egocentric Networks
Egocentric Networks, Personal Networks, Time Networks
SAT.AM2

Opportunities for individuals to interact with their friends, kin, and colleagues wax and wane with the various schedules they follow. While the growing literature on network dynamics has uncovered periodic and episodic effects on discrete interactions (such as email exchanges in an organization) over time, little is known about the extent to which copresence in individual networks varies in everyday settings. Using data from the American Time Use Survey, the amount of time individuals are copresent with members of personal networks is analyzed for temporal variability. Results comparing men and women egocentric networks at different age-groups are discussed.

“How Can We Be Lovers If We Can’t Be Friends”: On The Methodological Implications Of Resolving Disagreement In Multiplex Relationships
Methot, Jessica R.; Crawford, Eean R.

Analyzing Network Data
FRI.PM1

Dyadic interactions captured as directed network ties are asymmetric when actors disagree on whether a relationship exists. However, for many network analyses a researcher needs ties to be symmetric, such as when a network routine requires it, or the researcher is not interested in investigating asymmetry. When deciding which symmetrizing approach to use (e.g., representing a relationship as the strongest of the ties between actors—maximum—or as the weaker of the ties between actors—minimum), there is little guidance beyond “it depends on the research question.” In uniplex relationships, such as when someone is a friend, there is only one type of disagreement to resolve: whether the relationship exists. Here, the research question and type of relationship often provide sufficient guidance as to which symmetrizing approach to use. However, in multiplex relationships, such as when someone is both a coworker and a friend, there are two possible disagreements: whether a relationship exists, and if so, what kind. In this paper, we introduce both theoretical and methodological implications of maximum and minimum symmetrizing of single and multiplex relations using a sample of small group networks. Results suggest that, for multiplex relationships, there are methodological implications that go beyond the research question itself, such that the order of operations (symmetrize then calculate multiplexity, or vice versa) will influence whether a multiplex relation emerges.
How Far Our Network Perceptions Are From Reality: The Role Of Structural Positions And Self-monitoring

Vecchi, Patrizia

Knowledge Networks
Cognitive Social Structures, Personality, Interpersonal Networks

THURS.AM1

Cognition of social networks is an extremely young field of study in the broader area of social network research. The few studies conducted so far on this topic have shown that accuracy in social network perception (perceiving the structure of social relations in the social environment) plays an important role in explaining social and organizational behavior, and that accuracy in network perception can be enhanced by occupying more central positions in the social group. In addition, accuracy was found to be affected by some motivational traits, that are presumably out of individuals’ control. This study adds to research on the antecedents of accuracy in social network perception by verifying the impact of individuals’ centrality in the advice and friendship networks at work on their ability to accurately perceive the overall structure of the two networks. Also, the study analyzes the effects, on accuracy, excised by a personality trait (i.e., self-monitoring) which implies an acute sensitivity to the social context and to individual behavior. The network data for this study were collected in a large multinational company and are represented by the individual perceptions of the people constituting the top management team of the company (n = 45). The results indicate that the position that an individual occupies in the informal structure of the network is the only determinant of his or her degree of accuracy in perceiving the network itself.

Identifying Bias And Its Effects On Interpreting Behavioral Social Network Data

Bienenstock, Elisa J.; Singh, Lisa; Samuel, Nayyara; Bansal, Srividya.; Stanton, Margaret; Mann, Janet

Collecting Network Data
Data Collection, Animal Networks, Validation Methods, Bias Correction, Sensitivity Analysis

THURS.PM1

Exponential growth in computational power has extended the uses of SNA beyond description to inference about context from network structure. Here, we study how observer and sampling biases can affect these inferences using a 25 year dolphin behavioral database from the Shark Bay Dolphin Research Project. Bias occurs when the collection of behavioral data is correlated in some way with a variable of explicit or implicit interest to the researcher. Additionally, some subjects (e.g., mangled dorsal fins) or behaviors (e.g., socializing) are more obvious or easier to observe or classify than others. We examine how social network metrics vary by observer by comparing each researcher’s observed network with the representative (aggregated) network. Doing this allows us to identify the biases of different researchers and determine how sensitive network metrics are to observational differences. We also investigate whether these differences are related to dolphin attributes (age, sex, distinctiveness) and environmental and/or social conditions (season, group size, location). We find that network metrics differ by observer and interact with dolphin attributes and external factors (e.g. some observers provide more reliable records on dolphins of one sex or age class than others and/or tend to bias observations towards larger groups).
### Identifying The Pathways For Network-mediated Effects Of The Community Partners In Care Study

<table>
<thead>
<tr>
<th>Horta, Mariana ; Stockdale, Susan E.; Mendel, Peter; Ramos, Esmeralda; Jones, Felica; Dixon, Elizabeth L.</th>
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<tr>
<td><strong>Poster Session</strong></td>
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<td>Organizations, Mental Health, Depression, P*</td>
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<td>SAT.PM3</td>
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<td>Community Partners in Care (CPIC) is an organizational-level randomized trial of an implementation intervention to promote adoption of an evidence-based quality improvement program for depression care. Participating organizations are social safety-net agencies in two low-income and minority neighborhoods. The intervention is delivered through a community engagement process to foster cross-agency collaboration and training for agency staff on processes of care known to improve outcomes for depressed patients: cognitive-behavioral therapy, case management, and medication management. We observed that levels of participation in intervention activities have been heterogeneous among enrolled organizations. To better understand how referral links between organizations with high and low levels of participation may mediate intervention effects we collected data on the referral networks of participating organizations. We found that less-engaged organizations have established referral links to those more engaged, and that certain organizational-level characteristics such as size and service sector predict higher levels of engagement. Referral links from less-engaged to more-engaged organizations emerged as potential pathways for extending intervention effects to clients of less-engaged organizations.</td>
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### Identities In Action: Modeling Local Processes In Political Mobilization Using Tripartite Erg Models

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<th>Mische, Ann; Robins, Garry; Gondal, Neha</th>
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<td><strong>Exponential Random Graphs</strong></td>
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<td>Exponential Random Graph Models, Political Networks</td>
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<td>SUN.AM1</td>
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<td>We investigate the relationship between identities and action in political mobilization by examining how group memberships influence individual and group participation in events. Using a tripartite extension of exponential random graph (p*) models for relational data structures, we examine how local interdependencies between memberships, attendance and representation contribute to individual and group action at social movement events. We use these models to examine the role of leaders and organizations at two different stages in the 1992 Brazilian impeachment movement. Our findings suggest the importance of latent or suppressed identities and brokerage-style mediation for broad-based coalition building in response to mobilizing events.</td>
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**Impact Of Team Faultlines On Socio-cognitive Networks And Team Performance**

Wax, Amy; Huang, Meikuan; DeChurch, Leslie A.; Contractor, Noshir

Sports, Teams and Networks

Team Performance, Socio-Cognitive Networks, Emergent States, Team faultlines

FRI.PM2

Faultlines are theoretical divisions that split a group into subgroups based on member differences. Social category faultlines occur due to differences in social category demographic variables of group members, such as sex or race, while information-based faultlines occur with regards to job-related attributes of members, such as general mental ability (Bezrukova, Jehn, Zanutto, & Thatcher, 2009). We submit that faultlines shape the development of team socio-cognitive networks. In particular, that social category faultlines shape affective networks, whereas informational faultlines shape cognitive networks. Furthermore, we link changes in affective and cognitive networks to team action process, team information sharing, and team performance. We test these ideas in a sample of 120, 6-person teams performing a PC-based strategy game modeling a cross-functional emergency response team. We measure faultlines (sex, personality, psychological collectivism, general mental ability, and motives), affective networks (social identity and trust), cognitive networks (transactive memory and mental models), and action process, information sharing, and performance.

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**Importance Of Where Low-income Adolescents Met Their Most Recent Sexual Partner**

Staras, Stephanie A.; Maldonado-Molina, Mildred M.; Livingston, Melvin D.; Komro, Kelli A.

Social Networks and Health

HIV/STD, Adolescents, Prevention, Sex, Meeting and mating

SUN.AM1

Introduction: Unprotected sex and acquiring HIV are more common among age discordant sexual partnerships than among similarly aged partners. The place where low-income adolescents met their sexual partners may influence age discordance and condom use. Methods: Between 2008 and 2009, 2996 low-income adolescents from the Project Northland Chicago cohort, mean age 17 to 18 years old, reported their sexual history. The 1931 adolescents who ever had sex reported characteristics of the last time they had sex (e.g., type of sex, condom use, partner’s age, and where they met their partner). Among adolescents who reported having vaginal or anal sex the last time they had sex (n=1657), we used logistic regression to estimate associations between partner meeting place, age discordance (&#8805;5 years), and unprotected sex. Results: Adolescents met their partner at school (43%), through interpersonal connections (31%), in the community (13%), and in public (12%). Age discordant partnerships increased with partner meeting place: 1% at school, 7% through interpersonal connections, 12% in the community, and 16% in public. Compared to meeting partners at school, the odds of unprotected sex was similar when adolescents met their partner through interpersonal connections [Odds Ratio (OR)= 1.2, 95% Confidence Interval (CI) = 0.9 to 1.5], and greater when adolescents met their partners in their community (OR=1.7, 95% CI = 1.2 to 2.3) or in public (OR=1.7, 95% CI= 1.2 to 2.5). Associations between partner meeting place and unprotected sex were similar when adjusting for age discordance. Conclusions: Adolescent sexual partners’ meeting place likely influences the risk of acquiring HIV, and may represent an important target or site for preventive interventions.
**Increasing The Reliability, Sustainability And Scalability Of Social Network Data Collection**

Wang, Yiran; Steffen-Fluur, Nancy

**THURS.PM1**

The power of social network analysis is limited by a tension between the need to collect complete, high quality data and the corresponding burden. Also it’s often not feasible to collect self-reported data multiple times to track changes. In this paper, we discuss how we have addressed the need to reduce both respondents’ and researchers’ burden, while simultaneously increasing data quality. The NSF-funded ADVANCE program at NJIT studies collaborative patterns in faculty research networks to advance the careers of female STEM faculty. We have constructed a co-authorship network and have established correlations between collaboration, retention, and career advancement. Initial attempts to collect faculty’s free recall networks through an online survey were limited by a low response rate and incomplete data, however. In our new study, we use multiple name generators to collect different organizational ties. To address faculty’s burden with multi-generators and their reluctance to participate, we provide subjects with real-time visual feedback in an integrated and interactive modality in order to increase playfulness and recall rate. To reduce researcher’s burden and meet the challenge of automating data collection, we compare networks generated from self-reported data with bibliometric data to test our hypothesis that the latter is a valid proxy for the former. We thus help to transform social network data collection into a more accessible, reliable, and sustainable process.

**Individual, Tie, And Network Level Predictors Of Access To Social Capital: Applying Multi-level Analysis To The Study Of Ego-network Capital**

Young, Lindsay E.; Contractor, Noshir

**SAT.PM2**

By virtue of being connected to others, networks provide access to resources that can be mobilized toward productive outcomes. These embedded resources are called social capital. The relational nature of social capital means that the extent to which a person has access to social resources should be thought of as a function of individual, dyadic and network characteristics. Drawing from a sample of 218 ego-networks, this study estimates a multi-level model for the likelihood of a ‘resourceful’ tie, operationalized as the presence of a tie with someone with at least a college degree. The proposed model posits that a tie is likely to be resourceful based on individual characteristics such as their education and organizational affiliation, dyadic characteristics such as tie strength and educational heterogeneity, and network characteristics such as mean educational heterogeneity and network constraint. Identifying factors that affect the likelihood of having a ‘resourceful’ tie requires a method that accounts for the nestedness of units (i.e., individuals and ties nested within networks) and the potential interactions across levels. Traditional methods assume independence between units of analysis, making them inappropriate tools for nested observations. Instead, a multi-level approach (van Duijn, van Busschbach & Snijders, 1999; Wellman & Frank, 2001) accounts for the hierarchical structure of ego-network data and allows us to simultaneously examine effects at all levels.
Individualization As Driving Force Of Opinion Clustering In Social Networks

Maes, Michael; Flache, Andreas; Helbing, Dirk

Social Influence and Support
Social Influence, Agent Based Models, opinion dynamics

A persisting theoretical puzzle is the clustering of opinions in networks, particularly when opinions vary continuously, such as the degree to which citizens are in favor of or against a vaccination program. Existing continuous opinion formation models predict monoculture in the long run, unless the network consists of perfectly segregated subsets. Yet, social diversity is a robust empirical phenomenon, although perfect segregation is hardly possible in an increasingly connected world. Considering randomness did not overcome the theoretical shortcomings so far. Small perturbations of individual opinions trigger social influence cascades that inevitably lead to monoculture, while larger noise disrupts opinion clusters and results in rampant individualism without any social structure. Our solution of the puzzle builds on recent empirical research, combining the integrative tendencies of social influence with the disintegrative effects of individualization. A key element of the new computational model is an adaptive kind of noise. We conduct computer simulation experiments demonstrating that with this kind of noise a third phase besides individualism and monoculture becomes possible, characterized by the formation of metastable clusters with diversity between and consensus within clusters. When clusters are small, individualization tendencies are too weak to prohibit a fusion of clusters. When clusters grow too large, however, individualization increases in strength, which promotes their splitting. In summary, the new model can explain cultural clustering. Strikingly, model predictions are not only robust to noise, randomness is actually the central mechanism that sustains clustering.

Individuals Or Households As The Unit Of Analysis In Village Studies

Podkul, Timothy; Wojcik, Deborah; McCarty, Christopher

Collecting Network Data
THURS.AM1

Anthropologists are increasingly applying social network analysis in community studies where social position is thought to impact variables such as knowledge and access to resources. One methodological quandary in whole network community studies is whether the actors should be the households or the individuals within the households. In this presentation we will outline the circumstances where these different approaches are applicable and will illustrate the differences in outcomes using data collected in a village in Botswana.
**Industry Structure And Inter-firm Collaboration**

Bojanowski, Michal

Organizational Networks

Dynamic Network Analysis, Economic Networks, Inter-organizational Networks, Alliances, Exponential Random Graph Model

FRI.AM1

Firms engage in various types of collaborative relationships. The partnerships, in the form of inter-firm strategic alliances or joint ventures, are cases of cooperation between market players who, and the same time, might be fierce competitors. As many firms engage in such partnership agreements simultaneously all these collaborative linkages make up a network of relationships which spans the major parts of economic systems.

**Influence And Expertise In Digital Information Networks: An Examination Of Online News Distribution In Social Networks**

Weber, Matthew S.; Gilbert, Jeremy

Online Social Networks

Trust, Expert, Reputation, New Media Ecosystem, Social Media, Social Networks

THURS.AM1

Where should you get your news online? The New York Times? Or perhaps CatLover85? Today’s online information landscape is a complex network of authoritative organizations, influential individuals, and masses of intersecting user groups. This study examines online information networks and the effect of status and prestige on information distribution. Specifically, this research examines why certain contributions to an online information network are more likely than others to be trusted and redistributed by users, and in turn why certain information is likely to be retransmitted. Theoretically, this study is grounded in signaling theory, but also draws on previous work examining expertise and social capital in networks. Factors considered include the role of specific status cues such as title, role and organization. In addition, the context within which information is transmitted is considered through an analysis of the text associated with information. Data was collected over a two-week period from the micro-blogging platform Twitter.com. Researchers focused on a regional network of newspaper reporters, bloggers, and news enthusiasts in a major Midwest city, and examined the distribution and sharing of news stories by tracking the transmission of links. The results illustrate the critical role of status and reputation in determining what information users are likely to disseminate to their networks. Additionally, preliminary analysis shows that users are more likely to seek information from users who are perceived to be influential than from users who are perceived to be experts.
### Influences Of Return Migration On International Collaborative Research Networks

**Murakami, Yukiko**

**Academic and Scientific Networks**

**Scientific Networks, Migration, International Networks, Knowledge Transfer, Co-authorship Network, Collaboration Network**

Emigration of scientists facilitates the formation of international networks. However, are ties in such networks maintained after the scientists return to their respective home countries? This paper analyzes, using the data from the Web of Science, as to whether or not Japanese scientists returning from the U.S. maintain the collaborative research network ties that they formed during their stay in the U.S., and found some characteristics of the ties that are maintained. The physical distance between the U.S. and Japan can impede the transfer of tacit knowledge, which is important for research. Actually, approximately 90 percent of the ties, which were formed while the Japanese scientists were living in the U.S., were severed after they returned to Japan. However, social proximity can be a substitute for physical proximity. The ties that Japanese scientists formed with other Japanese scientists living in the U.S. are more likely to be maintained than the ties they formed with scientists of different ethnicities. The social proximity was also measured by past experience in collaborative research. The ties with collaborative research partners with whom the returnees more frequently published papers are more likely to be maintained. In addition, we found that other demographic features such as the type of organization one is working for and years of research experience and the field of research also affect the probability of maintaining ties across borders.

### Informal Networks And Organizational Performance: An Empirical Study

**Ding, Haijie; Rigby, Jacob; Lee, Jeremiah**

**Intra-O rganizational Networks and Job Performance**

**Trust, Centrality, Information Sharing, Team Performance, Social Network Analysis, Network Structure**

This paper investigates the empirical relationship between informal networks and organizational performance. We collected both social network data and organizational performance data from over 20 branches of one of the biggest multinational express delivery companies operating in China. Three informal networks were mapped using a web-based survey: information flow, positive energy flow and emotional trust. Four kinds of organizational performance indicators were collected after 6-months: financial performance, operational performance, customer satisfaction, and employee turnover. Analysis showed that: (1) Average branch in-degree, out-degree, eigenvector centrality, betweenness centrality and density of the information flow network showed significant correlation with all performance indicators. Positive energy flow and emotional trust network metrics showed a similar correlation to performance with the exception of financial indicators. (2) Branch E-I index showed a significant positive correlation with turnover rate on the emotional trust network. (3) Branch triadic ratio showed a significant correlation with customer satisfaction on all three networks. Both conceptual and practical implications will be discussed in the paper.
**Informal Status Hierarchies In Work Groups – Moving From Single To Multiple Individual Qualities**

Grow, André; Wittek, Rafael; Flache, Andreas

Simulation and Agent Based Models

Social Influence, agent-based modeling, Inequalities in attachment networks, Emergence, Status hierarchies

FRI.PM1

Informal status hierarchies in work groups receive increasing attention in organization research due to their impact on individual and group level outcomes. Informal status hierarchies are here conceptualized as inequalities in the attachment network in a group (i.e. individual differences in in-/outdegree). Current research on the emergence of such inequalities rests on two assumptions. First, individuals base their attachment decisions on a desirable quality of the target (e.g. research performance among academic university staff). Second, factors such as social influence can bias quality perceptions. Based on this, researchers made predictions about inequalities in attachment networks. Hitherto research focused on situations in which individuals possess one desirable quality. However, in many organizations individuals possess multiple desirable qualities (e.g. research and teaching performance among academic university staff). Our contribution is to integrate this aspect into theories of the formation of status hierarchies. To this end we introduce new assumptions about how individuals direct attachments to targets with multiple qualities. We elaborate our theory with an agent based computational model. In the model we assume that individuals possess multiple qualities of differential desirability. We examine the resulting status hierarchies and derive predictions about their emergence under varying conditions. One counterintuitive prediction of our model is that in groups with certain quality compositions it might not be the most desirable quality that leads to high individual status but a less desirable quality.

**Information Flows In Rural Botswana**

Wojcik, Deborah; Podkul, Timothy; McCarty, Christopher

Overlapping Personal Networks

SAT.AM1

Water and wildlife are natural resources of paramount importance in the Okavango Delta region of rural Botswana, where communication around these resources affect governance and conservation efforts. This research examines the hypothesis that network structure, community size and ethnicity can affect access to information and communication patterns within and beyond rural villages. We collected interview and personal network data from four villages of varying size, and overlapped the networks within each village to construct whole networks. These whole networks were compared and used to construct a sample for further investigation of network structural effects on individual cognition. We will focus our discussion on the process, advantages and challenges of creating whole networks from personal networks.
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<th>Innovation Through Imitation</th>
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<td>Gladstone, Eric; Brashears, Matthew E.</td>
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**Innovation, Diffusion, and the Adoption of Technology**

**Diffusion, Innovation, Cognitive Networks, Creativity**

**THURS.PM1**

Current explanations for innovation largely rest on the assumption that humans attempt to differentiate themselves from one another. Yet sixty years of research strongly suggests that humans exhibit an overwhelmingly tendency to conform. We attempt to reconcile these two competing perspectives by setting forth an “innovation by imitation” account of innovation. We propose an error accumulation and information mutation model of innovation which rests on 1) the human tendency to conform, and 2) the human inability to always accurately receive and transmit information. The attempt to be like one another ultimately results in innovation as actors accidently create new information flows. We propose that this information mutation hypothesis has predictable consequences in differing types of information networks. We argue that certain types of networks will either promote or retard information mutation and innovation. Paradoxically, we also submit that the very same types of networks that prohibit mutation will, at some threshold, actually promote information mutation. Through computer simulations and laboratory/online experiments, our goal is to be able to predict the likelihoods of innovation within a given network structure, and to predict the likelihood that a given agent may innovate or receive corrupted information.
Identification of the benefits of green roofs and walls have largely focused on their engineering functions such as storm water retention, climate mitigation, and/or the aesthetic value of their plant life. By incorporating an understanding of ecological processes into the design and construction of green roofs and walls, the provision of habitats and/or foraging grounds for pollinators, seed dispersers, or particular red-listed species is also possible. Taken individually, such habitats and foraging grounds would be isolated habitats, at risk for population extinction. However, a network of green roofs and walls, designed with an ecological understanding of species movements in and between fragmented habitats, could maintain viable species populations providing expanded ecosystem services in a wider urban landscape, especially when existing surrounding ground level habitats and foraging areas are incorporated into this ecological network. By further incorporating social networks - active citizen involvement and management - in the use and maintenance of this fragmented ecological network, additional ecosystem services connected with educational, social, cultural, recreational, and health benefits are also possible. These linked social-ecological networks would be an inherent part of a larger green infrastructure that could for example enhance urban resilience by providing increased capacity for climate change mitigation. The provision of these expanded greenER roof and wall ecosystem services can be studied by examining the interaction of user and management social networks with the ecological networks on which they impinge, and vice-versa, as integrated social-ecological networks. Such work builds upon studies that have begun to use a network perspective in understanding the resilience of social-ecological systems as well as a particular study sketching a typology of four approaches to integrated social-ecological network analysis: (1) Analytical integration of separately examined social and ecological networks; (2) Analysis of the social network with ecological elements as node attributes, or vice versa; (3) Integrated social-ecological network analysis removing social and ecological distinctions between network nodes and flows between nodes; and (4) Translating interactions between social and ecological entities into two-mode networks, possibly complemented by one-mode social and/or ecological networks. Possible use of these four approaches in analyzing a hypothetical social-ecological network of users and species-inhabited green roofs, walls, at a planned Albano campus in the Stockholm University area is examined.
**Interplay Between Individual And Group Structure In Networks**

Reichardt, Joerg; Alamiño, Roberto; Saad, David

Analyzing Network Data

Bayesian Methods, Block Model Analysis, Sports Participation, Community Detection, Analytical Methods, Equilibrium

FRI.PM1

Network structure is the result of a complex interplay between latent and observed characteristics at the level of both individual nodes as well as groups of nodes. However, when inferring latent group structure using stochastic a-posteriori block models, the expansiveness and attractiveness of individual nodes have generally been excluded from such models. We present a computationally efficient Bayesian framework for inferring stochastic block structure in networks that includes the estimation of node specific expansiveness and attractiveness parameters as well as block specific reciprocity. This corresponds to a-posteriori block modeling in a dyadic exponential random graph model (ERGM), also known as p1-model. We show that neglecting individual expansiveness and attractiveness when inferring block structure may lead to wrong assignments of nodes into classes and hence wrong conclusions about the block structure in the graph. Further, we show that inferring latent block structure and block specific reciprocities may allow for an accurate representation of the triad census in networks, while still using a computationally simple dyadic model. Our approach applies to undirected, directed as well as bi-partite networks.

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**Interprofessional Relationships Among Biomedical And Complementary/alternative Practitioners**

Wellman, Beverly; Kelner, Merrijoy

Qualitative and Mixed Method Network studies

Mixed Methods, Healthcare Networks, Collaboration Network, Interprofessional Collaboration

THURS.AM2

Working in collaborative teams requires a blurring of professional boundaries, new role definitions, and sharing of professional knowledge, skills and power. One instance of interprofessional collaboration that is currently receiving attention is integrative health care, a combination of biomedical care and complementary and alternative medicine. This study traces the perspectives and experiences of health care practitioners working at two different integrative health care centres as they strive to adapt their professional identities and practices to working in collaborative interprofessional teams. We asked about their motivations for working in a team setting, whether there are formal mechanisms to enhance collaboration, the nature of their everyday interactions with other practitioners, and whether they feel that they operate as part of a team or on their own. We analyze how professionals adapt to an environment that is counter to the unique ways they have been socialized, and to observe how they relate to each other and share patient information as team members under one physical and organizational roof. We interviewed all the practitioners at each of the two centres. We are continuing to attend staff meetings as well as sitting in the waiting rooms observing. Initial findings and reviews of the literature suggest that collaboration is more than co-location. Without formal structures and strong leadership guiding the team towards collaboration and communication, achieving it is unrealistic.
**Intra-organizational Social Networks Influence On Employees Attitudes Towards Corporate Social Responsibility In Small And Medium-sized Enterprises**

Hernandez, Rene; Hernandez, Norma

Organizational Networks

Social Network Analysis, Corporate Social Responsibility, Small and Medium-sized Enterprise

SAT.AM1

This study emerges from the interest in two fields where little research has been done: Corporate Social Responsibility (CSR) in Small and Medium-sized Enterprises (SMEs) in emerging economies and the relationship between intra-organizational social networks and attitudes towards CSR. Existing literature claims that attitudes towards CSR in these times are important for businesses in developed economies where regulations, customers, and other stakeholders give attention to environmental and social concerns as well as to the economic ones. Nevertheless, the case of emerging economies and SMEs has been studied to a lower extent. A study case was carried out in a manufacturing medium-sized enterprise in Mexico to analyze the influence of personal contacts on attitudes of the employees towards CSR and environmental issues. The findings of the study suggest that interpersonal and interdepartmental relationships inside of the firm have a significant impact on the attitude of the employees towards CSR. Implications for strategic management are drawn from the study. Especially on the importance of understanding and taking advantage of intra-organizational networks when implementing CSR practices. Further research should be carried out in order to strengthen or refute the findings of this case study.

**Invisible Networks**

Rodriguez, Jose A.

Organizations and Networks

Inter-organizational Networks, Intra-organizational Networks, Covert

SUN.AM2

Looking at what is not visible we discover half of the social reality. Invisible relations and invisible actors make up a social reality that tell us stories as interesting and valuable as those coming from the visible reality. Thanks to serendipity the study of the visible casts light on the path to the invisible. This paper reveals, looks at, and analyzes three types of non-visible networks: invisible, in the shadows, and non-existing. Invisible networks emerge from apparently non-existing relations. In this case we analyze relations between corporations created outside the inter-corporative field by invisible actors (non-interlockers). They lead us towards invisible power. The analysis of terrorist networks points to networks in the shadows, networks of indirect relations offering fast and non-visible communication among actors. It helps us to understand action in the shadows. The study of networks in a Buddhist monastery pushes us to look at emptiness. Emptiness is the non-existing system of relations. Life is also what is not. Non-existing networks unveil the relational potential in emptiness. And, just as looking at the dark side of the moon, this sight provides a new dimension to the visible.
Stress and burnout has become an increasingly significant problem for the individual, organizations and society as a whole and the economic loss due to stress-related absenteeism alone are astronomical. Prior research on stress has almost exclusively focused on the individual and/or work-related factors as explanatory variables, but never research has drawn on areas such as social-psychology, sociology and anthropology. This allows for a more integrated approach highlighting the collective aspects of stress symptoms, perceived stress, and coping mechanisms. By applying social network analysis (SNA) and a theoretical contribution from the areas of communication networks and social support in the workplace we present a model for the complex interplay between network position and stress. One particularly interesting issue is the causality, since it can be argued convincingly that there are both effects of network position on stress levels and vice versa. Therefore we’ve designed a longitudinal case study of one large department of a Danish pharmaceutical company using both a series of SNA questionnaires with a comprehensive set of stress questions and a series of interviews. Besides the purely academic interest there are obvious managerial implications in gaining a more nuanced insight into what causes stress and how it might possibly spread or be mediated by social factors that are at least partially within their powers to change.
Focus of this research is the interplay between knowledge diffusion and social collaboration structures. Contribution to the field is three fold. First, it elaborates on mutuality of knowledge and social structure theory borrowed from sociology of knowledge literature, where knowledge is perceived as an essentially social and societal category. Second, it develops a coherent research framework which relates cognitive structure and the collaboration patterns into an integrated socio-knowledge analysis of a given scientific community. The framework combines and extends meta-network perspective and co-word analysis. It is enhanced by introducing a novel model. The new model maps actors from co-authorship networks into a strategic diagram of scientists. The mapping is based on cohesiveness and pervasiveness of issues each author has published in the field. Third, it adopts a longitudinal approach to trace knowledge diffusion within peculiarity of a national level socio-knowledge system identifying (i) mechanism of knowledge diffusion within the community, (ii) interplay in between scientists socio-knowledge structures and their research strategies, (iii) axes of fragmentation in the community, and (iv) their evolutions over time. The exemplary longitudinal case from Turkey covers scientific publication activities in Turkish management academia spanning the years from 1922 until 2008. Amongst other findings, it is seen that management knowledge within local community is transferred following patterns of information diffusion rather than patterns of knowledge diffusion found elsewhere at cognitively demanding areas. On the other hand, publishing in citation indexed international journals reveals formation of cohesive team structures as a mean of collaborative knowledge production and transfer. Besides, while within local community diffusion of management knowledge is lead by academicians with certain socio-knowledge properties, academicians publishing at international arena do not show any significantly differing socio-cognitive properties, instead, they are merely embedded in strongly connected groups. Leading academicians within local community, however, exhibit a common cognitive structure relative to the rest of the community. They have more social ties and more diversified knowledge compared to the rest. Knowledge they have is distinct compared to their peers in the network, they hold certain part of their knowledge exclusively, thus knowledge-wise they don’t resemble the rest, but they keep a level of common knowledge with the rest of the community. Empirical findings of exemplary case are in align with theoretical discussions of the research. They provide new perspectives within body of relevant literature and points the potential of proposed research framework to be employed for future studies. The in depth analyses on the exemplary case are demonstrated with a rigorous set of computationally supported descriptive and visual tools, which are adopted or developed for this research.
### Knowledge Sharing In Non-knowledge Intensive Organizations: When Social Networks Do Not Matter

**Koppius, Otto R.**

**Organizational Networks**

**Knowledge Networks, Intra-organizational Networks, Knowledge Transfer, Non-knowledge Intensive Organizations**

**SAT.PM1**

Considerable attention has been paid to the network determinants of knowledge sharing. However, most, if not all, of the studies investigating the determinants of knowledge sharing are either focused on knowledge-intensive organizations such as consultancy firms or R&D organizations, or knowledge workers in regular organizations, while lesser knowledge intensive organizations or non-knowledge workers are rarely explored. This is a gap in the literature on social networks and knowledge sharing. In this paper, the relations between network determinants and actor determinants of knowledge sharing are empirically tested by means of a network survey in a less knowledge intensive organization, specifically two separate stores of a Dutch department store chain. The results show that individual-level variables such as organizational commitment, departmental commitment and enjoyment in helping others are the major determinants of individuals’ knowledge sharing behavior, but none of the social network variables play a role. The results thus present an important boundary condition to social networks effects on knowledge sharing: social networks only seem to play a role in knowledge sharing for knowledge workers, not for blue-collar workers.

### Leadership And Brokerage In Decision Simulation Experiments

**Christopoulos, Dimitrios**

**Leadership Networks**

**Leadership, Evolution, Political Networks, Experiments, Decision-making Structures, Simulation Game**

**SAT.PM1**

Leadership roles are assumed determined by decisional power, most typically related to the hierarchical positions of agents. I examine here the conditions under which the position of agents in social structure affects their leadership reputation. Leadership behaviour is seen in this context to be the outcome of the combined effect of the psychological predispositions of agents, their initial power endowment and their structural advantage versus other agents. There is an attempt here to combine leadership as agency with leaders as agents. A number of hypotheses are tested via an empirical case study where the evolution of the interaction and influence networks across multiple decision events is combined with attribute, reputational and psychometric data of the actors. A decision simulation game provides a quasi-experimental setting for exploring the effects of variegated distributions of power and their social networks on actor effectiveness at coalition formation, reputation and trust within the network. A number of the prominent brokerage assumptions (Burt, Lin) are comparatively explored in this context.
**Leadership Behavior, Network Centrality, And Innovation:**

Moolenaar, Nienke M.; Daly, Alan J.; Sleegers, Peter J.

Leadership Networks

Intra-organizational Networks, Centrality, Leadership, Multilevel Analysis, Advice Network, Innovation

SAT.PM1

Leadership is one of the most examined concepts in the social science literature. Scholars that examine leadership are increasingly recognizing the importance of social processes and relational linkages involved in leading. Leadership in its broadest sense has often been conceptualized as a process of influence toward an outcome. Social relationships therefore may provide leaders with the necessary infrastructure to exert social influence in achieving individual and organizational goals. This study aimed to investigate the interplay between school leaders’ positions in their schools’ social networks and their leadership behavior, and its impact on schools’ innovative climate. The study was conducted among 702 teachers and 51 principals in 51 elementary schools in a large educational system in the Netherlands. Using social network analysis, multilevel analysis, and network visualizations, we analyzed a survey with social network questions on work related and personal advice and Likert-type scales for transformational leadership and innovative climate. Findings indicated that leadership behavior and principals’ social network position (in terms of degree, closeness, and betweenness centrality) was predictive of schools’ innovative climate. The more principals were sought for professional and personal advice, and the more closely connected they were to their teachers, the more willing teachers were to invest in change and the creation of new knowledge and practices. Moreover, work related closeness centrality was found to mediate the relationship between transformational leadership and innovative climate. Theoretical and practical implications are discussed.

**Linking Social Networks And Agroecology Management For Information Diffusion**

Isaac, Marney E.; Dawoe, Evans

Communication Networks

Communication Networks, Natural Resource Management, Ego-centered Networks, Advice Network, Agriculture, Integrated Social-ecological Network Analysis

FRI.PM1

The implementation of sustainable agricultural systems has become of increasing interest, and of particular importance is the distribution of information on agrodiversity management. Accordingly, we investigated producer-to-producer and producer-to-rural institution networks in Ghana to determine structural features of agrarian communication networks. Individual network metrics (density scores) were correlated to management employing agrodiversity (species richness) as an estimate of management. This was done to establish some measures between network structural characteristics and sustainable agrarian management. Pooled data from two regions of Ghana showed a negative relationship between individual network density (excluding institutions) and the number of reported species ($r = 0.35$). This suggests that increasing ties between community members did not forecast adoption of agrodiversity. Regardless of weak or strong institutional support, higher reporting of agrodiversity occurred from individuals with relatively low-density ego-networks. This suggests a higher adoption frequency with fewer informal ties, particularly among alters. It is possible that with increasing ties, information becomes redundant or even conflicting. Information excess may lead to information homogenization and thus declining sustainable resource use. Characterization of emerging network structure will play a critical role in the transfer of sustainable agriculture.
### Link-trace Sampling For Social Networks: Advances And Applications

Kurant, Maciej; Gjoka, Minas; Butts, Carter T.; Markopoulou, Athina

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<td>Statistical Methods, Respondent-driven Sampling, Online Networks, link-trace sampling, random walks</td>
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**THURS.PM1**

Link-trace sampling methods, in which units are selected by iteratively following ties from currently selected units to other members of a target population (e.g., random walk sampling), are of increasing importance for researchers in a variety of fields. Although link-trace methods are powerful tools for sampling hidden or hard-to-reach populations, using them in a principled manner poses many challenges. Among these are (i) problems of assessing convergence (i.e., determining whether the tracing process is sufficiently close to the target distribution to cease sampling), (ii) sampling from populations where no one-relationship network is sufficiently well-connected to permit convergence, and (iii) accelerating convergence in settings where simple procedures are inefficient. Here, we present practical methods for addressing each of these problems, drawing on ideas from the literature on Markov Chain Monte Carlo simulation and survey sampling. We demonstrate the efficacy of our techniques via application to several large online social networks, as well as simulation studies. Some implications for approaches such as respondent-driven sampling are also discussed.

### Local And Global Diversity In Networks And Systemic Performance

Lazer, David; Gomez, Charles

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<th>Agent-Based Models and Multi-Agent Systems</th>
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<td>Network Dynamics, Problem Solving, Organization Theory, Agent Based Models, Exploration Versus Exploitation</td>
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**FRI.PM2**

The relationship between diversity and group problem solving has received substantial scholarly attention, often with the conclusion that diversity assists in more thorough examination of potential solutions, with superior performance (e.g. Page). Is it better for individuals with different perspectives to be mixed together, allowing for the emergence of synergies among approaches? Far less attention has been paid to the impact of the distribution of a given level of diversity within a system. In other words, for a given level of global diversity, how much local diversity is desirable? Our analysis suggests a complex answer. We distinguish between three types of diversity: capacity, scope and foresight. Diversity in capacity refers to differences in capacity of agents to explore possible solutions. Diversity in scope distinguishes agents in their capacity to explore a much broader search field at each starting point. Diversity in foresight allows agents to explore all possible solutions at any given starting point using their limited search capabilities. We find that with respect to capacity and to foresight, preserving local diversity is unambiguously best at all time scales. Local diversity enhances the system’s ability to see alternate pathways from any solutions in the network. However, the benefits of preserving local scope diversity are unclear.
## Local Cities, Global Influence: An Inquiry Into The Relationship Between The Global City And Its Region

Mendelsohn, S. J.

**Geographic and Social Space**

Economic Networks, Globalisation, Geo-location Networks, Transportation Networks, Urban Space

**WED.PM2**

What makes a global city? Some scholars have argued that global cities occupy structurally advantageous positions within the global network, while others have focused on special processes that occur between the city and its region, imbuing the city with distinctive global strengths. I contend that there is an under-examined tension between these two proposed mechanisms -- one posits that regions are very relevant to the success of the global city, while the other implies that regions become irrelevant as the city comes to depend on the global system. Here, I examine this latent incongruity from a network standpoint, using air-traffic patterns to uncover the kinds of city-region relationships that distinctively characterize global cities. My findings suggest that, compared to other cities, global cities have stronger intra-regional ties, relative to their inter-regional ties. This favors theories that posit that the region remains relevant to the global city, because global cities have stronger (not weaker) regional ties than other cities. This relationship is robust, remaining consistent and statistically significant under a variety of conditions.

## Local Convergence And Global Diversity: From Interpersonal To Social influence

Flache, Andreas; Macy, Michael

**Simulation and Agent Based Models**

Simulation, Homophily, Social Influence, Dynamic Networks, Agent Based Models, Polarization

**FRI.PM1**

How can minority cultures resist assimilation in an increasingly “small world”? Paradoxically, Axelrod found that local convergence can actually preserve global diversity if cultural influence is combined with network homophily, the principle that “likes attract.” However, follow-up studies showed that this diversity collapses under random cultural perturbation. We discovered the source of this fragility – the assumption in Axelrod’s model that network influence is interpersonal (dyadic). We replicated previous models but with the more empirically plausible assumption that influence is social – people can be influenced by several network neighbors at the same time. Computational experiments show that cultural diversity then becomes much more robust than in Axelrod’s original model or in published variations that included either social influence or homophily but not both. We conclude that global diversity may be sustained not by cultural experimentation and innovation but by the ability of cultural groups to discourage those activities in dynamic networks.
**Lotico The Semantic Social Network**

Neumann, Marco

Organizational Networks

Scientific Networks, Semantic Networks, Social Networks, Online Networks

SUN.AM1

A Semantic Social Network (SSN) is a new product category that combines features of online social networking sites with Semantic Web technologies to maximize data fidelity and data reusability across heterogeneous social networking products. With the increasing number of online networking sites and social media content offerings propriety data formats become a road block for efficient data management and transfer across community boundaries. Centralized services and API based data exchange are a temporary fix to tackle this issue but do not address the challenge of data mobility that we already face with the growing data deluge on the world wide web. In a Semantic Social Network the business logic of social practice become first class objects, uniquely identifiable on the web and maybe most importantly relationships between objects become first class objects as well, and thereby are now negotiable amongst users and will allow for entirely new services on the web. In this presentation we will take a look at Lotico a Semantic Social Network with more than 15000 members worldwide that share a common interest in the Semantic Web. Lotico’s core platform is powered with semantic technologies, that now enable Lotico to publish its content in form of Linked Open Data to the public web. In addition to the core platform Lotico augments existing social networking and community sites such as meetup.com, mediawiki and facebook to allow members to utilize Lotico resources across heterogeneous community platforms, to find content and to connect people across sites.

**(Love)birds Of A Feather: Online Dating And Homophily Preference In Romantic Relationships**

Blackwell, Derek R.

Qualitative and Mixed Method Network studies

Qualitative Approaches, Homophily, Online Dating

FRI.AM1

As a growing number of singles are taking their search for partners to the Web, the question arises of how this new dating forum could potentially influence the mate-selection process. This study explores how online dating as a method of relationship-initiation might affect tendencies for homophily within romantic relationships. Through in-depth interviews with adult Internet users who have experience in both online and offline dating methods (N = 28), this research attempts to: (1) identify patterns of homophily within online-initiated and offline-initiated romantic relationships, (2) describe the social processes driving homophily in romantic relationships, and (3) determine whether or not the online medium influences an individual’s cognitive approach to choosing a romantic partner (i.e. which characteristics are viewed as most important in a potential partner). As respondents described their experiences, common themes included (1) a more rational and strategic approach when seeking partners online, which often included increased selectivity; (2) a heightened awareness of commonalities in the online dating realm, which shaped likelihood of initial interaction; and (3) an excessive number of partner choices on most dating sites that prompted users to seek ways of narrowing the dating pool. These findings coupled with previous research on homophily preference suggest the possibility that, over time, online dating may lead to increased homophily in romantic relationships.
Macrostructure From Survey Data: Generating Whole Systems From Ego Networks

Smith, Jeffrey A.

Analyzing Network Data

Sampling, Exponential Random Graph Models, Simulation, Ego-centered Networks

SAT.PM1

This paper presents a new method to make global network inference from sampled data. The proposed simulation method takes ego network, or local level, data and uses Exponential Random Graph Models (ERGM) to construct the full (unknown) network from which the ego networks were sampled. After describing the method, I present two validity checks using known, empirical networks: the first uses the 20 largest Add Health networks while the second uses the Sociology Coauthorship network in the 1990's. For each test, I take random ego network samples from the known networks and use my method to make global network inference. I find that my method successfully uses ego network data to reproduce the properties of the known networks, such as distance and main component size. The results also suggest that simpler, baseline models provide considerably worse estimates for most network properties.

Management Systems And The Social Capital Of Knowledge Workers In Virtual Environments

Biseda, Marlene A.

Social Capital

Organizations, Social Capital, Virtual Environments, Management Systems, theory-building

FRI.AM1

Working in geographically dispersed organizations is increasingly becoming the reality for knowledge workers. Working virtually can provide a sense of autonomy, but also a sense of isolation. Similarly, managers have additional challenges when they and their employees are not co-located, especially when they must integrate new employees into the firm. Managers spend time and resources to develop systems that replace the informal meetings and discussions that happen naturally in traditional offices. The resultant infrastructure is expected to enable virtual employees to develop relationships with other members of the organization. This paper examines how knowledge workers develop a network of relationships during their initial years in geographically dispersed firms. It assesses effectiveness of the organizational infrastructure (the roles, processes, and information technology) in place to enable the building of social capital in the virtual environment. Three cases were studied: auditors in a regional practice of a Big Four accounting firm, project managers in the professional services practice of a global technology company, and executive managers in a business unit of a global manufacturing company. 42 participants were interviewed about the use and perceived value of the organizational infrastructure to develop relationships. The quantitative assessment and key drivers of value are presented. Similarities across cases and differences based on firm context are discussed.
### Mapping Networks: Spatial Visualizations Of Global Commodity Flows 1980-2009

**Nag, Manish**

Geographic and Social Space

Visualization, Globalisation, Geography

**WED.PM2**

Sociologists from the time of Simmel have noted the power of space in determining the form and content of social relations. Space has also been acknowledged as a key factor in determining the form and content of social networks, exemplified by McPherson and Smith-Lovin’s discussion of "geographical propinquity" and homophily. Though social network analysis has long used graphs to visualize actors and ties, the state of the art in network graphs does not integrate a sense of space. This paper seeks to intersect space and social networks by providing a new method for mapping network data over geographic space. Benefits to this approach are shown, particularly in the area of longitudinal visualizations of network data. In addition, a new website will be demonstrated that allows users to interactively create network maps using a new dataset of global commodity flows from 1980 to 2009. The website provides a tool for researchers and students to investigate the flows of individual commodities, bundles of commodities, and total trade between nations over time. The tool provides immediate benefits to scholars of globalization, world systems, development, and trade inequality.

### Mapping Schemas With Qualitative Data

**Rackin, Heather M.**

Qualitative and Mixed Method Network studies

**SUN.AM1**

Network text analysis techniques are explicitly relational, i.e. words have no meaning except in relation to other words. These methods connect words used in the same document or paragraph, which builds a map of interconnected concepts. Clusters of concepts that are often spoken together signal schemas. Here, I extend such techniques to the much richer, though empirically more complicated, free-form settings of real life captured in ethnographic transcripts. I compare meanings of family derived from ethnographic transcripts of low income women with and without children to examine how life course transitions affect schematic structures.
### Mapping The Structure Of The Hookah Community In A College Town

**Smith, Thalia V.; Barnett, Tracey E.; McCarty, Christopher**

**Overlapping Personal Networks**

Adolescents, Social Networks, Behavioral Networks, Interview, Egonet, Tobacco

SAT.AM1

Hookah use is a growing public health concern on college campuses nationwide. This study was conducted to first assess the prevalence of hookah use on the University of Florida campus. Once prevalence was established, a social network analysis was conducted of students who indicated current hookah use to understand the social situations in which this product is used. Utilizing a face-to-face intercept survey, 1,203 students were surveyed on the University of Florida campus. Of those surveyed, 131 (10.9%) reported smoking hookah in the past 30 days. During the second phase of the study, 74 (56.5%) of the hookah smokers were recruited to complete a 45 item alter Egonet interview. Among the name interpreters were whether the alter smoked hookah. The 74 personal network interviews were merged by name and the respondent was added as an alter. By constraining the resulting whole network to hookah smokers, we created a map of the hookah community in Gainesville. We will present this map along with an analysis of the community structure and the accuracy of this approach.

### Mapping Vancouver’s Biomedical Innovation Network

**Lander, Bryn**

**Academic and Scientific Networks**

Bibliometrics, Scientific Networks, Innovation Networks, R&D, Co-authorship Network, biomedicine

THURS.PM1

Using the biomedical subfield of immunology as a case study, this presentation will explore how scientists and clinicians based in Metro Vancouver collaborate, the degree to which these collaborations are local or global, and map local collaborations onto organisational structures such as hospitals, hospital based research institutes, universities, and firms. Previous research has found that both local and global contexts are important for knowledge translation. Information sharing and communication occurs through the ‘local buzz’ of face to face contact and co-location while ‘global pipelines’ often introduce key information into a local context. Comparing local and global collaboration rates will help to determine the relative importance of these collaborations while mapping local collaborations onto organisations will determine the degree of inter organisational collaborations within Metro Vancouver. This analysis of Vancouver’s immunology community will be conducted through a bibliometric social network analysis using co-authorship in journal articles to represent collaboration, map collaborations between individuals and organizations and trace knowledge flows. Articles published in immunology journals where “Vancouver, BC” appears in the address line of at least one author between 2004 and 2009 will be extracted from the Thomson Scientific Institute for Information. Author addresses will identify links between organizations and will be classified as ‘local’ if Vancouver based, ‘national’ if from another Canadian location, and ‘global’ if from another country. Through this analysis, I seek to better understand collaborations between clinicians and scientists, hospitals, universities, and firms as well as the relative importance of global and local collaborations in immunology.
### Markets Or Networks: Rural Households' Borrowing Choices In Western China

Zhang, Yanlong

Networks and Economics
Social Capital, Culture, Markets, Network Composition, China, Household Financial Decision

FRI.PM2

Borrowing is a common yet important household financial behavior for families in developing countries. This paper employs Hechman’s selection model, and uses a Chinese household survey data to explore how social network structure and socioeconomic status condition households’ choices between within-network borrowing and market borrowing. The paper finds that network size and share of weak ties positively affect one’s search embeddedness, which facilitates information search and flow. Moreover, having contacts from key state agencies enables one to utilize the contacts' social influence to acquire loans. In addition, the share of urban contacts has both a positive direct effect and negative indirect effects (through other network features) on within-network borrowing. The paper also finds that high SES families are more likely to borrow from markets, because they have more financial knowledge, higher affordability for market goods, and higher capacities to repay loans. It is also due to the fact that the types and quantities of financial needs are different between high and low SES families. On the one hand, the quantity of network resources is usually limited as compare to market resources. Since high SES families usually borrow more, their high demands are more likely to be satisfied by market resources. On the other hand, lending to those who are in substantive needs is more likely to be considered as a social obligation than lending to investors. Therefore, it is more appropriate for high SES families to seek market resources for investment purposes.

### Mate Choice In An Online Dating Site

Lewis, Kevin

Online Social Networks
Exponential Random Graph Models, Homophily, Online Dating

FRI.AM1

Due to limitations in available data as well as difficulties inherent to the study of mate choice, previous research on romantic relationship formation has had difficulty disentangling the role of individual preferences from the constraints imposed by opportunity structure. Using data from a popular online dating site, combined with advances in exponential random graph modeling, I examine the contribution of multiple dimensions of individual preferences to observed patterns of interaction. This research not only represents a methodological improvement over past studies of mate choice; but findings have growing practical significance as more and more singles rely on online dating as a primary means of meeting and mating today.
Matrix Permutation Tests For Two-mode Data
Jasny, Lorien
2-Mode Networks
Two-mode Data, Statistical Methods, Political Networks
SAT.AM1
Social network analysis has a long history of using permutation tests, a well-known being the QAP test, and an equally long history of employing two-mode data structures. The current conventional wisdom concerning the QAP test is that it can only be performed on a one-mode projection in the case of two-mode data. The falseness of this condition is glaring given that two-mode data was analyzed in Hubert’s own work introducing the QAP, however this fact has received relatively little attention. In this paper, I show how the hypotheses of the QAP test can be applied to two-mode data structures and how the different data structure changes the nature of the reference distributions. I use examples from the political networks literature to show how applying the traditional QAP test to a one-mode projection would give different answers to hypotheses than a permutation test on the two-mode structure.

Me And You And Everyone We Gossip About: Social Network Analyses Of Gossip Triads
Ellwardt, Lea; van Duijn, Marijtte; Wittek, Rafael
Organizational Networks
Triads, Gossip, Friendship Ties, Organizational Behavior
SAT.AM1
Gossip, broadly defined as talking about absent others, receives increasing attention in recent theories of cooperation. Most of these theories focus on the positive or negative effects of gossip for the group, or the individual senders, receivers and targets in the gossip triad. Not much is known about the social network conditions favoring or inhibiting positive and negative gossip, nor do we dispose of the appropriate statistical models that would allow us to take into account the relationships between all three actors of a gossip triad. The present model argues that closed triads, in which all actors share a friendship tie, breed positive gossip. Negative gossip flourishes in coalition triads, where sender and receiver share a friendship tie with each other, but not with the object. The statistical model consists of a logistic regression model with three correlated random effects for ego, alter, and object. To test these predictions, three-way data on a complete gossip network have been collected among employees in a Dutch child-care organization (N=36). First, main effects of friendship on gossip are tested for every dyad in the triad (e.g., whether friendship with receivers increases sending positive gossip). Second, interactions between two dyads are examined (e.g., whether friendship with receivers and objects increases sending positive gossip). Third, interactions between all dyads are tested (e.g., whether friendship with receivers and objects, and friendship between receivers and objects increases sending positive gossip). Preliminary results show indeed differences between positive and negative gossip and differential triadic friendship effects.
Measurement Error In Network Analysis: The Effects Of Missing, Spurious, And Aggregated Data
Wang, Dan J.; Shi, Xiaolin; McFarland, Daniel A.; Leskovec, Jure

Analyzing Network Data / Blockmodeling

Methods, Centrality, Missing Data
SAT.AM2

We embed missing data in a broader classification of measurement error scenarios. In addition to missing data, which we term "false negative nodes and edges", we analyze the consequences of "false positive nodes and edges", and "falsely aggregated and disaggregated nodes". We simulate these six measurement errors in an online social network and a publication citation network, reporting their effects on four node-level measures--degree centrality, clustering coefficient, network constraint, and eigenvector centrality. Our results suggest that in networks with more positively-skewed degree distributions and higher average clustering, these measures tend to be less resistant to most forms of measurement error. In addition, we argue that the sensitivity of a given measure to an error scenario depends on the nature of the measure's calculation. Thus, we revise the claim that the more 'global' a measure, the less resistant it is to measurement error. We find that clustering coefficient and network constraint are, in general, the least resistant of our four measures even though they are less 'global' measures than eigenvector centrality. Finally, we anchor our discussion to examples of past network research that likely suffer from these different forms of measurement error while making recommendations for error correction strategies.

Meeting In Settings, Mating In Networks: Stochastic Actor-oriented Models For Large Network Dynamics
Preciado, Paulina; Snijders, Tom A.; Losinno, Joshua A.

Network Dynamics
Incomplete information, Settings, Meeting and mating, Stochastic Actor- Oriented Models, Large network dynamics
THURS.PM1

Stochastic Actor-Oriented Models (SAOM; Snijders, 2001), provide a flexible and rich framework for analysing social network dynamics. These models assume that actors have full information about the network and about the other actors. For large networks the assumption of full information is often not realistic. In this paper we extend the SAOM by proposing that social actors are embedded in settings (Feld, 1981; Pattison & Robins, 2002) in which they have different levels of information about the network and the other actors. In their primary setting, which includes their direct network neighbourhood, actors have full information about the other actors and the ties between them, and the usual SAOM specification operates. Besides, actors can have meeting settings in which a two-step process takes place: at a given moment, a particular actor i randomly meets another actor j (“meeting”), and acquires information that probabilistically determines the creation of a tie (mating). Examples of meeting settings are institutions (schools, work places), neighbourhoods and the residual category of the rest of the network. We compare the standard SAOM, with the extended settings specification using a three-wave friendship network of all adolescents in an age cohort living in a small Swedish town. Computing time for large networks is reduced by the new modelling framework.
### Merging Meta-networks: Exploring Organizational Network Integration

**Frantz, Terrill L.**

Organizations and Networks

Organizations, Dynamic Network Analysis, Mergers And Acquisitions

SUN.AM2

This paper presents an overall discussion of the phenomenon of sovereign organizational networks (meta-networks) merging. Business organizations often merge, or form alliances, that are essentially a “network event” that is complex and needs to be studied, understood and often managed. This paper presents a general assessment of the challenge for researcher and managers alike about the event dynamics and the new, post-merger singularity. The paper puts forth a taxonomy to facilitate the advancement of investigation into this marvel of organizational behavior. This discussion is grounded and based within the concept of Computational Organization Theory (COT) and Dynamics Network Analysis (DNA), and advances ideas in both fields as well.

### Mexican Interlocking Directors: Kinship And Educational Background Factors To Understand Dyadic Relationships In Board Appointments

**Rocha, Jorge M.**

Business & Entrepreneurial Networks

Corporate Elites, Kinship, Interlocked Directors

THURS.PM2

The relationships that are formed between individuals as a result of their multiple corporate board affiliations have attracted the attention of social researchers for close to a century. Explanations as to the functional nature of these social structures range from those emphasizing their economic benefits as more or less cost efficient monitoring bodies that oversee the functioning of firms, to those which emphasize their socio-political roles as class-based coalitions seeking to further their interests within capitalist economies in which there is –at least 'de jure'—a separation between ownership and control. Working with the information of all Mexican companies that traded in the country’s stock market in 2004, the research reported focuses on how well demographic, educational, familiar/kin based, and professional history factors help explain the presence of dyadic ties between the 261 individuals who by their affiliations to more than one corporate board create the interlocking directorate network that links all the country’s firm’s in a single network. The results show that both similar educational background and kinship relationships are important factors in explaining the configuration of multiple board affiliations.
Micro-mobilization In A Scientific/intellectual Movement: The Case Of Recovery In Mental Health Services Research
McCranie, Ann L.
Networks, Collective Action and Social Movements
Scientific Networks, Mental Health Services, Academic Networks, Mental Health, Social Movement Theory, Co-authorship Network
THURS.AM1

The scientific/intellectual movement (Frickel and Gross 2005) of research and promotion of "recovery" in/from mental illness has grown in prominence in the mental health services research field in the past 20 years. The network of behavioral researchers who have worked to both promote and harness this concept has grown dramatically, as has the academic literature surrounding the topic. Amidst this, there is no clear consensus on exactly what is meant by this concept. However, the calls for "recovery oriented services" continue to be influential in policy decisions at the state and federal level, even as what is meant by those calls is unclear. This study focuses on the co-authorship activity of the scholars who have both defined and invoked this concept in their research over the last 20 years, with an eye to understanding how the different definitions of recovery have been embraced by different segments of the mental health services literature over time. It combines a content coding of articles on recovery with a positional analysis to determine how micro-mobilization contexts (using different definitions of the concept) within the recovery scientific/intellectual movement have emerged, with some attention paid to which sets of meanings and contexts have been most successful in the policy world.

Mining Large-scale Online Communities: The Development And Dispersion Of Tools For Analyzing Collaborative Processes And Structures
Britt, Brian C.; Matei, Sorin A.; Braun, David
Analyzing Network Data
On-line Communities, Network Analysis, Wikipedia, Data Mining, Technology, Motivation
FRI.PM1

Wiki-based social media sites such as Wikipedia have become very successful collaborative frameworks, to some degree supplanting previous platforms and tools. Some of their characteristics such as ad-hoc organization, role and norm fluidity, and a relatively flat organizational structure suggest the emergence of a new social-structural form of organization. Yet, very little is known about the global characteristics of this form and most importantly, what drives the most successful collaborative communities. Of particular interest is the relationship between collaborative ties and motivation to contribute to wiki sites. Our work utilizes innovative methodologies to delve beyond surface-level, node attributes, focusing on understanding how node embeddedness motivates contributions to Wikipedia and other similar task-oriented online communities. We mined the full Wikipedia corpus of edits from 2001-2010 and have developed an analytic framework that allows us to ask such questions in a systematic manner. Especially productive is our approach to determining if social entropy and assortativity/dissasortativity can explain social motivation and ultimately Wikipedia’s success. In addition, we have developed a research platform, Visible Symbiosis, which will invite researchers from throughout the world to further explore the entire Wikipedia corpus.
Mining Social Networks To Understand Group Formation Patterns Using Market Basket Analysis

Ganesh, Jai; Cheluvaraju, Bharath

Online Social Networks
Social Network, Social Network Analysis, Group Structure, Associograms, Data Mining

Social Networking destinations allow users to create groups and sub-groups based on common areas of interest including areas such as technology, business, fun, movies, books etc. The groups bring together like-minded users by providing a common platform for interaction, collaboration and knowledge exchange. The peer-to-peer exchanges that take place in social networking environments go beyond providing direct value to the user. The environment fosters collaboration among the participants; this can lead to an aggregation of content and ideas within sites or sections of sites. This has interesting implications on enterprises wanting to leverage social networks to draw insights and inferences on user preferences as well as user participation in networks. Understanding users’ group behavior would help to establish generic user needs and attitudes towards various areas of interest. This has interesting implications for enterprises marketing their products and services by allowing them to conduct improved demographic analysis as well as better segmentation targeting and positioning of their offerings. The same can be extended to enable firms to better monetize their offerings. This paper attempts to analyze patterns within group membership in Facebook user groups. We propose a model based on market basket analysis over a subset of the social networks groups and then derive a set of associative mining rules. The inferences provide interesting insights into user behavior in social networks with regard to group formation as well as group participation. In this paper we share results from mining Facebook user profiles and the findings about group formation patterns using market basket analysis. The objective is to attempt aggregation of social network participants at the group membership and participation level and draw insights into user profiles.

Mission Statements - Networks Of Concepts

Zdziarski, Michal

Leadership Networks
Leadership, Organization Theory, Core/periphery, Interorganizational Networks, Clustering, Business Systems

The aim of this lecture would be to compare key concepts in mission statements of largest corporations. Defining mission and values is key competence of corporate leadership. I will present analysis of two mode network of companies and concepts for two sets of missions: world's largest industrial companies, and largest companies from developing countries. Analyses will focus on central and peripheral concepts and thus similarities and dissimilarities among corporate visions and missions, as well as comparative characteristics of both sets.
## Mixing In Large Populations: Some New Measures - Part II

Klovdahl, Alden S.

Social Networks and Health

Measures, HIV/STD, Infectious Disease, Homophily, Heterophily, Mixing

FRI.AM1

Alden S. Klovdahl The Australian National University Canberra, Australia alden.klovdahl@anu.edu.au More often than not when we obtain 'real' network data (i.e., allowing us to map overall patterns of connection) it is with a view to measuring structural properties to ascertain their effects on individual actors, groups of actors, or on some characteristic of the network as a whole. Where possible, we also try to understand effect-producing processes. Rarely, however, do we recognize that these network data can be employed to develop measures of population characteristics for use when network studies are not appropriate, feasible or cost-effective. One important characteristic of populations is the degree of 'mixing' (homophily/ heterophily) (within/between groups similar/different on some feature(s). Examples: mixing between infected/ susceptible individuals in epidemiological studies, between various ethnic groups in studies of potential conflict, ... and so on. Previously some new measures of mixing were introduced, their theoretical justification provided, and then they were validated with supercomputer simulations \( n = 753,571 \) and \( n = 20,791,225 \). Here, these measures are applied to empirical data related to social networks and the spread of infectious diseases. Advantages over previous measures of mixing/homophily/heterophily are discussed. These measures allow meaningful comparisons within and across epidemiological, policy, social and other research studies. As well, they provide a uniform basis for parameterizing relevant mathematical models.

## Mobilizing Strategies And Network Centrality In Shareholder Activism

Lee, Jegoo

Networks, Collective Action and Social Movements

Social Movement Theory, Collaboration Network, Social Mechanisms

THURS.AM1

This research investigates the framing strategies of leading actors who effectively mobilize and are followed by supporters in the shareholder activism. Specifically, it examines how some social investors’ strategies of framing their goals effectively appeal potential following investors. Both social network theory and social movement perspectives help examine this issue. The social network literature indicates that social relationships to many constituents with whom a focal actor is working together result in the prestige based on the network centrality. In social movement theory, the ability of an agent or a group of agents to bring about change depends upon effective framing and mobilizing strategies. Integrating these two frameworks, the present study hypothesizes that active shareholders’ framing of reciprocal relations, target identification, and issue choice strategies determine their likelihood of becoming leading actors among others. Empirical analysis draws upon a dataset of shareholder resolutions confirms that shareholder activists utilizing proposed social movement strategies enjoy central positions in the activist shareholder networks. This research suggests a theoretical insight on the theories of social networks, social movements, and shareholder activism.
### Model Selection Of Exponential-family Social Network Models
**Wang, Ranran; Handcock, Mark S.**

**Exponential Random Graphs**

Bayesian Methods, Exponential-family Random Graph Models, Goodness-of-fit, Model selection

**SUN.AM1**

Exponential-family random graph (ERG) models have been widely applied in social network analysis. Hunter, Goodreau and Handcock (2006) developed procedures for the goodness-of-fit of ERG models based on graphical diagnostics. However, the problems of model selection for ERG models have yet not been well studied. In this paper, we investigate model selection for ERG models using both likelihood ratio tests and Bayesian methods. We propose a novel systematic procedure to conduct likelihood ratio tests to compare ERG models. Given two sets of models, we evaluate the likelihood ratio statistic, explore its sampling distribution and calculate the Monte-Carlo p-values at the end. Bayesian inference has been recently applied to ERG models to resolve model degeneracy and bias-reduction problems. We develop a numerical algorithm to estimate the Bayes factor for given models. Finally, likelihood ratio tests and Bayesian model selection are tested and compared using real social network data.

### Modeling Innovation Arms Races In Socio-technical Networks
**Thomas, Russell C.; Metgher, Cristina**

**Poster Session**

Mixed Methods, Innovation, Co-evolution, Socio-technical Network, agent-based modeling, Information security

**SAT.PM3**

Information security has been commonly viewed as a rivalry between attackers and defenders, and it has been popularly described as an evolutionary arms race where each side has incentives to continually create new innovations to overcome the opponent’s capabilities. In doing so, neither side gains a lasting advantage (i.e. the Red Queen effect). From a research viewpoint, there has been very little research on computational models of innovation and the co-evolutionary dynamics of innovation in adversarial networks We explore these problems in the context of email spam and anti-spam defenses using a hybrid computational model designed to be ‘history-friendly’. We examine these questions: 1. Does adversarial co-evolution inevitably lead to a Red Queen arms race? 2. How do incentive systems affect co-evolution and does lack of incentives lead to underinvestment in innovation? We model the system at two levels. At the Innovation Process level, we have built a Multi-Agent System (MAS) where the agents interact with design solutions to either improve existing solutions incrementally (‘exploitation’) or attempt to invent new solutions from available components (‘exploration’). Agents also learn from each other through communities of practice. At the Transaction level we will adapt the system dynamics model to model the sending and receiving of email and to observe the cost and volume dynamics of spam and anti-spam technologies, systems, and business models.
Rumors, new ideas, and attitudes spread though groups of people via interpersonal communication. One approach to simulating these diffusion processes is to generate random networks. Normally, the algorithms by Erdos/Renyi (1959), Watts/Strogatz (1998), and Barabasi/Albert (1999) are used to that end. However, the structure of the network is an important parameter for the pattern of diffusion. Therefore, the model has to fit the properties of the corresponding system. The basic questions for this presentation are: What are the characteristics of real world interpersonal networks, and which random network algorithm fits these characteristics? Based on this examination, a new algorithm is introduced to model the diffusion of information, opinions, and messages in real world social networks by interpersonal communication. Our work also shows the connectivity of empirically collected ego networks and algorithmically generated overall networks, and offers correspondences between the micro and the macro level.

Traditional models of leadership have recently been challenged by a growing sentiment that they failed to completely represent and understand the dynamic, distributed, and contextual nature of leadership. To overcome this limitation, a greater number of scholars aim at basing their approach on complexity theory which suggests that leadership should be framed as a complex, interactive, and dynamic event which emerges from relational interactions among all group members. This study is an attempt to merge complexity theory, leadership approaches, and longitudinal network analysis to investigate complex process of leadership emergence in groups. Based on the model of distributed leadership, leadership is represented as a network of leadership perceptions, where nodes and ties represent actors and leadership perceptions respectively. When captured over time, the emergence of leadership networks can be investigated using SIENA. Actor-oriented models’ specifications implicitly combine different, but complementary, approaches to leadership. Actor-oriented models allow to simultaneously reveal how formal and informal relationships (relational approach to leadership), leaders’ and followers’ characteristics (leader-centered and follower-centered approaches), and group processes (social construction of leadership) affect the social process of leadership emergence. Such complex, dynamic, and relational approach to leadership emergence has the potential to make a substantive contributions on leadership emergence and to provide practical implications to leaders embedded in a complex environment.
### Multi-dimensional Trajectory Analysis For Career Histories

**Sharara, Hossam; Halgin, Daniel; Getoor, Lise; Borgatti, Steve**

**Analyzing Network Data**

**Network Dynamics, Multilevel Networks, Careers, Teams, Trajectories, Computational Methods**

FRI.PM1

In this work, we conceptualize career histories as traversals through a temporal multi-modal network describing individuals’ different positions at various organizations across time. We describe methods for clustering and visualizing career histories using a multi-relational, multi-dimensional approach. We show how we can discover patterns in career trajectories, using a variety of structural similarity measures and identify common motifs and detect anomalies. We show results on a dataset describing the recent career histories of US NCAA basketball coaches.

### Multilevel Governance In Metropolitan Emergency Management Networks

**Garayev, Vener; Kapucu, Naim**

**Collaboration, coordination and cooperation**

emergency management, functionally collaborative networks, network sustainability

FRI.PM2

Emergency management is basically about solving a single problem through inter-organizational networks. Such a structure is a result of the need for collaboration in terms of capital, resources, and expertise. Function-based emergency management networks are one way to deal with disasters requiring separate attention for each area of the disaster scene. Focusing on the four metropolitan county emergency operation centers (EOC) in the State of Florida, this paper analyzes the functionally collaborative networks in terms of their design/plan and actual networks. Drawing on the date from the 2004 hurricane season in Florida with, the study focuses on the emergency support functions (ESF) vs. agency matrices to understand the nature of the anticipated and actual networks within each county during the consecutive four hurricanes of the season. The findings suggest a gap between the both in the case of two counties. Recommendations are made in terms of the anticipated plan structure as well as required efforts to increase the sustainability of emergency management networks for more effective results.
Multilevel Longitudinal Analysis For Studying Influence Between Co-evolving Social And Content Networks

Wang, Shenghui; Groth, Paul; Kleinnijenhuis, Jan; Oegema, Dirk

Analyzing Network Data

Social Network, Co-evolution, Content Analysis, Longitudinal Analysis, Influence

The Social Semantic Web has begun to provide connections between users within social networks and the content they produce across the whole of the Social Web. Thus, the Social Semantic Web provides a basis to analyze both the communication behavior of users together with the content of their communication. However, there is little research combining the tools to study communication behaviour and communication content, namely, social network analysis and content analysis. Furthermore, there is even less work addressing the longitudinal characteristics of such a combination. This paper proposes to take into account both the social networks and the communication content networks. We present a general framework for measuring the dynamic bi-directional influence between co-evolving social and content networks. We focus on the twofold research question: how previous communication content and previous network structure affect (1) the current communication content and (2) the current network structure. Multilevel time-series regression models are used to model the influence between variables derived from social networks and content networks. The effects are studied at the group level as well as the level of individual actors. We apply this framework in two use-cases: online forum discussions and conference publications. By analysing the dynamics involving both social networks and content networks, we obtain a new perspective towards the connection of social behaviour in the social web and the traditional content analysis.

Multilevel Models For Social Network And Group Dependencies

Tranmer, Mark

Analyzing Network Data

Statistical Models, Network Autocorrelation Models, Multilevel Models

In social network analysis the network effects model and the network disturbances model are often used to allow for network dependencies. Another way to allow for dependencies in a population is via multilevel modelling. In this talk I propose some multilevel modelling approaches to allow for social network dependencies. I begin by considering a single network, and then consider the situation where there are a number of groups, each of which contains a social network. An example of the second situation is a number of schools, each containing a friendship network for the pupils. In this example, the extent to which an educational or behavioural outcome varies between pupils, social networks, and schools may be of substantive interest. I present some empirical results to compare the multilevel models I propose with existing models for network dependencies. Such a comparison also allows an assessment of the effects of ignoring groups and/or social networks in statistical analysis.
### Multi-model Modeling In Support Of Crisis De-escalation

*Lanham, Michael J.; Morgan, Geoff P.; Carley, Kathleen M.*

**Agent-Based Models and Multi-Agent Systems**

*Agent Based Models, ORA, AutoMap, Modeling, agent-based modeling, Construct FRI.PM2*

The combination of network extraction from texts, network analytics to identify key actors, and then simulation to assess alternative interventions in terms of their impact on the network is a powerful approach for supporting crisis de-escalation activities. In this talk, we describe how this approach was used as part of a scenario-driven modeling effort. The researchers, mimicking the supporting staff of two Geographic Combatant Commands, US Central Command and US Pacific Command, used the disparate tools to model the inputs and outputs of various courses of action in a US-led effort to deescalate a fictionalized international crisis between India and Pakistan. We demonstrate the strength of going from data to model, that even with the same tools the commands will reach different conclusions due to differences in focus, and that proposed interventions would not have de-escalated the crisis. Forecasted results were confirmed by researchers at GMU using alternative non-network methodologies.

### Multiplex Ties And Buffering Transgressions

*Shah, Neha; Venkataramani, Vijaya*

**Organizational Networks**

*Multiplexity, Transgressions SAT.PM1*

Network researchers have found that the presence of a social relationship affects whether and how task-based relations influence individuals’ behavior. In particular, scholars have noted that these combined relations act as governance structures to limit transgressions against relationship partners. We take a different perspective to consider how individuals react to transgressions that the relational partners commit against third parties. We contend that individuals may be more likely to condone their partners’ transgressions if they share combined or multiplex ties, than they would if they did not share a combined relationship. Further, the individuals likely condone more serious transgressions than they would if only a uniplex tie was present. Thus, the multiplex tie acts as a buffer against sanctions. We refer to transgressions as behaviors that seemed questionable, inappropriate, or wrong to the individual. In task groups, we consider how the person’s relation to the transgressor, the transgressor’s position in the network, the salience of the transgression to the individual, and the target of the transgression affects the severity of the sanctions that the person chooses to pursue against the transgressor. We contribute to the existing network research by pushing forward the existing knowledge of how multiplex ties affect individual behavior in organizations.
### Multiplexity, Heterogeneity And Overlap Of Relationships Between Financial Institutions And Firms: Investigation Of Top Executive Turnover From A Social Network Perspective

Yamanoi, Junichi

**Organizational Networks**

**Multiplexity, Interfirm Networks, Financial Sector, Corporate Governance, Firm, Overlapping**

FRI.PM1

Financial institutions have relationships with multiple firms via diverse directional ties, such as lending, equity ownership, and directorship. Although previous studies on corporate governance have investigated the dyadic relationship between a financial institution and a firm, little is known about how the network ties and structure of a financial institution’s relationships with multiple firms influence the effectiveness of corporate governance on a firm. In this study, from a social network perspective, I shed light on the characteristics of financial institutions’ networks: multiplexity (the extent to which the firm is connected with the focal financial institution via lending, equity ownership, and directorship), heterogeneity (the extent to which the focal financial institution has relationships with different types of firms), and overlap (the extent to which the firms in the network of the focal financial institution span the counterparts of other financial institutions). Since the three characteristics affect a financial institution’s incentives for and capabilities of monitoring a firm, they have significant impact on sensitivity to a downturn in firm performance, which typically appears as top executive turnover, and performance improvements subsequent to the turnover. Using a sample of private financial institutions (i.e., commercial banks and insurance companies) and non-financial listed firms in Japan during the period, 1990-2000, I empirically test for the hypothesized relationships between a financial institution’s network and a firm’s top executive turnover and subsequent performance. This study is purposed to broaden the horizons of social network theory and corporate governance.

### Multi-step Generalized Blockmodeling

Doreian, Patrick; Brusco, Michael

**Analyzing Network Data / Blockmodeling**

**Block Model Analysis, Algorithms, Clustering**

SAT.AM2

Blockmodeling is an approach to partitioning social networks in ways that are intended to discern, or delineate, their fundamental structure(s). One presumption of blockmodeling, in both its traditional and generalized versions, is that one blockmodel is fitted to an entire network array. We propose relaxing of this presumption: we suggest that it is more fruitful to allow different parts of a network to be represented by different block structures. This can be done in a variety of ways that include: i) examining the detailed internal structure of blocks obtained from a blockmodel of the entire network; ii) initially partitioning a network into multiple parts – based on either empirical knowledge of the network or substantive knowledge – and blockmodeling the different parts independently; iii) taking a set of blocks and partitioning this set. Different block types can be used the subsequent step(s) of multi-step blockmodeling. This approach can be applied to both one-mode and two-mode networks. We present some formal results and illustrate multi-step generalized blockmodeling by using a set of empirical networks and constructed networks. Comparisons are made between the results of one-step blockmodeling and multi-step blockmodeling in terms of the delineated networks structures.
Neighborhood Cultures? Composition, Constitution And Significance Of Neighborhood Networks

Hollstein, Betina; Pfeffer, Jürgen; Behrmann, Laura

Qualitative and Mixed Method Network studies

Mixed Methods, Personal Support Networks, Network Composition

SAT.PM1

Besides kinship ties, neighborhood relationships have been a central element of social integration in traditional societies. In individualized modern societies, neighborhood relationships seem to be of importance only for certain social groups, e.g. for members of the working class or the elderly. The question arises: Can we actually speak of different neighborhood cultures? Topics of the paper are differences in current neighborhood relationships and networks: We analyze differences in composition and significance (meaning, support) of neighborhood networks between social groups. We present data of a research project on neighborhood networks in urban areas. Analyses are based on 100+ qualitative interviews including an ego networks survey via touch screen computers in three cities in Germany. Aim of the project is to better understand the structure (composition) and the functionality (social support) of neighborhood networks. Bringing these networks into context with the strong ties of the interviewee the relative importance of the neighborhood network is analyzed. Finally, we look at the duration and the origins of the relations to understand the constitution of in neighborhood networks and their changes over time.
### Network Centralization And The Dissemination Of Evidence-based Guidelines In Eight State Tobacco Control Networks

**Wald, Lana M.; Harris, Jenine K.; Luke, Douglas A.**

**Poster Session**

**Social Network Analysis, Tobacco**

**SAT.PM3**

Due to limited resources, public health organizations often partner to effectively address complex problems. Since little is known about the structural properties of public health partnerships, it is important to understand how, with scarce resources, these organizations work together to be efficient and effective. The use of evidence-based guidelines is one way to ensure effective strategies are being used to address a given public health problem. Evidence-based guidelines summarize interventions that have undergone rigorous testing and have been successful in addressing a particular problem. In our study, we evaluated the networks of organizations comprising eight state tobacco control programs. We measured contact and collaboration among partners, as well as the use and dissemination of particular evidence-based guidelines. Because this is one of the first studies to examine the dissemination of evidence-based guidelines, little is known about the differences in network structure that result from these three types of relationships: contact, collaboration, and information diffusion. We hypothesized that centralization of the state networks would increase from the least formal interaction among partners (contact) to the most formal (dissemination of guidelines). We found that as interaction between agencies within a state becomes more formal, the network becomes more centralized around the lead agency. This information can aid in developing effective dissemination processes around evidence-based guidelines and other informational resources.

### Network Effect And Mobile Operator Choice: An Empirical Analysis

**Gonzalez, Nancy P.**

**Innovation, Diffusion, and the Adoption of Technology**

**Social Network, Mexico, Adaption And Networks, IC Industry, Local Networks, Cell-phone Network**

**THURS.PM1**

This paper investigates the impact of social networks in the choice of a mobile operator; besides, the effect of network externalities in the use of mobile communications is empirically tested. The study relies on a survey of 56 members of a university sports team. Social network analysis is used to test the relation between the social structure and the choice of a mobile operator. The results of this study shed light about the effectiveness of price discrimination strategies that induce ‘artificial’ network effects and number portability policies that seek to enhance competition.
### Network Effects On Interest Rates In Online Social Lending

**Lerner, Juergen; Brandes, Ulrik; Nick, Bobo**

**Online Social Networks**

Financial Networks, Event Data, Dynamic Networks, prosper.com

**THURS.AM1**

The Prosper Marketplace (prosper.com) facilitates peer-to-peer lending by matching potential borrowers with potential lenders using an auction mechanism. Borrowers can post loan requests and lenders can bid on a request specifying a minimum interest rate and an amount they are willing to lend. In this talk we analyze the impact of social information on the probability of funding, on the final interest rate, and on the credit default risk. While externally determined credit grades strongly influence these outcomes, there is a large variation within classes. We hypothesize that potential lenders use social information - including group membership and endorsements from other users - to trust some borrowers more than it is suggested by their credit grade. Furthermore we analyze whether this social behavior is rational in the sense that it leads to lower credit default rates.

### Network Evolution And The Beauty Advantage

**O'Connor, Kathleen; Gladstone, Eric**

**Knowledge Networks**

Status, Personality, Laboratory Experiment, Cognitive Science

**THURS.AM1**

Current theories of network evolution presume that actors consciously seek to occupy advantageous positions in networks. We relax this assumption, and argue that status characteristics—e.g., attractiveness—are sufficient to generate favorable network positions without agentic behavior on the part of the actor. Specifically, in a series of experiments, we find that people believe that both male and female actors who are described as more attractive are more likely to occupy advantageous positions in networks, irrespective of other important characteristics (e.g., competence). Moreover, our results indicate that when people select actors to fill advantageous network positions, they are more likely to select more attractive rather than less attractive actors. Together, our results support our argument that actors need not be agentic in their pursuit of favorable network positions to achieve these positions. For some, centrality finds them.
Network Influence On Adolescent Alcohol Use: Relational, Positional, And Affiliation-based Peer Influence

Fujimoto, Kayo; Valente, Thomas W.

Social Influence and Support

Adolescents, Youth Networks, Friendship Network, Peer Influence

SAT.PM1

Numerous network studies have been conducted to examine the role that peer influence plays on adolescent substance use. The majority of these studies report a significant association between close friends’ substance use and an adolescent’s use. However, network influence can range from immediate friendships to those of more distant peer structures derived from occupying structurally equivalent positions in a friendship network, or from affiliations formed through joint participation in organized activities at school. Such activities involve less one-on-one interaction, but may still involve more pronounced influences from social norms and group dynamics. This study investigates the relative contribution of different network influences (relational, positional, and affiliation-based network influences) on adolescent’s alcohol use, using data from the National Longitudinal Study of Adolescent Health (Add Health), which consists of a nationally representative sample of adolescents who were in Grades 7-12 in the United States during 1994-95. Using a network exposure model (E=Wy/Wi+), we computed three types of network exposures (E) using different weight W matrices to be multiplied by an alter’s alcohol use (y) to examine relative contributions of individual network effects on adolescent alcohol use. This study also explores some methodological issues of simultaneously analyzing multiple network effect on behavioral outcome.

Network Predictors Of Turnover Amongst Knowledge Workers

Gerbasi, Alexandra; Parker, Andrew; Cross, Robert

Organizations and Networks

Organizations, Communication Networks, Affective Ties, Social Network Analysis, Dynamic Networks

SUN.AM2

This project examines how the changing networks of co-workers ties can help predict turnover in firms. Turnover is an important issue for organizations, especially when those employees that leave have technical and organizational specific knowledge that is not easily replaceable. Specifically, we explore how the changing structure of the information and energy networks over time and the roles played by individuals within these networks relate to turnover. The data comes from a study of a global IT department within one of the world’s largest engineering consulting firms. Over an eight-year period, the IT leadership team in conjunction with one of the authors conducted an annual SNA. Our findings indicate that individuals on the periphery of the information network and those with the most de-energizing ties are most likely to exit the organization. In terms of information centrality, these individuals were not always on the periphery, however. Over time the people that left the firm moved from more central positions in the information network to the periphery, indicating they are slowly detaching themselves from the organization. In addition, the leavers were not always de-energizers, rather, they became less positive members of the network over time. This research seeks to expand the theoretical knowledge about turnover of knowledge workers as well as having practical implications for HR Managers who we suggest could use SNA techniques to identify and re-engage key knowledge workers prior to them exiting the organization.
**Network Sampling With Memory: A Proposal For More Accurate Sampling From Social Networks**

Verdery, Ashton M.; Mouw, Ted

Collecting Network Data

Sampling, Methods, Data Collection, Respondent-driven Sampling

**THURS.AM1**

Sampling from a network using a random walk based approach such as Respondent Driven Sampling (RDS) is difficult because the sample can get stuck in isolated clusters of the network, reducing accuracy. In this paper we propose an alternative strategy—Network Sampling with Memory (NSM)—that uses multiple dependent random walks and social network data collected from respondents to force the sampling process to mix rapidly through the target population. We test our approach on simulated data and on 30 large university-based social networks from Facebook. While RDS has an average design effect of 2.3 for these 30 university networks, NSM has an average design effect of 1.0—i.e., the same standard error as random sampling—in samples of 500 when network data is collected on 20 friends per respondent.

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**Network Science Contributions To Advancing Translational Research**

Forthofer, Melinda; Roscoe, Robert; Clarkson, John; Mackelprang, Alyssa

Academic and Scientific Networks

Academic Networks, Partnerships, Research Networks

**THURS.AM1**

Solutions to modern societies’ greatest challenges are likely to come from those who can mobilize knowledge and expertise across perspectives and facilitate translation of new knowledge into practice. Academic-community partnerships are acknowledged as central to such efforts. Nonetheless, we must move beyond relationship focused approaches to consider best practices and processes at the level of networks, to inform our understanding of effective systems for linking academic and local expertise. As part of a study of one academic institution’s portfolio of community engaged research, we conducted an online survey with faculty members from the institution’s health science units (N=130). Then, we interviewed community partners (N=34) identified by faculty research participants. Our social network analysis of these examine partnership-level and network-level patterns of community engagement. Our results reveal dramatic diversity of perspectives among network members and highlight areas where academic researchers may fall short of “walking the talk” of community-based research. Using network analysis to focus on the linkages among collaborating entities and on the patterns and implications of those relationships can inform strategies for strengthening network linkages that are already functioning well, as well as for developing linkages to address network gaps. Additionally, we will use these findings to illustrate how a network approach can inform institutional strategies for supporting community engaged scholarship and facilitating the bridging of gaps between researchers and community partners that may hinder the translation of research into practice.
### Network Structure And A Proposed “Analytical Framework” Of An Emerging Capital Market

Balstad, Jack; Szablowski, Evan; Evans, Daniel

**Networks and Economics**  
**Economic Networks, Financial Networks**  
**THURS.AM2**

The Network Science Center at West Point seeks to advance basic research in human network structure of social, communication, and cognitive branches of Network Analysis in the context of Frontier Capital Markets. Frontier Capital Markets are defined by Standard and Poor’s as the capital markets of developing nations typically in Southern and Southwest Asia, Africa, South America and Eastern Europe with the minimal requirements for global investment. An on-going research project at the Network Science Center is developing an analytical framework to quantitatively compare these Frontier Capital Markets. A follow-on effort to this study involves a quantitative comparison between three Frontier Capital Markets and an identified Emerging Capital Market—a market that is more advanced than a Frontier Market but not yet considered a Developed Market. We will present the development process of our proposed “analytical framework”, as well as our initial results. The team will present their progress and findings addressing the following items: 1) The compilation of open source social and organizational data for the Emerging Capital Markets. 2) A proposed Social and Functional Network of the identified Emerging Capital Market. 3) Our proposed plan for in-country interviews and the quantitative analysis supporting this plan. 4) Initial quantitative comparative findings and an initial analytical framework for this network.
The Network Science Center at West Point seeks to advance basic research in human network structure of social, communication, and cognitive branches of Network Analysis in the context of Frontier Capital Markets. Frontier Capital Markets are defined by Standard and Poor’s as the capital markets of developing nations typically in Southern and Southwest Asia, Africa, South America and Eastern Europe with the minimal requirements for global investment. The major Network Analysis research questions we seek to address are: (1) What metrics of network structure best describe a multidimensional, weighted relationship graph of Frontier Capital Market actors? (2) What is the relationship between Frontier Capital Market Network Structure and Nation-State stability? (3) Can a Social Network model provide a descriptive model of Frontier Capital Market success/failure? Over the past year, the team has compiled open source social and organizational data for three different Frontier Capital Markets. Additionally, we have visited these countries and interviewed people that we have indentified through traditional Network Analysis methods to be key nodes or connectors in the networks. From this data, we have developed a quantitative comparison that effectively compares the “social layer” topology of these different capital markets. Based upon our compilation of data and expert interviews, we have realized that modeling and collecting appropriate data on Frontier Markets from a network perspective is more complex than originally posited. We will present two proposed “analytical frameworks”, as well as initial results, based on the compilation of data and in-country interviews: 1) A “Capital Markets Functions” framework that builds upon the underlying the social network in the capital market and describes the particular capital market in “Macroeconomic” terms. This functional framework allows us to develop network topologies and, consequentially, allows us to compare these Frontier Capital Markets. 2) Building on the groundbreaking concepts published in a paper published in 2004 by Van der Gaag and Snijders entitled “The Resource Generator: Social capital quantification with concrete items,” the team has developed an innovative method to gather data and then quantify and classify the Social Capital levels in these Frontier Capital Markets. With these results, the team can then compare the network topologies that are generated.
**Networked Play For Health: Promoting Physical Activity Through A Social Game**

Wang, Hua; Gotsis, Marientina; Jordan-Marsh, Maryalice; Spruijt-Metz, Donna; Valente, Thomas

Social Networks and Health
Personal Networks, Physical Activity, Health Promotion, Interview, Game, Wellness Partners

FRI.PM1

This study explored the phenomenon of networked play in the context of a novel health intervention called Wellness Partners. Primary participants enrolled their family and friends as partners to pilot test the program by sharing updates about their physical activities, sending direct messages, viewing other group members' activities, and interacting with various digital gaming elements on the purposefully designed social network site. In-depth interviews were conducted with 20 participants. They were selected based on individual attributes such as their role in the study as an ego or alter, gender, age, education, ethnicity, marital status, geographic location as well as the structure of their personal networks such as a dyad, triad, or a group of larger size. Atlas ti was used for a thematic and content analysis of interview transcripts. The study found that close ties were chosen as wellness partners for the comfort of exchanging private information, shared health interests or concerns, active lifestyle and positive personality, and prior co-exercise practices. The intervention website not only facilitated network members to track each other's individual physical activities, but also provided a space for health information sharing, friendly competition, emotional support, and social networking through playful activities. Despite the technical difficulty and design limitations of the intervention, participants enjoyed the virtual rewards and felt especially motivated when engaged in meaningful social interactions with their partners. Some even reported attitudinal and behavioral change after 10 weeks.

**Networked Science: Distance And Discipline In A Collaborative Research Network**

Dimitrova, Dima; Mok, Diana; Gruzd, Anatoliy; Hyatt, Zack; Mo, Guang Ying; Wellman, Barry

Academic and Scientific Networks
Collaboration, Online Survey, scholarly networks

THURS.AM1

This paper explores the role of distance and disciplinary background in research collaboration. The broad concern of the paper is the transition of scientific research from the informal collaboration in “invisible colleges” to more formal collaborative networks that are multi-disciplinary, cross-sectoral, county-wide or even global. A lot of the existing literature is normative: it deals with how such scientific collaboration should function rather than how it actually functions. Where empirical research does exist, it points to the existence of social, cultural, and technological constraints that maintain disciplinary and geographic boundaries. While collaborative research today is almost by default distant and multi-disciplinary, both distance and working across disciplines reinforce the challenges in coordinating and communicating. This study clarifies to what extent research collaboration crosses disciplinary and geographic boundaries, how discipline and distance interact, what collaborative relations cross these boundaries more easily, and which boundary – distance or discipline - is stronger. The analysis uses qualitative and quantitative data from the study of a country-wide research network in Canada. Preliminary qualitative analysis shows that multidisciplinary teams do not necessarily mean multidisciplinary collaboration; while researchers easily exchanges information from a distance they strive to create opportunities to meet in person. In survey data, we expect to find stronger disciplinary boundaries in more demanding professional relationships and across the social/computer sciences divide. Further, we expect that distance reinforces such disciplinary boundaries. In short, we expect that distance and discipline are still relevant in large collaborative research networks and cyberscience is not yet here.
**Networks And Little Magazine**

Ewing, Chatham B.
Qualitative and Mixed Method Network studies
Academic Networks, Netdraw, Social Networks
SUN.AM1

Using the little magazine Perspective as a point of departure, this essay will explore how network diagramming using NetDraw and basic approaches using network analysis can be used to understand how patterns of association and publication might be used to open up and focus literary analyses interested in coterie, canon, and the creation of literary value.

**Networks Generated By FIFA Soccer Games Played Between Countries**

Breznik, Kristijan; Batagelj, Vladimir
Sports, Teams and Networks
Network Analysis, Sports, Pajek
FRI.PM2

Soccer has been the most popular sport in Europe and South America for some time. After the World Cup 1994 in the USA soccer gained a lot of supporters also in this part of America. At the Fifa (world football association) web site data on the results of all games between countries are available on the single game level. From these data some (temporal) networks can be obtained. Additional data about countries (number of registered and unregistered soccer players, number of soccer clubs and officials etc.) are also available. In the paper we will analyze all official matches played between countries, starting with the first game in 1872, with the methods of network analysis. We will describe how we dealt with some problems arising during data analysis: disintegrating countries and the new emerging countries etc. The importance of soccer games played between countries varies considerably, from friendship matches to those at highest level e.g. the World Cup matches. Since August 1993 the results of all games are evaluated every month on the so-called FIFA/Coca-cola World Ranking list. The calculation of points is complicated, nevertheless it has in our opinion some weaknesses that will be discussed. The programs for producing networks were written in R. For analysis of networks we used program Pajek.
**Networks, Collective Action, And State Formation**

Conway, Drew

Agent-Based Models and Multi-Agent Systems

Game Theory, Collective Action, Agent Based Models, Simulation Game

FRI.PM2

The study of state formation often focuses on building state capacity. The formation and subsequent bolstering of state capacity, however, are distinctly different activities. While the study of state capacity building has provided considerable insight into the role of formal institutions in maintaining stable governance, the implicit assumption in this work is the existence of a state upon which to build capacity. The collective decision to formalize institutions into a state—necessary prior condition for building state capacity—is rarely addressed. In the following paper the role of informal institutions; specifically, social networks, in the process of state germination are explored. Using Afghanistan as a framework for the discussion of state formation through informal networks, the research presented below attempts to illustrate the importance of the structure of these networks, and the actors therein, in state formation. The paper begins with a brief description of the role of informal institution and social networks in Afghanistan. Next, a provision point public goods game is presented as a basic model of the collective action problem inherent in state formation. Then, a network variant of this game is presented, which is implemented as a computational model. In the final sections the results of simulations from the computational model are presented, with a discussion and conclusions.

**New Structural Hole Measures For Dynamic And Adaptive Social Networks**

Oh, Poong

Network Characteristics

Network Dynamics, Social Capital, Structural Holes, Brokerage, Closure, Equilibrium

WED.PM1

Since proposed by R. Burt (1992), the concept of structural holes has occupied a central position in social network analysis for examining competitive advantages of actors embedded in a network. Recently, Burt (2005) has further extended its conceptual utility and applicability by suggesting two new contrasting concepts – network closure and brokerage – which bridge the conceptual and methodological gap between social network theory and social capital theory. However, a close examination of Burt’s formulation of structural holes reveals two hidden assumptions: (1) non-diminishing marginal utility of additional ties, i.e., \( U(Xij) + U(Xik) = 2U(Xij) \) or \( 2U(Xik) \); and (2) equal utility of indirect ties to direct ties, i.e., \( U(Xik) = U(Xij) \). These two assumptions are not only unrealistic but unable to capture the dynamic nature of social networks that evolve over time. From this perspective, this study attempts (1) to discuss the limitations of the original structural hole measures due to the hidden assumptions, such as the convergence to infeasible equilibrium states (2) to extend the original measures into more general situations by introducing a new parameter, heterogeneity index, \( h \), (3) to demonstrate the theoretical relationships of the new measures to existing notions, such as maximum carrying capacity at nodal level that emerges from structural constraints in evolutionary/ecological network theory and the law of diminishing returns in the general rational choice theory. The findings of the present study deepen our understanding of the evolutionary mechanisms of social networks. The technical issues with the operationalization of the heterogeneity index, \( h \), are also discussed.
On Dopamine, Social Rewards And Formation Of Social Networks

Tsvetovat, Maksim; Kabbani, Nadine

Agent-Based Models and Multi-Agent Systems

Network Dynamics, Agent Based Models, Network Plasticity, Social Cognition

THURS.PM2

In human history, every culture has produced a set of rules governing social behavior, thus dictating a macro-level social network structure. While these rules do differ from culture to culture, they produce remarkably similar macro-level social networks, both on family- and small-group level, but also on societal level. Examples of low-level rules can be found in work of Granovetter(1983), diffusion models(Friedkin 1998, Carley 1999, etc), Burt (1992), etc., as well as social-psychological literature such as Simmel(1905) and Heider(1979). We hypothesize that a basic, low-level set of rules of social behavior may be biologically dictated via the physiological properties of the human brain. This is based on the findings that most aspects of human (and animal) behavior appear to be at least in part directly mediated by select processes of neurotransmission, including genetically defined individual expression of neurotransmitters and neuropeptides within distinct brain regions (Schultz 2007). Further, Dunbar(2003) hints at these mechanisms by correlating size of social groups with size of prefrontal cortex in primates. We call this set of rules a Social Operating System of Homo sapiens. In our work, we go down to the hardware to explain social reward mechanisms behind triadic structures, information diffusion, and ultimately social network structure. We are building a first-of-a-kind computational model of this operating system, and will demonstrate first modeling results.

On-line Communities As "issue Publics": Network Structure Of Interaction In LiveJournal

Semenov, Alexander

Online Social Networks

Blog Networks, Russia, Social Networks Sites, Community, LiveJournal, Public sphere

THURS.AM1

LiveJournal is the most popular blogging service in Russia Its influence is so high that many public discussions and political debates started here and caused significant resonance in mass media. However it is still unclear whether Internet and blogosphere can be accounted for Habermas’s concept of public sphere. Habermas wrote that Internet would cause the split of global public sphere into small “issue publics” where people could discuss issues relevant to their interests exclusively. I deploy the concept of “issue public” to study online communities in LiveJournal. I demonstrate that formal “communities” of the latter serve mostly as indicators of taste, sources of news and so forth but not as “third places” of interaction. I redefine communities in LiveJournal in terms of their interactions around issues that shape “issue publics”. I specify 4 types of interaction: 1) befriending; 2) quoting/linking; 3) commenting; 4) posting. Each of them can be quantified and presented as a network. While the first one is the least informative (as the reason for befriending is unknown for the observer), the analysis of comments’ networks and map analysis (Carley) of postings can help to reveal the structure of “issue public” and its perspective towards an issue. To illustrate this approach I use the case study of the scandal at the department of Sociology, Moscow State University, which exploded in 2007 and was mediated mostly through LiveJournal.
### Online And Offline Ego-centered Network Data Collection

Vernon, Matthew C.; Danon, Leon; House, Thomas A.; Read, Jonathan M.; Keeling, Matt J.

Online Social Networks

Data Collection, Network Data, Contact Diary, Ego-centered Networks, Online Survey, epidemiology

**THURS.AM1**

The Social Contact Study was a cross-sectional study of the contact patterns of more than five thousand people from the United Kingdom. It employed postal and electronic questionnaires to elicit data about a responder's conversational and tactile encounters on a particular day, as well as the responder's view of the social encounters between their contacts. This study was designed to collect large-scale data on the contact patterns of individuals in the UK that would be suitable for modelling the transmission of infectious diseases such as influenza; during the data collection period, a Facebook tie-in was developed to increase online participation in the survey. In this paper, we compare and contrast the offline and online participants (the latter being partitioned into those who responded before the Facebook tie-in, and those who responded after it was launched). In particular, we show that these responder groups differ in their demography, as well as in the contact patterns that they report. Further, we show how demographic data can be used to make the different participant groups more comparable and to assess the impact of response mode on the supplied network data. These findings give us confidence in the validity of combining offline and online techniques to gather large-scale contact data.

### Online FriendDships In The Netherlands: Analysis Of A National-level Network

Corten, Rense

Online Social Networks

Large-scale Networks, Online Networks

**FRI.AM1**

Progress in research on friendship networks has long been hampered by data limitations. Most earlier studies use either a sample of ego-networks, or complete network data on a relatively small group (e.g., a single organization). The advent of online social networking services such as Friendster and Facebook, however, provides researchers with opportunities to study friendship networks on a much larger scale. In this study, we use complete network data from a popular online social networking service in the Netherlands, comprising over 8,000,000 nodes and hundreds of millions of online friendship relations. In the first study of its kind for the Netherlands, we examine the structure of this network in terms of the degree distribution, average distance, clustering, and community structure. First results indicate that this network shares features of other large complex networks, but also deviates in other respects.
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This paper explores the connection between organizational culture characteristics and informal network patterns within a high performing multinational organization. We collected both social network data and organizational culture data from over 20 branches of one of the biggest global express delivery companies operating in China. Three informal networks were mapped using a web-based survey: information flow, positive energy flow and emotional trust. At the same time participants responded to an organizational culture survey modeled after Cameron & Quinn’s competing value framework (Cameron & Quinn, 2005) and Schwartz’s value framework (Schwartz, 1992). The survey measures an organization along eight progressively more evolved dimensions of cultural emphasis: Pleasure, Safety, Power, Order, Achievement, Social, Learning and Harmony. Analysis showed that: (1) Network indices such as average branch in-degree, out-degree and density showed negative correlations with the less evolved Pleasure, Safety and Power cultural dimensions and positive correlations with the higher order Social and Learning cultural dimensions. These correlations were highest for the information network indices and lower, but still significant, for the positive energy flow and emotional trust network indices. (2) Branch E-I index negatively correlated with the Learning, and to a lesser extent, the Social cultural dimensions. The conceptual and practical implications of these findings will be discussed in the paper.
**Organizational Embeddedness And Strong-weak Ties: Why Mothers In Childcare Centers Seem To Contradict Granovetter’s Thesis**  
Small, Mario L.

**Qualitative and Mixed Method Network studies**  
Organizations, Adults, Strong Ties, Social Interaction, Childcare Centers

SAT.PM1

A common rule of thumb, derived from now classic studies in SNA research, is that strong ties tend to provide support but not new information, while weak ties provide new information but not social support. The notion derives from the basic principles that strong ties tend to be inbred, that only weak ties are likely to be bridges, and that closure encourages strong commitments. The present paper examines a case that appears to contradict the rule of thumb: among mothers of children enrolled in New York City childcare centers, many reported friendships providing strong forms of support but also consistently new information. Respondents formed strong bonds that were, nonetheless, compartmental in nature, strictly delimited in discursive, interactional, and spatial dimensions. In-depth interviews with 67 mothers (and some fathers) make clear that the organizational context in which the friendships are sustained make possible and encourage the formation of ties that exhibit both strong- and weak-tie elements but not the anticipated traits of either. Findings suggest probing more closely how interactional contexts structure the nature of strength in dyadic relations.

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**Organizational Networks And The Pre-diffusion Of Innovations**  
Grant, August E.

**Innovation, Diffusion, and the Adoption of Technology**  
Diffusion, Collective Action, Organizational Behavior, Communication Technology

THURS.PM1

Research on the diffusion of innovations has focused almost exclusively on the process of adoption and the effects of adoption of innovations. However, before the first consumer adoption of an innovation can take place, a set of organizational functions must be served. For example, the adoption of 3-D television requires organizations to 1) manufacture the television receivers, 2) distribute the receivers, 3) produce content in 3-D format, and 4) distribute 3-D content. This paper addresses these processes, identified collectively as the “pre-diffusion of innovations,” which leads to the “diffusion threshold”—the point at which the first consumer adoption can take place. The paper applies collective action and network analysis theories to propose a set of hypotheses regarding the pre-diffusion process and attainment of the diffusion threshold, addressing the strength and multiplexity of interorganizational linkages. The paper then applies network analysis to explore the pre-diffusion processes for a range of communication technologies including 3-D television, HD radio, HD television, tablet computers, and video game systems.
### Overlap And Distinctiveness In Adolescent Social Networks: The Effects Of Name Generators And Boundary Conditions
Valente, Thomas; Unger, Jennifer; Meeker, Daniela; Ritt-Olson, Anamara; Soto, Daniel; Fujimoto, Kayo

**Adolescent Friendship Networks**

Adolescents, Risk, Peer Effects, Friendship, Tobacco, alcohol

FRI.AM2

This study reports data from a survey administered to approximately 1,100 students in four high schools in southern California. We varied boundary conditions by asking friendship questions using an ego-centric format and then restricting nominations to the students’ grade and classroom. We also asked several name generators for the grade and class networks including: whom do you admire, think is the most successful, and think is popular. We present preliminary data indicating the degree of overlap and distinctiveness generated by these data. We also estimated regression models to determine correlates of overlap and distinctiveness.

### Overlapping Personal Networks I: An Examination Of The Effects Of Social Context On Juvenile Delinquency Using Overlapping Personal Networks
Roman, Caterina G.; Cahill, Meagan; Lowry, Samantha; McCarty, Chris

**Overlapping Personal Networks**

Adolescents, Criminal Behavior, Network Composition, Network Structure, Crime Networks, Social bonding

SAT.AM1

Our objective was to test whether structural position within a whole network and personal network compositions and structure predict juvenile delinquent behavior. A neighborhood in Montgomery County, Maryland with high gang activity was identified by local law enforcement and social service agencies. We attempted to interview all youth within the neighborhood boundary between the ages of 14 and 21 using the data collection program Egonet, ultimately interviewing 160 respondents. Each respondent provided the names of 20 alters, along with a set of 17 questions about each alter. Respondents also evaluated all 190 unique alter-alter ties resulting in a matrix for each respondent representing their social context, both inside and outside the neighborhood. The personal networks were merged adding respondents as alters. The resulting whole network showed social position within the neighborhood as well as common sets of alters on the neighborhood periphery. Our analysis will show the effects of social context, including gang membership, on levels of delinquent behavior.
**Peer Effects in Migrants’ Remittances: Evidence From Sibling Networks in 22 Rural Thai Villages**

Garip, Filiz; Snyder, Ben; Eskici, Burak

*Networks and Economics*  
*Diffusion, Social Capital, Economic Networks, Migration, Social Influence, Peer Effects*

**THURS.AM2**

Migrant remittances are one of the largest sources of external finance for many developing countries in the world. Prior research suggests altruism, insurance or investment as potential motives for remitting behavior. This paper suggests an alternative view: Remittance behavior may diffuse through social interactions in kinship networks in the origin community, and migrants may become more likely to remit if other households they are connected to also receive remittances. Using complete sibling network data from 7,331 households in 22 rural villages in Thailand, this study analyzes the changes in remittance behavior from 1994 to 2000. The longitudinal aspect of the data allows us to separate peer effects from other confounding influences. We also explore the influence of village level network structure on the diffusion of remittance behavior. Preliminary findings show that, even controlling for the most important determinants of remittances suggested in prior work, migrants’ remittance behaviors are strongly correlated with aggregate remittance patterns in their immediate kinship network. These results seem robust to the addition of household and community fixed-effects. These encouraging findings indicate the potential cumulative nature of remittance behavior, which carries important implications for future patterns of inequality in these communities.

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**Peer Group Structure and Online and Offline Communication**

Van Cleemput, Katrien  
*Poster Session*

*Adolescents, Communication Technology, Friendship*  
*SAT.PM3*

This study departs from an adolescent friendship network (in a secondary school) and explores the use of communication technologies in this context by using social network data. It investigates whether a person’s position in the network is related to his or her use of communication technologies, whether the nature of the relationship between two people and its embeddedness in the network predicts the intensity of offline and online communication between these two people, and whether substructures (e.g. ‘cliques’) shape the use of communication technologies. The study departs from both general theories on social networks and theories on studies on the social affordances of technologies. Data were collected among the 78 pupils of a fourth grade (15-16 year olds) in a Belgian secondary school. The results showed differences in the way face-to-face communication and communication through different technologies were related to three main structural mechanisms in the peer group.
### Peer Influence On Smoking Initiation And Cessation Among Adolescents

Schaefer, David R.; Haas, Steven A.; Kornienko, Olga; Bishop, Nicholas

Adolescent Friendship Networks

Adolescents, Selection And Influence, Smoking, Siena, Peer Influence, Health

THURS.AM2

We use a stochastic actor-based (SAB) model to investigate the processes by which social networks and smoking are related among US adolescents. Prior research has documented that smoking is a salient dimension of friendship selection and that adolescents influence one another’s smoking behavior. Unlike many of the behaviors investigated with the SAB approach, smoking is physically addictive. Thus, adolescents may have difficulty quitting smoking, even if their friends do not smoke. Accordingly, we differentiate between peer influence on smoking initiation versus smoking cessation. We use data from the National Longitudinal Study of Adolescent Health and a series of SIENA models to test the different forms of peer influence. Results indicate that adolescents are more influential for smoking initiation than for smoking cessation.

### Perceived Job Characteristics As Antecedents Of Intra-organizational Networks: A Case-study In A German Sme

Rank, Olaf N.; Brennecke, Julia

Organizational Networks

ERGM/P*, Perception, Intra-organizational Networks, Organizational Behavior, Job Characteristics

SAT.PM1

In the present study, we investigate behavioral antecedents of instrumental and affective intra-organizational collaborative networks. Specifically, we are interested in how the creation of network ties is affected by the way employees perceive their jobs on a number of dimensions. Applying the Job Characteristics Inventory proposed by Sims, Szilagyi, and Keller (1976) we analyze how employees’ perceptions of variety, autonomy, task identity, feedback, dealing with others, and friendship opportunities shape the structural patterns of intra-organizational interactions. Data were collected in a German medium-sized enterprise employing about 100 individuals. We analyze the effects of job characteristics on the structural patterns of collaborative networks by applying a class of bivariate exponential random graph models (ERGMs). We find that employees’ embeddedness in information and advice networks is influenced by the way they perceive different aspects of their jobs. More specifically, the individual job characteristics differently affect instrumental (i.e., information) and affective (i.e., advice) ties. For example, while perceived autonomy determines an individual’s activity within the information network there is no such effect within the advice network. Our study contributes to research on organizational behavior and intra-organizational networks firstly by emphasizing the influence of individual-level perceptions on network behavior and secondly by distinguishing these influences with respect to instrumental and affective relationships.
Personal Influence Among Core Ties On Social Network Sites
Innovation, Diffusion, and the Adoption of Technology
Homophily, Influentials, Social Networks Sites, Core Network

This paper examines social network sites’ capacity to host personal influence among core ties, asking to what extent users are “friends” with their core ties (persons who are especially influential in decision-making processes), and additionally, the extent to which core tie dyads interacting on these sites are homophilous. Findings suggest that connections between core ties are often absent from social network sites; however, certain categories of users (e.g. young adults), have forged online connections with a significantly greater proportion of their core ties on these sites, potentially making these users susceptible to undue influence as a result of online marketing. Further, levels of homophily among core ties interacting on these sites vary. Females have a significantly greater predominance of same-sex contacts in these networks, while older users are more likely to have networks consisting of a higher proportion of kin relations. These findings have implications for both the efficacy of marketing tactics targeting users' strong ties, and the areas of personal influence users are most susceptible to as a result of interaction with core ties on social network sites.

Personal Networks As A Way Of Understanding The Social Capital Of Households
Portales, Luis
Egocentric Networks
Social Capital, Personal Networks, Poverty, Households

In recent decades the increased interest in social capital has resulted in a proliferation of definitions which at times are incommensurable amongst themselves. Generally, however, all have the common notion of an actor which is embedded in a particular social network which gives him or her access to some kind of resource, or makes it act in a particular way. Furthermore, related to this conceptual ambiguity, there too has been a proliferation of ways to measure social capital, which is conceptually relevant when social capital is presumed to have a relationship with the quality of life of households, has some authors have suggested. Within this context, the present work here looks at personal networks as a way of understanding and analyzing the social capital of 96 households in a low-income community in the periphery of a large Mexican city. In the study households are considered as the ‘ego’s’ of the personal networks of their members, and their aggregate quality of life is assessed as influenced by this network. The name generators are not restricted to a certain number of alters, since the context in which alters are mentioned by the interviewees’ is also relevant. Constructed in this way, personal network of the households can help researchers better understand the different contexts, and ways that the households use their social resources to improve their quality of life. Finally, it also allows to map the relationships between ‘alters’, which can be analyzed with the traditional network metrics, allowing a more comprehensive view of how household social capital is used and formed.
**Personal Networks, Biographical Experiences And Professional Decision**
Behrmann, Laura

Poster Session

Egocentric Networks, Education, Embeddedness, teachers’ social network
SAT.PM3

Professional actions and decisions of teachers have a great impact concerning educational and occupational careers of their students. However, little is known on what these decisions are based on. This study focuses on the beliefs and interpretations which determine the actions of teachers. What are their ideas and conceptions of school, performance and success? Therefore special interest is put on the context of these beliefs: How important is the social embeddedness of teachers? What is the role of their social origin (working or middle class background), their social network as well as their personal relationships (i.e. family, friends and acquaintances) concerning their image of school, performance and success? Consequently focus is put on how teachers are affected by their biographical experiences and system specific socialization. Using narrative interviews egocentric network cards of twenty East and West German teachers were collected. This poster presents first results on how the conception of their task as teacher is linked to their personal network.

**Personal Values, Work Activities, And Collaboration Networks In The Fedora Project**

Cummings, Jonathon N.; O’Driscoll, Tony

Collaboration, coordination and cooperation

Collaboration, Coordination, Community, Collaboration Network, Tie Measures
FRI.PM2

We explored the impact of personal values and work activities on collaboration networks in the Fedora Project, which is an open source community devoted to developing a linux-based operating system. Participants in the Fedora Project engage in work activities such as contributing code, fixing bugs, maintaining packages, and writing documentation. To better understand participation in the community, we conducted initial interviews with 18 participants. These interviews revealed significant variation in the personal values relevant to their participation (e.g., communication, accountability, governance, recognition) as well as significant variation in the nature of the work activities that characterize their participation (e.g., duration, effort, novelty, complexity). In a web-based survey of 287 participants in the Fedora Project, we also found that the level of collaboration with other participants varied significantly (e.g., only 127, or 44%, of these participants reported collaborating with others on their work activities). For the 127 participants who reported collaborating with others, we collected ego network data on the content of their collaborative relationships (task interdependence, knowledge seeking, and socializing), which resulted in dyadic data on 495 ties (an average of 3.9 ties per participant who collaborated with at least one other person). In preliminary analyses, we found that personal values and work activities were both associated with the likelihood of collaborating with other participants as well as the content of their collaborative relationships. As a whole, we highlight how variation within individuals (as reflected in personal values) and variation within the social context (as reflected in work activities) shape the collaboration networks of participants in the community.
The aim of this paper is to analyze a company commander’s activity within his workplace community and external professional network in the Finnish Defence Forces (FDF) context. Relationship-based learning underlines horizontal growth and interactive relations in working life. The professional development of a person includes constantly increasing competence, which results from both developing expertise and expanding personal networks. The relationship-based learning is closely related to the concept of protean career, which involves the idea that the main sources of professional development in working life are the peers and other relationships at work. Also, a company commander’s personal life, formal and informal relations and accumulation of experience all affect her or his working behaviours. This is one of the realizations that broaden the perspective on professional development of company commanders from individual achievements to a larger framework of relations, where professional development is contributed to by the interaction of relationship of networks. The networks of company commander do not consist of the people only, but also meditative tools and other intelligent artefacts and this establishes the need to reflect the social networks in an innovative frame of reference of intelligent networks of relations. Social network analysis is a useful tool for the investigation of knowledge flows within organizations. It is important to pay closer attention how soldiers learn from in practice and from their colleagues too. Wenger (1998) introduces the concept of communities of practice and emphasises the meaning of practices in the process of knowledge creation. Knowledge creation and learning take place through complementary processes of participation, which means the daily, situated interactions and shared experiences of members of the community working towards common goals. The debate on learning and knowledge creation in organizations has been empowered by many contributors in the last decade. The idea of learning in an organizational context has its basics in the principles of learning through joint activities and interaction with others; the central importance of sociocultural theorists. Bereiter (2002) writes about knowledge-building community. Knowledge building can be described as collaborative working for developing conceptual creations, for example practices and theories. One of the benefits of knowledge building is that it makes the thinking of the participants with different expertise open and perceptible.
<table>
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<tr>
<th><strong>Post-disaster Formation Of Sub-groups Based On Impact Experience: Parents Of Injured Vs. Deceased Children</strong></th>
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<tr>
<td>Murphy, Arthur D.; Jones, Eric C.; Norris, Fran H.; Prigerson, Holly G.</td>
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<tr>
<td><strong>Networks and Culture</strong></td>
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<td>Social Support, Mexico, Resilience, Disaster Response, Community Networks, Coping Strategies</td>
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<td><strong>SAT.AM2</strong></td>
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<td>Following a disaster, social support can be high, but then typically dissipates and is even accompanied by conflict as resources wither and people are expected to return to some sense of normalcy. Although social support declines, it does not cease to exist—but may coalesce in subgroups. In the case of a day care fire in Hermosillo, Mexico in June 2009, many parents lost children while the children of others were injured. We interviewed 227 parents and caretakers, soliciting from each of them up to seven names (and several attributes) of other parents/caretakers. Most of the parents and caretaking grandparents did not know each other or even know of each other before the fire. Nine months after the fire, almost everyone knows at least someone else who had a child at the daycare, but clear (although moderately interconnected) subgroups have formed of bereaved parents, and of parents of injured/burned children.</td>
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Predicting Survival From Social Network Metrics In Bottlenose Dolphins
Stanton, Margaret A.; Singh, Lisa O.; Mann, Janet

Friendship networks
Centrality, Alliances, Animal Networks, Affiliation Networks, Friendship Formation

WED.PM1

In human and non-human studies social network analysis is rarely linked to critical biological parameters such as survival and reproduction. This study addresses the potential relationship between sociality and fitness in wild bottlenose dolphins. Although social complexity is presumed to persist because it increases survival and reproduction, few studies have empirically tested how individual social variation relates to fitness. Like humans, bottlenose dolphins society is characterized by compositionally and temporally variable groups (high fission-fusion). Since both sexes remain in their natal range as adults, important social relationships may form early and persist later in life. Using the extensive 25 year Shark Bay Dolphin Research Project dataset we employ social network analysis to determine whether early social patterns predict juvenile survival. In this analysis, the survival status of 56 juvenile dolphins with >20 sightings serves as the binary response variable in a rank-order logistic regression with calf sex and network metrics including degree, strength, betweenness, eigenvector centrality, and clustering coefficient as explanatory variables. Sex segregation in adult behavior suggests that different metrics have different predictive capabilities for males vs. females. Inquires that incorporate network theory into traditional hypothesis testing are imperative to increasing our understanding of animal sociality and behavior.

Professional Networks Of Underrepresented Minorities In Science: Building And Accessing Career Resources In Early Career Stages
Pinheiro, Diogo L.; Melkers, Julia

Academic and Scientific Networks
Academic Networks, Underrepresented Minorities

FRI.AM2

Minority faculty are dramatically underrepresented in science. Qualitative studies of minorities in the workplace point to evidence of exclusion, and qualitatively different experiences in the work environment. Yet, little is known about how these factors matter in the structure and resources of professional networks of underrepresented minorities (Blacks, Hispanics, and Native Americans). Most studies have focused on work environment issues, and little is known about minority networks. Do underrepresented minorities develop different career-oriented networks than the majority? Are the structural aspects of underrepresented ethnic minorities more similar to those of other underrepresented groups, such as women? What explains patterns in racial homophily among minority scientist’s professional networks? Based on data collected as part of an NSF-funded national study of academic scientists, this paper reports findings regarding the structure, composition, and career resources in the professional networks of minority academic scientists. Preliminary results using a series of explanatory models and statistics show that although minorities do not have significantly different network sizes, they do differ in terms of network composition and resources. More specifically, minorities tend to have larger collaborative networks outside their current institutions. Related, underrepresented minorities are much more likely to have met close collaborators at academic conferences.
In project management it is the project manager’s competence in encompassing strategic considerations in the practice of his or her personal communication that influences the conduct of and thereby the outcome of projects. However, project communication is often restricted by fixed procedures and systems, which may be the reason why research show that 95% of project failure is caused by bad communication. Project managers are to maintain relations to internal and external stakeholders through dialogue in order to achieve high performance and project success. Data show that project managers go beyond the traditional frame of project communication and their communication networks indicate strong understanding of the power of influence for the sake of the project. Furthermore project managers intentionally seek out key roles in their peripheral networks to bridge the gaps of structural holes with the aim of enhancing progress and performance of the project and thereby the company as a whole. By realising and embracing communication as more than status reports, mail correspondence and weekly information meetings, doors open to a whole new range of ways to influence. The purpose of this paper is to expand the perspective of bridging structural holes and to explore to what extent awareness of communicating strategically in communication networks is linked to influence and effectiveness in project management. Social network analysis and semantic network analysis has been used to identify factors influencing the communication networks in project management in three major Danish companies.

The association of encouragement within family network systems and engagement in physical activity following receipt of personalized family health history information was investigated. Parents (N=238) nested within 126 multigenerational Mexican origin households enumerated members of their family networks and indicated from whom they had received encouragement to increase their levels of physical activity. Parents also indicated which family members they encouraged to engage in physical activity. The current analyses focus on encouragement received and provided to their enumerated children ages 5-20 years (N=493). Encouragement ties and levels of physical activity were assessed at baseline and 10 months following receipt of personalized family health history information. At baseline, 15.6% of parents reported to have received encouragement relationship with at least one of their children, which increased to 26.5% at follow-up. The change from a non-reciprocal parent-child encouragement relationship to a reciprocal encouragement relationship with a participants’ son (either father-son or mother-son) was associated with a significant increase in the parents’ physical activity of almost 40 minutes per week (p=.002). This association was not significant for parent-daughter encouragement relationships. Our findings indicate that parents can become more physically active when mutual encouragement to be physically active is initiated with their sons. In the context of a population at high risk for common chronic diseases, our findings imply the potential of network-based interventions targeting family systems. Future analyses will address the impact of homophilous encouragement ties on physical activity.
## R&D Networks, Knowledge Transfer And Research Impact

Takahashi, Marissa

Qualitative and Mixed Method Network studies

Small World, Multilevel Analysis, Knowledge Transfer, Network Performance, Network Structure, R&D

FRI.AM1

Traditional, repository-centric knowledge management (KM) has failed to deliver on its promise of easy access to expert knowledge for competitive advantage. Reexamination of the basic assumptions about knowledge has led to conclusion that the dynamic nature of knowledge that resides in people’s minds cannot be managed but can only be facilitated through interactions within social structures such as social networks. This study examines the task-focused social network of corporate R&D project teams. These R&D teams have the specific task of conducting research projects that advance the state of the art of the knowledge in a specific domain, as well as the mandate of commercially exploiting their results. To achieve their tasks, R&D teams collaborate, both face-to-face and electronically, with a network of diverse participants within their global ecosystem - a complex mesh of interconnected stakeholders dispersed geographically and across time zones. Drawing on Diffusion of Innovations Theory and Small-world-network, this study aims to examine how network characteristics influence the knowledge transfer processes that facilitate the creation of research impact. This study posits that knowledge transfer among the network stakeholders is a facilitating mechanism in generating research impact. This study further posits that the structural and relational characteristics of the network influence knowledge transfer. The network perspective provides a lens for examining the complex

## Race, Gender And Social Capital On Facebook

Sanders-Jackson, Ashley N.

Poster Session

ERGM/P*, Social Capital, Race, Gender

SAT.PM3

Research has suggested that women and minorities may form different types of social networks than their male or white counterparts. This may be particularly important for women and minorities in terms of access to social capital. This research uses ERGM and other methodologies to compare social network composition on Facebook of women and men and between White individuals and minorities using a college student sample at a major eastern university. Results indicate that whites have greater homogeneity of network ties than minorities, that minorities have different structural properties of their networks than whites, and that there are also differences between women's and men's social networks.
**Racial Segregation And Assortative Sexual Mixing During The Transition From Adolescence To Young Adulthood**

Ford, Jodi L.; Browning, Christopher R.

### Social Networks and Demographics

Adolescents, Race, HIV Risk, Friendship Network, Segregation, assortative

WED.PM1

Assortative sexual mixing by race is more common among the African American population and significantly contributes to the extensive racial disparities in HIV observed in the U.S. today. Research has found that structural forces, particularly racial segregation shape assortative sexual mixing patterns by reducing opportunities to interact with dissimilar others. However, our understanding of the longitudinal effects of exposure to racially segregated structural and social environments on assortative sexual mixing across the life course is limited. This study extends previous research and examines the extent to which exposure to multiple contexts of racial segregation during adolescence shapes racially assortative sexual mixing preferences and patterns during young adulthood. Our study utilizes secondary data from Add Health, Waves I and III. The sampling frame consists of high school students in 9th-12th grades at Wave I. Data sources include school administrator and student surveys and geographic administrative data from the 1990 and 2000 Census. Independent variables of interest include neighborhood racial heterogeneity at Waves I and III (the latter is included to account for concurrent opportunity), school racial heterogeneity, school network racial segregation and ego network racial heterogeneity. Dependent variables include: (1) preference to marry within the same racial and ethnic group and (2) the occurrence of assortative sexual mixing by race and ethnicity within the past year. Analyses include the development of network measures and multilevel regression analyses. All multilevel models are stratified by race and ethnicity to better understand unique patterns within groups.

**Re-assessing Dark Networks By Incorporating Spatial Data Into A Multi-modal Analysis Of Insurgent Groups**

Murphy, Philip J.; Everton, Sean; Roberts, Nancy

### Criminals, Gangs, Terrorists, and Networks

Spatial Analysis, Betweenness Centrality, Dark Networks

SAT.PM1

An analyst’s objective in analyzing covert, illegal, or militant groups is to describe and characterize the structure and interactions of these groups in a manner that will allow interventions to destabilize, disrupt, or otherwise prevent further violent or extreme activities. As such, the practical application of network analytic output has become increasingly valuable to analysts specializing in understanding dark networks as part of counter insurgency (COIN) and counter terrorism efforts. As more information becomes available, the incorporation of multi-modal data into the analysis of dark networks has served to greatly clarify the various roles and relationships between agents in a network and has become increasingly commonplace in the field. But the main focus remains on practical application. It is for this reason that the recent extension of measures of centrality to incorporate physical location presents an intriguing analytic option. We use the network of actors at two time points within the Jemaah Islamiyah organization. In a comparative analysis, we assess the new spatially corrected centrality measures against the more commonly applied centrality measures for their use with two-mode and multi-modal dark network data and the opportunities and challenges that they present.
Reasoning About Large-scale Social Networks With Probabilistic Logic

Grgić, Sinisa; Lauc, Davor

Empirical Large-N Networks

Link Prediction, Large-scale Networks, Algorithms, Data Mining, Node Identification, Network Matching

SUN.AM2

Network Matching and Link Prediction are relatively unexplored in the area of Social network analysis, but solving those problems in an efficient way is crucial in many real-world applications. Network Matching is a generalized problem of node identification. Node identification (matching individuals) is a task of unique identification a person in the analyzed network as a known entity in existing network, based on the known links and additional attributes. In the Link Prediction (social) graph is build or completed by inferencing links based on existing network's structure and node attributes. Both problems in the most real-world applications have to deal with incomplete information and probabilities. In perfect information environment, those problems would be naturally modelled in the predicate logic, hence, the real-world problems require methods of probabilistic logic ("ProbLog" framework). Two large-scale social networks were used to develop and test the model: (1) the sample of the largest social network consisting of 372 volunteers with over 1M links; (2) huge social network generated from all available Croatian public records with 540,000 individuals and over 100 million links among them. First network was matched with the second using developed model, with completeness of 86.8% (323 individuals). Results are evaluated against matched volunteers with an error of 5.3%. Probabilistic logic link prediction model was applied on a second network with promising results.

Reform At The Edge Of Chaos: Connecting Complexity, Social Networks, And Policy Implementation

Daly, Alan J.; Moolenaar, Nienke M.

Leadership Networks

Implementation, Organizational Change, Leadership, Longitudinal Analysis

SAT.PM1

Reforming public education is often a refrain in political discourse. Pronouncements of the failure of the educational systems often lead to reform policies meant to improve schooling. Once in place the assumption is that these policies will be implemented with fidelity and result in the intended outcomes. However, what is often lacking is careful consideration or examination of how policies are implemented by actors. Drawing on complexity theory, this paper argues that common rational assumptions undergirding current reform policies (such as linearity and uniformity) limit our understanding of how policy is enacted through complex social interactions. In this paper we examine the interactions among leaders across a school district over time as they implement reform. Our aim is to better understand how policy implementation evolves through social interaction. In a three-year study, we examined the implementation of a reform policy targeted at improving a consistently underperforming school district under progressive sanction. We collected data at three time points and utilized longitudinal social network modeling (SIENA) to illustrate how districts can be conceptualized as complex adaptive systems. Results suggest a distinct complex pattern of social interactions underlying the process of policy implementation with district and site leaders tending to form relationships based on reciprocity, triadic closure, similarity, popularity, and administrative experience.
### Relation Algebra For Directed Bipartite Networks

Eyre, Sean K.; Johnson, Benjamin; Johnson, Anthony; McCulloh, Ian

This study discusses appropriate relational algebra operations to extract social networks from directed bipartite networks. In addition, the concept of “link strength decay” is introduced, which implies that the likelihood that two nodes in a single mode are connected decays as the path length through an alternate mode increases. This work has direct application for extending social network analysis of criminal and terrorist networks beyond visual analysis to ensure the proper application of analytical methods.

### Relational Carrying Capacity: Limits On Network Development

Monge, Peter R.; Margolin, Drew B.

This paper articulates and expands the concept of relational carrying capacity (Monge, Heiss, & Margolin, 2008). The paper begins by distinguishing nodes from links as distinct forms of adaptive entity. Based on evolutionary principles of variation, selection, and retention, it then presents four related but distinct resources for the formation and maintenance of links between adaptive nodes: material resources, information processing capacity, normative compatibility, and adaptive freedom. Theoretical arguments and empirical support are offered for each pressure individually. Arguments are then developed which suggest that adaptations by nodes or links to limit the pressure imposed by one constraint increase the pressure imposed by other constraints, leading to a general limit on network growth. In the final section, these arguments synthesized into a model of network growth, limitation and potential collapse. The model is used to derive recommendations for sustainable network development.
Relational Compensation In Entrepreneurial Networks

This study examines the importance of network access to resources for new firm survival. It focuses on how new firms with comparably poor network access at their gestation will compensate by developing access to resources through alternative relationships. New firms differ in their access to resources that are valuable and relevant. During the start-up process, the initial resource-based is continually modified as some resources are consumed or discarded and new resources are acquired and integrated in the existing resource base. Accordingly, new firms rely not only on the resources initially at their control by the time of their founding, but also on their ability to negotiate favorable terms for the exchange of valuable resources during their formation. We examine the networks of supported spin-offs, non-supported spin-offs and independent ventures as these kinds of firms vary in terms of their access to relevant resources and in particularly those from a parent company. In a study of 139 three year old firms, we found differences in the value that the three kinds of firms attributed to their network with regard to the acquisition of managerial and organizational resources, but not with regard to technological and market resources. Further, we found systematic differences in terms of the sources utilized to attain different kinds of resources. Together, these findings suggests that non-supported spin-offs and independent ventures that have survived their first three years have been capable of compensating for their initial lack of access to relevant resources from parent companies by developing alternative relationships.

Relational Components In The Formation Of Electoral Politics

Electoral research has a persistent tradition of analyzing the Voter’s Choice by probing into personal behavior. We do not follow the mainstream assumption that, for understanding the formation of electoral publics, the individual elector should be the crucial unit of analysis. Neither should he or she be given credit as a major source of information in tracing the relevant assembly lines in the dockyards of partisan identity-building. We propose alternate ways to monitor the coupling and decoupling among initially loose and widely self organized collectivities that shape up while Election Day approaches. Not individual citizens, but emergent electoral components act and interact with changing acquired weights, contributing in non-linear modes to the pressures that forge a multitude of intentions into a limited array of alternate collectivities (“Electorates”), until the game is called, and the body politic delivers. The outcome of these widely self-organized processes has produced the special mix of the new body politic. It can best be traced from collective behavior marks, which the big event has left all over the political landscape. Our measurable units are numerous small-scale intra-party movements derived from grass roots facial contacts. By comparing local voting data of the 2009 German Elections with preceding results, we get a database of grass roots flows in a multi-party matrix. The analysis of such data will be guided by Harrison White’s theory.
**Relative Influence Of Network Effects In Actor-based Models**

Indlekofer, Natalie; Brandes, Ulrik

Network Dynamics

Longitudinal, Dynamic Network Analysis, Siena, Network Evolution Factors, Actor-Based Stochastic Modeling, Model Assessment

THURS.PM2

Actor-based models are designed for the statistical analysis of longitudinal social networks given as network panel-data. The aim is to detect formation rules, called network effects, that govern the unobserved evolution between consecutive states. The evolution is assumed to be a sequence of single changes resulting from myopic actor decisions and is modeled by a parameterized Markov process with parameters indicating the influence of associated effects on network dynamics. The interpretation of parameter estimates is mainly based on statistical significance and algebraic signs, while parameter sizes, although highly informative, are often ignored since they are not comparable in terms of several aspects: The relation between parameter sizes and amount of influence varies among network effects and model specifications and depends on data characteristics, such as network size and density. We introduce a measure that defines influences of included effects on instantaneous actor decisions. Applied to sequences of changes, sampled by MCMC methods, it reveals relative influences on network dynamics. Since the measure depends not only on parameter sizes but also on associated effects and the current network, influences of effects are comparable across different models and data.

**Reliability And Robustness Of Network Analysis From Dynamic Social Events**

Olson, Jamie F.; Carley, Kathleen M.

Event-based networks

Entropy, Dynamic Network Analysis, Event Data, Data Reduction, Analytical Methods

FRI.AM2

The propagation of uncertainty from dyadic observations to computed network analytic measures suggests serious concerns when those observations come from noisy and dynamic human social behavior. Networks are generally constructed by combining all relational events in a particular time interval to create a network connecting all individuals who interacted in that time interval. As the aggregate time interval increases, the larger number of observations decreases the dyadic variability which in turn percolates up, improving the reliability of an analysis of the network structure. However, this aggregation also introduces the ecological fallacy, with the result that conclusions at the network level may not have meaning or validity at the underlying relational event level. We show how information theory can be used as a heuristic to judge the risk of committing the ecological fallacy and to guide the choice of an aggregate time interval. Using real datasets from a variety of human social contexts, we compare the information lost to the reliability gained, illustrating this bias-variance tradeoff quantitatively and (hopefully) enabling more informed aggregation decisions.
### Representation Of Complex Cognitive Pattern Stratification

**Evans, Carolyn A.; Woelfel, Joseph**

**Poster Session**

SAT.PM3

The stratification of eight large cognitive patterns (anthropology, communication, economics, geography, library and information science, political science, psychology, and sociology) was examined using 2008 interdisciplinary citations and journals. Networks were developed for the 13-21 journals (depending on discipline) that appeared as a top 5 journal in at least one of the 8 ranking methods available in the Journal Citation Report (JCR) database. Asymmetries in information flow between pairs of disciplines are considered indicators of gradients. “Higher” disciplines exert greater influence over “lower” disciplines.

### Return On Investment Of Teachers’ Social Networks

**Kim, Chong Min**

**Poster Session**

Education, Decision-making Structures, agent-based modeling, Return on Investment

SAT.PM3

Social network could be formed randomly or strategically depending on the types and processes of social networks (Jackson, 2008). Previous social exchange theories based on sociological perspective have explained that repeated social network could reduce uncertainty, which leads to relational commitment. In addition, other studies based psychological perspective have insisted that that repeated social network could produce positive emotion, which leads to relational commitment (Lawler and Yoon, 1996). And recent study integrated sociological and psychological theories into an economic model of utility in order to maximize utility at equilibrium condition (Coleman, 1990; Frank and Maroulis, 2009). However, two key challenges still remain when we model strategic network formation; to model the costs and benefits of network and to model the effect of individual incentives on network outcomes (Jackson, 2008). Thus, the purpose of this study will integrate three types of costs and benefits into the model of return on investment of social network to model the mechanism of strategic social network formation. Research questions will be Can the return on investment of social network model the mechanism of strategic social network formation? Computational simulation studies will be conducted by using agent-based modeling. Anticipated results will be that the return on investment of social network could model the mechanism of strategic social network formation and increasing individuals’ return on investment of social network may not lead to efficient knowledge flow and collective change.
Revealing Legitimacy Structures From Discourse. A Semantic Network Approach To Organizational Identity Construction.
Barberio, Vitaliano; Lomi, Alessandro

This paper argues about the role of discourse in shaping legitimacy through organizational identity construction. Then it introduces a semantic network method for the structural characterization of discursive organizational identity. In managerial literature organizational identity is referred to either as a set of shared "mental models" emerging from organizational assessment or as a set of "claims" borrowed from a reference institutional field. We conceptualize discursive organizational identity in a way that bridges these two points of view. Discourse is here regarded to as a "symbolic space" of identity construction. Within this space, both issues arising from the operational environment of an organization and societal judgments of understandability of the entailed organizational action interact in complex ways. In order to explore this interaction a semantic network method is introduced. Departing from rhetoric analysis, whose focus is on stylistic elements of communication, the method proposed here allows the representation of discourse as a structural symbolic space. Meaning structures are represented as networks of voices (as spokesmen) and symbols (as words). Once discourse’s elements are modeled as networks of voices and symbols, a number of positioning techniques can be used for assessing their interaction. Here we have illustrated the use of correspondence analysis for positioning both spokesmen and issues and the use of structural equivalence for revealing the institutional model entailed into claims. In order to illustrate our method empirically we have analyzed the electoral manifestos of six candidates running for presidential elections recently held at a large university in northern Italy.

Revisiting Small-World Networks: Is The World Small?
Opsahl, Tore

Small-world networks have been found to exist in abundance. Most studies focus on observing an average distance among nodes that is comparable to one found in corresponding classical random networks. Two issues are worth considering when comparing observed properties to random ones: (1) what is a corresponding random network, and (2) how close should an observed value be to the randomly expected one to be deemed comparable. In this presentation, I will show how various types of randomisations impact on the randomly expected value of both the average distance and a second small-world property, clustering, in a range of domains, and how to determine whether the two properties are statistically non-significantly different from and significantly higher than, respectively, the randomly expected values. The results demonstrate that small-world networks are far from as abundant as previously thought, and only a few networks satisfy both properties.
**Road Networks And Insurgent Violence**

Cunningham, Dan; Schroeder, Robert; Everton, Sean

Criminals, Gangs, Terrorists, and Networks

Insurgencies, epidemiology

SAT.AM1

This paper applies an epidemiological model to understand the relationship between road networks and insurgency in the Philippines. Conventional wisdom holds that transportation infrastructure, namely roads, is not only an indicator of development and sign of a government’s reach over its territory, but also a potentially critical component of any development strategy for countering insurgencies (Kilcullen 2009). Zhukov (2010) challenges this notion and utilizes an epidemiological model in which roads can in fact transmit insurgent violence from an “infected” village to a “susceptible” village. Just as road networks can benefit a government or a counterinsurgent’s development policies, they can facilitate insurgencies by reducing an insurgency’s operational costs, permitting rapid access to and extraction from targets, easing day-to-day operations, and enabling deliveries of supplies to establish base camps (Zhukov 2010). We apply Zhukov’s model to the southern Philippines by using the presence of Moro Islamic Liberation Front (MILF) camps as an indicator of insurgent activity along with road network data from the Philippines National Statistic Office (NSO). Our initial findings support Zhukov’s work and may begin to validate the idea that a developmental strategy centered on road infrastructure can present mixed results when dealing with an insurgency.

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**Rules Of The Game: Generalized Exchange And Dominance Hierarchies In A Gang Homicide Network**

Papachristos, Andrew V.; Lewis, Kevin

Criminals, Gangs, Terrorists, and Networks

ERGM/P*, Exchange, Gangs, Ucinet, Dominance, Crime Networks

SAT.AM1

The modern street gang exists in a social milieu where social status is determined by the manner in which individuals and groups handle violence and the threats thereof. Gang members frequently refer to street life—and the norms that guide it—as simply “the game.” Like other games, successfully participating in the street game demands adherence to certain rules, such as the willingness to violently redress a threat, the avoidance of “weak” behaviors, the protection of one’s friends, and so on. This paper combines ethnographic data and detailed police records to ascertain if the rules of the street game described by gang members in fact contribute to the relative social standing and perceived dominance of groups. Qualitative data are used to devise theoretically relevant rules of the street game and, then, exponential random graph models are used to test the relatively prevalence and importance of said rules on observable patterns of gang violence. Results suggest that while some of the rules of the game are indeed good predictors of observable patterns of violence, many of the prized norms of gang members have little empirical relation to group identity and status.
**Rumoring In Informal Online Communication Networks**

Spiro, Emma S.; Acton, Ryan M.; Sutton, Jeannette; Greczek, Matt; Butts, Carter T.

Online Social Networks
Communication Networks, Disaster Response, Online Networks
THURS.PM1

Informal exchange of information, including gossip and rumor, is a characteristic human behavior. Literature suggests both mundane and important information are exchanged via social ties. In this work we explore rumoring about the 2010 Deepwater Horizon oil spill occurring on a popular micro-blogging service. In particular we evaluate the extent to which possible rumor determinants -- the perceived importance, degree of cognitive unclarity, and relevance to behavior of the topic -- affect the volume of information exchanged via the social network. This work is also of practical concern because, as past work indicates, informal communication ties are often the primary means by which time-sensitive hazard information first reaches members of the public. Changes in local network structure during the event are also discussed.

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**School Networks And Integration Of Migrant Children In Russian Schools**

Ivaniushina, Valeria; Alexandrov, Daniel

Adolescent Friendship Networks
Adolescents, Migration, Schools, Friendship, p2 model
WED.PM2

The paper presents preliminary results from our ongoing project on children from migrant families in Russian schools. The work is based on two original surveys: pilot survey in 2009 (22 schools, 66 classes, 1,200 students) and large survey in 2010 (104 schools, 409 classes, 7300 students). We measure ethnicity, language use, migration history, academic effort, grades, pro/anti-school attitudes etc. Social network approach (analysis of classroom friendships) is used as a tool for measuring social inclusion / exclusion. School, along with the neighborhood, is the most immediate environment of the integration of youth. Students’ integration can be measured by many different ways, in particular: (a) through attitude questions on self-perceived popularity and/or sense of belonging; (b) through analysis of actual relations and choice of friends. We measure both aspects, and our research questions are: how ethnicity (controlled for background characteristics -- gender and socio-economic status) influences the choice of friends; whether ethnicity influences student’s position in a classroom network; how ethnicity influences relations between self-perceived popularity and actual network position. We use multi-level p2 models and multivariate statistics. Our findings are in accordance with the results of similar surveys in Belgium and the Netherlands (Baerveldt e.a., 2007; Vermeij e.a., 2009). For example, in Russia the ‘majority’ students are ‘ethnically blind’ in their choices of friends while children from ethnic minorities more frequently choose friends from ethnic minorities, but not necessarily of their own ethnicity.
School/community Policing—mixed Methods Network Strategies In A London Borough Focused On Youth Crime Prevention

Dickmann, Ellyn M.; Briers, Andrew N.; Cross, Jennifer E.

Criminals, Gangs, Terrorists, and Networks

Criminal Behavior, Schools, Law Enforcement, Community Networks, neighborhoods, School Policing

SAT.PM1

This study will present the results of a mixed methods study (network analysis, interviews, and open-ended questionnaires) that were completed by various community workers and school-based police officers focused on youth crime prevention in a London neighborhood. School-based police officers, community workers, and school personnel completed questionnaires designed to collect information related to relationships focused on developing and implementing youth crime prevention strategies as outlined by the UK’s Youth Justice Board and London Metropolitan Police Services. This study shows how networks based in neighborhoods can positively impact the implementation of national strategies related to youth violence prevention.

Scientific Consensus And The Structure Of Scholarship

Lee, Stephanie Y.

Academic and Scientific Networks

Citation Networks, Academic Networks, Education, Structural Equivalence, Consensus Analysis, Scientific Production

FRI.AM2

How is scientific consensus related to the structure of scholarship? Recent works on network structures of academic articles have examined cohesion in network structures of researchers, hypothesizing that cohesion is related to ability to come to consensus. However, these studies map network structure without relating it to a measure of consensus on relevant research ideas. In this paper, I test the predictive power of structural equivalence and network cohesion on a measure of consensus for a subfield of academic research in which there is disagreement. I construct two citation networks, a bibliographic coupling network and a direct citation network, which represent structural equivalence and cohesion, respectively. I then examine whether subgroups found in these networks have higher consensus, and test hypotheses about how structure affects groups’ ability to reach consensus. The findings show evidence that structural subgroups do indeed correspond to cognitive groupings of authors, but differences in cognition do not completely explain the network structure. This implies that scientific consensus is at least partly dependent on structural cohesion and agreement on cognitive authority.
Semantic Analysis Of Gatekeepers In Collaborative E-learning Environments.

Stuetzer, Cathleen M.; Carley, Kathleen M.; Koehler, Thomas; Thiem, Gerhard; Diesner, Jana

Words and Networks - Roles, Health, Methods
Communication Networks, Communities Of Practice, Semantic Networks, Role Theory, Learning Communities, Gatekeepers
FRI.PM1

The analysis of social roles in social structures has a long tradition in the social sciences. Especially the structural positions of social actors are crucial for studying processes of innovation and diffusion. Prior research has shown that in digital knowledge networks, gatekeepers acquire crucial positions by forming dynamic chains of flow in the process of knowledge transfer. Therefore it is important to be able to detect and describe the function of gatekeepers for digital learning processes. We present a case study in which we explore the role of gatekeepers in formal and informal online learning communities through a combination of social network analysis and relational text analysis. Our data come from e-learning discussion boards that are actively used by eleven universities located in the state of Saxony, Germany. In order to examine the flow of information through the network of learners and educators and to analyze the network data, we use the network text analysis tool AutoMap and the network analysis tool ORA. We extract semantic networks from the data, and combine them with social network data. By performing structural analysis on the resulting relational data we identify the roles of gatekeepers in this e-learning environment as well as the relationship between semantic network structure and information flow processes. With this research we ultimately aim to contribute to a better understanding of the relationship between theories about socio-technical networks, communication, and human learning.

Sequencing In Information Dissemination In Scholarly Networks

Mo, Guang Ying; Dimitrova, Dimitrina; Gruzd, Anatoliy; Hayat, Zack; Mok, Diana; Wellman, Barry

Academic and Scientific Networks
Structure, media use, information dissemination, Sequence
FRI.AM2

This study investigates social networks from an original perspective of sequence, which is an important dimension of social structuring time. Although information and communication technologies (ICTs) enable information dissemination to numerous receivers simultaneously, people do not necessarily send out messages to all their contacts at the same time. Instead, they choose different media at different times to pass the information to different people. The sequence of the contacts is a result of the actors’ process of determining on the primary and secondary contacts within social networks. This study investigates how hierarchical structure in social networks influence actor’s sequencing of information dissemination in scholarly networks. To answer this question, I study information dissemination in scholarly networks within the Graphics, Animation and New Media (GRAND) Network of Centres of Excellence. Interviews were conducted with 30 professors in GRAND to understand their sequences in providing information within their projects. To find the relationship between social structure and sequencing process, I asked interviewees how they contact collaborators under three scenarios: important / non-urgent, urgent, and routine. Preliminary findings show (1) the stronger the strength of ties, the more prioritized they are in the sequence; (2) formal position in the networks is related to awareness of sequencing; (3) the awareness of network members’ formal positions and personal preference is related to the development of norms of sequencing. Providing a new perspective for social science research, the findings of this study contribute to a further understanding of the formation of social norms in social networks.
Sex And Drug HIV-risk Networks Among Latino Migrant Men In A New Receiving Environment

Kissinger, Patricia ; Friedman, Samuel R.; Muth, Stephen Q.; Schmidt, Norine; Anderson-Smits, Colin; Shedlin, Michele

Social Networks and Health
HIV/STD, Sex Networks, Drug Use
SAT.AM1

Introduction: In 2005, Hurricane Katrina led to an influx of Latino migrant men (LMM) to New Orleans to work in reconstruction. An urban environment with high rates of drug use, HIV, and other sexually transmitted diseases (STDs), New Orleans had a relatively small Latino population prior to Katrina. Marginalized by legal status, poverty, low education, and lack of English language proficiency, LMM are more vulnerable to diseases and drug use. In new receiving environments, vulnerabilities may be magnified. Our prior work revealed that isolation from sexual partners/families led some men to have, and sometimes to share, multiple short-term sex partners, including female sex workers which could increase their vulnerability to HIV/STDs. The influence of risk networks on LMM risk and resilience for HIV/STDs is the focus of this study. Methods: Respondent-driven sampling with steering incentives produced a cohort of 25 drug using and 25 non-drug using LMM egos. Participants will be given monetary incentives to recruit 2 generations of alters with an attempt to uniquely-identify all persons and links between them. Pajek and MS Access will be integrated to facilitate data capture of participant-aided sociograms. Sociometric data, merged with computer-assisted personal interviews, will be analyzed to: 1) determine feasibility of conducting sociometric analysis with LMM; 2) determine network predictors, particularly k-plex rank, of HIV/STD risk and morbidity and 3) explore the relative contribution of network predictors beyond individual, cultural and other environmental factors on these outcomes. Results: Data collection will start in December 2010. Preliminary findings will be presented along with lessons learned.

Similarity Feeds Connection, Diversity Spices It: Exploring The Structure Of Advice Networks In A Knowledge Network

Koku, Emmanuel F.; Dimitrova, Dima

Education, knowledge and learning networks
Knowledge Networks, Advice Network, Communities Of Practice, Collaboration Network, scholarly networks
SUN.AM1

Increasingly, collaborative learning has formed the cornerstone of knowledge transfer and innovation in a variety of social arenas, from scientific research to business, education, or health. To meet the challenge of knowledge transfer and innovation, the Canadian government created the Networks of Centres of Excellence (NCE) program, which fosters research and innovation in partnerships with industrial and government participants. Such trends lead to the proliferation of organizational forms that have to grapple with several challenges, including how to share knowledge among geographically dispersed communities of professionals. Advances in technology provide the infrastructure for contact, though they provide only a partial answer. Social network analysis emphasizes the role of informal network connections in channeling access to information and advice. However, there is paucity of data on how contextual variables (such as managerial practices or formal policies) interact with other structural dynamics in shaping the flows of advice and information exchange networks in knowledge networks. The presentation will use findings from the social network surveys of a Canadian NCE, supplemented with insights from and interviews and documentary data, to explore how informal communication networks, managerial practices and governmental policy initiatives shape the structure and content of advice network exchanges in a knowledge network.
<table>
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<tr>
<th>Simulating The Impact Of Strategic And Energizing Leaders On The Development Of Upper Management Trust Networks</th>
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<tr>
<td>Willburn, Philip T.; Kirkos, Christopher</td>
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<td>Leadership Networks</td>
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<td>Trust, Intra-organizational Networks, Leadership, Agent Based Models, Positional Analysis, Management</td>
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<td>SUN.AM1</td>
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<td>The presentation/paper simulates the development of upper management trust networks using leadership behaviors as a predictive mechanism for overall network structure. Using an empirically informed agent-based model, we examined the impact of strategic and energizing leaders on the development of trust networks in upper management teams. Drawing for data collected on 672 leaders over a 4 year period, our results suggest that both the number of strategic leaders and their hierarchical position can play a significant impact on the development of management trust networks. Specifically, strategic leaders placed in 2nd tier hierarchy positions have the greatest effect on the development of a dense trust network. We also found that energizing and de-energizing leaders in certain organizational positions (gatekeeping roles) can impact a strategic leader’s ability to develop trust across a management team. Strategic leaders and other managers whose bosses were energizing had the best chance of creating trust networks across the organization we examined. We created a social scientific Agent-Based Model (ABM) to test the dynamics of leadership behaviors in management teams. To cross-validate our findings, the model was empirically informed from and based on the Looking Glass Inc business workshop created and run by the executive leadership development organization Center for Creative Leadership. Data from 28 workshops comprising of 672 leaders was gathered from October 2006 to August 2009. Our research framework is based on Gilbert and Troitzsch 2005 recommendations for simulation development in social scientific research.</td>
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<th>Situated Communication - A Dynamic Visualization Framework</th>
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<tr>
<td>Windhager, Florian; Zenk, Lukas</td>
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<td>Network Theory</td>
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<td>Visualization, Network Theory, Education, Embeddedness, Dynamic Networks, Modelling</td>
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<td>THURS.AM2</td>
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<td>As formal models, social networks usually get represented as matrices or visualizations on screen or paper. In front of plain backgrounds they appear disembodied and separated from their various lifeworld environments. This form of representation, which qualifies network images as valuable information visualizations in scientific contexts, often proves to be a barrier for understanding in non-experts or education contexts. The presentation will take on the conception of a framework, which allows for embedding social network images in a multimodal visualization environment. By building on a generalized timeto-topographical modelling approach, this extended frame of reference enables visual and cognitive connections between commonly separated realms of scientific analysis and theory building. Referring to the resulting integrative capabilities, various usage scenarios like applications in the fields of consulting, education, and science communication will be discussed.</td>
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</table>
Economists have long been interested in the impact of country size on myriad international economic indicators, including trade patterns (Holmes & Stevens, 2005). Thus, small states have been shown to have a narrower export scope across industries and products (Meilak, 2008), a tendency to geographically concentrate their exports (James, 1980; Udovič & Rašković, 2010), and be more vulnerable to external trade shocks (Briguglio, 1995). While small states have been gaining increasing research attention (Easterly & Kraay, 2000), they have often been looked at as a “collective whole” (Liou & Ding, 2002). Similarly, quite some research has looked into foreign trade country patterns in network contexts, yet little of it has focused on the specific issue of universality vs. contingency of small state trade patterns. This paper aims to fill this gap. The purpose of this paper is to describe and compare export patterns of small EU member states (5 million people) as network egos in an intra-EU 27 country export network context. The approach first visualizes the relative importance of country-to-country export flows as a valued one-mode network, followed by analyzing the network from the perspective of small countries as network egos. In the analysis phase of these ego networks the approach of tie dichotomization is employed, as proposed by Doreian (1969). This is further complemented by blockmodeling to provide a clearer answer regarding the issue of universality vs. contingency of small EU states’ export patterns.

The networking form of organizations is becoming prevalent and worthy of study in every realm of social structure. In this paper we focus on the way this statement holds in the context of collaborative research networks. In order to do so, we analyze a specific network of researchers, CASCON conference paper co-authorship structure (between 1991 - 2009). CASCON is an annual conference that focuses on the fields of software engineering and computing. For our analysis we chose to utilize the SNA (Social Network Analysis) framework. Hence, the various authors are the nodes in our analysis, and any link between nodes indicates a joint publication between the two authors. Our analysis of individual actors (egos) provided us with insight into who is central to the CASCON community. Ten of those central actors were interviewed, and provided us accounts on their involvement in CASCON. Using the data we gathered, we addressed two research questions (1) What characterizes the social structure of the CASCON research paper network (2) What insights can we gain for further development of the CASCON community based on our analysis. Our preliminary data analysis indicates that the CASCON research community displays a strong sense of social cohesion, a pattern that has gradually increased over the last 19 years. We will discuss this finding within the context of potential actions that can be taken to further develop the CASCON and other similar communities.
**Snowball Sampling For Online Social Networking Sites: Problems And Remedies**

Zhu, Jonathan J.; Zhang, Lun; Yang, Muhan; Liu, Qirong; Lu, Heng; Jiang, Jing

**Collecting Network Data**

Sampling, Snowball Technique, Large-scale Networks, Online Networks, random walks

THURS.AM1

Sampling has remained to be a challenging issue for research on social networks. Snowballing is perhaps the only feasible approach in most, if not all, studies of large-scale social networks. However, snowball sampling usually results in biased samples. The emerging online social networking sites (SNSs) present not only new challenges (because of their massive size) but also new hopes (thanks to the advent of information retrieval technology). In the current study, we attempt to address two issues that have rarely been empirically studied: First, we will assess the quality (i.e., representativeness) of samples generated from the usual snowballing procedure. Second, we will explore several modified snowballing strategies and then test the resulting quality and efficiency of each strategy. We will make use of the population data of a large SNS (N > 10 million nodes) to accomplish both objectives. We have already completed the first objective, with results confirming the usual criticisms of snowball sampling. We are currently working on the second objective, with some surprising but encouraging results. We expect the final results from the two lines of inquiry will contribute to both theory of and practical solutions to social network sampling.

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**Social Capital And Adaptive Capacity In Declining Resource Based Communities**

Ortiz-Guerrero, Cesar E.

**Qualitative and Mixed Method Network studies**

Social Capital, Collective Action, Resilience, Adaptive Capacity, Rural Communities

FRI.AM1

The study of social capital and collective action (Lin, 2007) and other network-based relational dynamics through which diverse actors develop new governance initiatives is an emergent field in planning theory and practice (Albrechts & Mandelbaum, 2005; Hutchinson & Vidal, 2004) AND rural development (Murdoch, 2000). However, though there is also a long history of resilience, adaptive capacity and self organization in theoretical ecology and in the management of resource systems (Berkes & Folke, 1998) our literature search found no sources linking “resource-based communities AND social capital/collective action AND adaptive capacity/resilience”. This paper explores the network based relationships between social processes and urban form (Graham and Healey, 1999), through a multidimensional, participatory-based, qualitative interpretation of decline in the Rainy River District (Ontario). We suggest a SNA approach combining elements and theoretical frameworks explored in economics, resource and social systems. These centre on resilience, adaptive capacity, social capital and collective action in the context of resource-based communities. This framework will help us to understand change in resource-based communities, in particular, their relative capacity to (a) to recover/adapt from economic, social and ecological shocks and stresses; (b) to self reorganize and develop new governance initiatives; and (c) to plan for decline in the context of changing rural regions. This paper is based on the final version of my doctoral dissertation.
### Social Constraints, Agency, And Institutions In The Formation Of Interorganizational Ties And Knowledge Diffusion

**Greenberg, Jason; Lazer, David; Binz-Scharf, Maria C.; Mergel, Ines A.**

**Education, knowledge and learning networks**
**Diffusion, Information Sharing, Interorganizational Networks, Information Search**
**SUN.AM1**

Significant attention has been devoted to the patterns and consequences of boundary spanning activities, information search and sharing, and isomorphism of organizational knowledge and practice. In much of this research organizations are viewed as social actors and of themselves that engage in this boundary spanning activity. This focus is sensible when analyzing the patterns of organizational ties. However, it is not especially well-suited to study of the spanning activity. This focus is sensible governing how and why organizations span boundaries in the first place. In this research we open the black box of organizational boundary spanning activity. Using unique qualitative and quantitative data from a knowledge intensive industry--US government crime laboratories involved in DNA analysis--we identify several mechanisms leading to boundary spanning activity. Using the quantitative data we provide a test of several of the mechanisms, as well as the antecedents of isomorphism processes. Results reveal that structural features, chance meetings, and the initiative of lab leaders (and to a lesser extent subordinates) lead to boundary spanning activity, access to distinct pools of knowledge, and, ultimately, isomorphism.


**Oubenal, Mohamed**

**Networks and Economics**
**Advice Network, Interorganizational Networks, Cooperation between competitors, Exchange Traded Funds(ETFs), intermediaries**
**FRI.PM2**

Our paper aims at understanding the social construction of the market of Exchange Traded Funds (ETFs) in France. We assume that advice network allows cooperation needed for the inception of financial markets. We studied the advice relations between 57 actors of the French ETF market using Pajek and Stocnet. Our network analysis evidences that managers and marketing officers use their relationships with other participants to produce a promotional knowledge. We show that the advice network has a center-periphery configuration with some banks having a central position. When moving from interindividual to the interorganizational level we demonstrate the existence of a social niche between four banks. Building on structural approach we explain that cooperation between competitors in this market is done through the intermediation of participants with special status. The extraction of relations between some actors emphasizes that those intermediaries are event organizers namely: Edhec and Agefi. Those two actors are independent from banks and have many relationships with investors.
### Social Dynamics Of Morale: Influence And Selection Of Army Attitudes In Military Organizations

**Coronges, Kathryn; Lospinoso, Josh**

**Leadership Networks**

Leadership, Cognitive Similarity, Military, Stochastic Actor- Oriented Models

Contagion of values and beliefs throughout organizations has important implications for team cohesiveness and effectiveness. Group-task studies have shown that cognitive similarities lead to more effective & efficient communication, collaboration, problem-solving and coordination of activities (Levesque et al. 2001; Palazzolo, 2005; Palazzolo et al., 2006). The current study focuses on the role of shared cognitions on friendship, leadership and communication networks. Monthly surveys identify military, team, and opinion leaders among a small group of mid-career soldiers at West Point, US Military Academy (USMA). Email interactions of the soldiers are monitored, which is facilitated by USMA-server enabled blackberry devices that were distributed to participants. Actor-oriented stochastic models are used to assess whether there are preferences for individuals whose cognitions map well onto Army promoted values. In addition, models evaluate whether social structures tend to form around shared conviction of Army-promoted values, measured as both explicit and implicit cognitions. While past studies have successfully studied the importance of converging mental maps around organizational tasks, few if any, have looked at social and behavioral dynamics among soldiers and from the perspective of military leadership. Results will reveal various dimensions of leadership and group cohesion within military organizations.

### Social Network Analysis And Philosophy

**Bergenholtz, Carsten**

**Network Theory**

Social Network Analysis, Philosophy

THURS.AM2

The aim of the present study is to root social network analysis in the history of philosophy. One could argue that the nature of social network analysis is instrumental and utilitarian, since the main purpose is to codify and measure relations and be able to explain, or vice versa. In this sense the roots of SNA can be traced back to Hobbes and in particular Mill and their approach to social relations. In his theory of recognition and the master-slave terminology, Hegel introduces a different conception of social relation. If one bases SNA on a Hegelian tradition, a social relation is not as dyadic as much traditional SNA would argue, but to a much bigger extent relying on the (historical) context of the social interaction. The methodological implications that can be drawn from this history of philosophy will be discussed, e.g. that SNA to a larger extent should pay attention to the individuals (as Kilduff & Krackhardt argue) and in particular include the institutional context (as Owen-Smith & Powell argue).
### Social Network Analysis In Multiple-case Studies: Promises, Evidence, Challenges And Tentative Solutions For ‘better Stories And Better Constructs’

Oliveira, Nuno

Network Characteristics

Methods, Data, Management, theory-building

WED.PM1

Social network analysis in multiple-case study research has increased exponentially in the management literature, mainly owing to the promise that such a blend can better explain mechanisms underlying network configurations, and contribute to ‘better stories and better constructs’ (Eisenhardt, 1991). While boundary specification and its hazards are well-documented in the social networks literature (Freeman, White et al. 1992; Wickesberg, 1968), we know little about boundary specification at two levels: boundaries of multiple case-studies; and, the boundaries of the social network configuration being studied in each case. This paper presents evidence from published work which suggests that some ties are directly connected to more than one case within a set of cases - ‘cross-case ties’. Social network analysis in multiple-case studies provides insights into network processes; however, it faces the challenge of boundary (mis)specification – the occurrence of ‘cross-case ties’ increases the likelihood of misinterpretation, and may weaken the validity of stories and constructs. This paper presents the implications of ‘cross-case ties’ for both internal and external validity of reported findings. Finally, tentative solutions to address the boundary (mis)specification problem are discussed.

### Social Network Analysis Outcomes For A Cancer Disparities Community Network Partnership

Luque, John S.; Martinez Tyson, Dinorah; Bynum, Shalanda A.; Noel-Thomas, Shalewa; Gwede, Clement K.; Meade, Cathy D.

Poster Session

Inter-organizational Networks, Whole Networks, Public Health, Community

SAT.PM3

The Tampa Bay Community Cancer Network (TBCCN) is one of the National Cancer Institute’s Center to Reduce Cancer Health Disparities’ Community Network Program sites tasked to form a sustainable community-based coalition network focused on the goal of reducing cancer health disparities among racial/ethnic minority and medically underserved populations. The current network includes 22 local community partner organizations and covers a tri-county area in central Florida. In addition, four funded community-based participatory research pilot projects with academic and community partners have either been completed or are currently in progress, covering research topics such as culturally tailored colorectal and prostate cancer screening education, patient navigation for Latinas with cervical cancer, and community perceptions of biobanking. This poster reports network outcomes from social network analysis survey evaluation results to show the varying roles of community partners in the network, involving education, training, and research. Analysis of three years of social network data (2007-2009) found a trend toward increased network decentralization based on betweenness centrality measures and mean number of overall linkages, suggesting network sustainability. Degree centrality, trust, and multiplexity exhibited more modest gains over the time period. Through social network analysis, we can better evaluate the strengths and weaknesses of TBCCN to foster continued sustainability and trust in the network. Currently, we are planning a comprehensive baseline assessment for the second five-year phase of TBCCN in order to evaluate the expanded partnership network, with an emphasis on more community-based intervention research.
Social Network Effects On Sexually Risky And Exploitative Behaviors In Street Youth In San Francisco Differ By Gender

Valente, Annie M.; Auerswald, Colette L.

Social Networks and Health

Adolescents, HIV Risk, Gender, Sex Networks, Homeless

SAT.AM1

Homeless youth have unique social environments contributing to the development of high-risk behaviors and poor health outcomes. We examine how network structure (degree and measures of subgroup formation, n-cliques and k-plexes) and sense of network support relate to risky and exploitative sexual behaviors, and how these correlations vary by gender. We interviewed 266 venue-recruited youth about their networks, behaviors, and street beliefs, and conducted follow-up interviews with 138 respondents, collecting inter-alter ties at that time. Alter identities were matched, generating sociometric data. We compared degree, ranked k-plex/n-cliques, and support scores with behavioral outcomes, by gender. Our sample included 167 (63%) males and 92 (35%) females. Mean network size was 5.8 for males and 5.7 for females. For young women, increased degree and support are associated with more sex partners in the last 3 months, higher likelihood of sex with an HIV-positive partner, and increased pimping. For young men, increased degree is associated with decreased pimping, and increased network support is associated with decreased sex partners and pimping. While larger networks and sense of community may be protective for young men, they seem to be harmful for young women. Knowledge regarding gender-specific network effects may inform interventions for homeless youth.

Social Network Measures As Semantic Text Analysis Indicators For Compound Tokens

Elbirt, Benjamin S.

Words and Networks - Roles, Health, Methods

Methods, Longitudinal, Semantic Networks, Content Analysis, Visual Analytics

FRI.PM1

This presentation describes methodology for using degree centrality to join tokens (words) into clusters that better represent the data during a co-occurrence semantic network analysis. The method uses both binary and strength based degree centrality to identify outlier tokens. These tokens are then combined with related tokens to form new token-clusters. Results indicate a reduction in deviations, outliers and token volatility which in turn creates a better analysis. The presentation will start by introducing the data set and general methodology for semantic analysis. This is followed by a presentation of the new methods for token clustering. Next, the final token list with and without the new methodology added are provided with 3D OpenGL visualizations. Finally, discussion is presented regarding the results and their implication on future semantic analysis.
### Social Network Resilience Given Information Error And Intermittency

Morgan, Geoffrey P.; Joseph, Kenneth; Martin, Michael K.; Carley, Kathleen M.

**Network Characteristics**

Network Socialization, Research Networks, Network Plasticity, Actor-Based Stochastic Modeling, Network Matching, Age

**WED.PM1**

This paper examines the resiliency of social networks of decision makers to the impact of two distinct factors: the amount of erroneous information propagated to decision makers, and the intermittency of access by decision-makers to authoritative media sources. Each of several network topologies, including Scale-Free (Barabási, 2003), Erdos-Renyi (Barabási, Albert, and Jeong, 1999), and Cellular networks (Frantz and Carley, 2005), were evaluated for increasing amounts of error and intermittency. To examine the impact of error, we used a rich social network simulation tool, Construct (Carley, 1990). Preliminary results indicate that decision makers embedded in cellular and scale-free network structures may have non-linear non-monotonic responses in decision correctness to the amount of error distributed through their social networks. If these results are confirmed in further work, this may have important consequences to application areas in organizational structures and indicates an important area for further empirical research.

### Social Network Services, Gifts And Reciprocity

Kronenwett, Michael; Gamper, Markus

**Friendship networks**

Network Analysis, Reciprocity

**WED.PM1**

This study analyses a social network service (called “partyface”) located in Germany. We analyze the complete network with about 100,000 members as well as approx. 9 million friendship relations and about 800,000 “make a gift”-relations. Among descriptive findings, for instance the distribution of age or gender, we analyze how the geographic location of the users affects the formation of their friendship relations. Additionally we analyze the the structure of the gift network. In the social network service users can receive or send virtual gifts from or to other users. We examine the reciprocity of receiving and sending virtual gifts and the connection between the centralization of an user and the amount of receiving or sending virtual gifts to or from other users.
### Social Network Theorizing Using Ideal Types

Feld, Scott L.

Network Theory

Theory, Social Network, Structure, Formal Concept Analysis, Prediction, Network Models

Social Network Theorizing Using Ideal Types Identifying an ideal type network by a certain combination of properties is useful to the extent that: 1) Those properties occur together in nature and/or can be made to co-occur, 2) Those properties have systematic implications/consequences of some importance, and 3) The closeness of approximations to those properties can be specified such that, the nature and extent of the relevant consequences can be predicted. The relevant consequences may be implications for the experience or behavior of the system as a whole, parts of the system, or individuals within the system. Demonstrating that an ideal type has certain implications does not assure that closer approximations necessarily yield implications that are closer to those of the ideal type. One often needs to specify further conditions under which particular types of closer approximation have predictable implications. Ideal type theorizing involves careful specification of defining properties, logical derivation of important implications, and a consideration of how certain “approximations” affect those implications. Ideal type theorizing can also involve consideration of circumstances that can create the ideal type patterns. Ideal type theorizing is illustrated in this paper with respect to the ideal type of Transitivity in a Symmetric Network. Tentative lists of ideal types are presented for Symmetric Networks, Directed Network, and Ego-Centric Networks.

### Social Networks And Response To The Integration Of Public Housing

Dominguez, Silvia

Qualitative and Mixed Method Network studies

Immigration, Integration, Ethnography, Human Services

This comparative study looks at immigrants that were forcefully integrated to public housing and living clustered and segregated in one neighborhood that fought against their integration and another where they live next to an immigrant enclave to evaluate the social networks developed in response by the area social service providers. Through a comparative ethnography with longitudinal ethnographic interviews and participant observation, this study examines the consequences of forced integration in two public housing developments in terms of how it affected mobilization of human services providers though social networks and the consequences they had for the residents involved. Findings indicate that service providers in the antagonistic neighborhood developed ties that were more effective than those in the friendly immigrant neighborhood.
Sustainability in business is growing and will continue to grow. It is not a new topic but in an accelerating phase of expansion, affecting individuals, businesses and industries that may not have been engaged previously. Never have the stakes been higher for building proactive business models and practices that can contribute to sustainability, defined as meeting present needs without compromising future generations’ ability to meet their own needs. Considerable knowledge exists on social network factors related to organizational performance, but little or no work has been done in the area of sustainability performance in organizations. This paper starts from the premise that reductionist systems analysis and linear optimization techniques are inadequate to capture the complexity, unpredictability, and dynamism that are inherent when considering businesses in their ‘ecosystems’—the greater worlds of market and non-market stakeholders that define the context of sustainability. Complexity theory and complex adaptive systems are assumed to be more appropriate ways to frame inquiry into how firms can improve their ‘sustainability footprints’. The paper also assumes a social relations approach, including quantitative and qualitative epistemologies. Reality is contingent upon the socially constructed interpretations of actors, thereby implying the importance of social networks and motivational drivers in decision making towards sustainability goals. The purpose of this paper is to develop a theoretical framework and testable propositions relating to the role of social networks in enhancing sustainability in organizations, as framed from a complex adaptive systems perspective. The next step in this stream of research will be empirical testing.

Constructing social networks based on actors’ semantic similarity provides a definition of communities or cliques based on persons’ message production profiles. Semantic similarity is a novel kind of homophily that enables identification of potential future communication events between individuals as well as events that have transpired. Recent research has used the entire semantic network produced by individuals as the basis for measuring semantic similarity. Such a fine-grained approach, while conceptually appealing, requires long computation times. The goal of research reported here is to assess a type of dimensionality reduction in the semantic networks, the Bayesian Latent Dirichlet Approximation (LDA) of topic modeling based on collapsed Gibbs Sampling that identifies regions of semantic similarity, considered “topics.” The main appeal is several orders of magnitude faster computation. A problem is required a priori specification of the number of topics for a solution. Research has yet to systematically identify the effects of different numbers of topics on the number of highly similar pairs of online discussion forum authors that result. This research systematically increments the number of topics in a solution and examines as a criterion the number of highly similar pairs of authors. Three data sets are used: 1) Pakistani discussion forum on diverse topics, 2) Ten Indian discussion forums, and 3) Twenty-five American politics discussion forums.
<table>
<thead>
<tr>
<th><strong>Social Networks In Cyberspace: A Social Network Analysis Of A Hybrid Learning Community</strong></th>
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<tr>
<td>Cowan, John E.</td>
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<tr>
<td>Poster Session</td>
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<tr>
<td>Academic Networks, Education, Community Structure, Communities Of Practice, E-Administration, Adults</td>
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<td>SAT.PM3</td>
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<tr>
<td>The Internet-Based Masters Degree in Educational Technology (iMet) Program at Sacramento State University is a cohort program where students meet 25% face to face and 75% online. The program was designed with the belief that efforts expended to form a learning community during face-to-face sessions would result in a richer program experience and also provide a potential support for students beyond the program. Evidence that community building efforts did enhance the students experience include high retention rates, high levels of student satisfaction and high rates of graduates successfully gaining employment after their participation in the program. What has not been sufficiently analyzed is the role of social networks in students’ success while in the program and beyond. This poster session will share the use of UCInet and NetDraw in an analysis of 3 iMet cohorts (n=66). Survey items include students identifying who they knew prior to the program and with whom they worked, sought for advice and considered to be good contacts in the educational technology field before, during and after their time in the program. The survey also included attribute items such as age range, technology skill level, teaching skill level and past and current employment. The research questions for this analysis include: How did networks influence community members during and after the program? Who were central characters in the networks? Did the networks vary from cohort to cohort? This poster session will share the process and results of the UCInet and NetDraw analysis of these questions.</td>
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<th><strong>Social Resources And Correlates To Communication Technology Networks</strong></th>
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<td>Salem, Philip</td>
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<td>Communication Networks</td>
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<td>Social Support, Social Capital, Communication Networks, Personal Networks, Communication Technology, Resource Networks</td>
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<td>THURS.PM2</td>
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<td>Individuals create social resources when they assign a relative value to communication outcomes. The assignment of value varies to the extent an outcome fulfills some need, motive, or goal, and the extent to which the actor assigns value to a particular need, motive or goal relative to other needs, motives, or goals. Researchers typically ask subjects about the extent to which experiences provided outcomes researchers assume are positive or negative or about the extent to which subjects obtained desired outcomes. Lists of resources are common to communication motives, interpersonal needs, media uses and gratification, power, social capital, and social support research. There is considerable overlap in these lists of potential resources, and there are competing lists of similar resources within the same literature. The author employed a composite survey assessing the extent to which subject obtained nine social resources. Communication technology refers to how individuals exchange messages, and the emerging exchange pattern constitutes a communication network. Individuals employ a variety of technology, and they develop single and multiple technology networks. I examined the use of face-to-face, telephone, e-mail, private electronic (e.g., texting), and public electronic (e.g., Facebook) communication. Network dimensions include heterogeneity, range, density, efficiency, and constraint of the five separate and combined ego networks. This paper reports on how the dimensions of these communication technology networks correlate to social resources.</td>
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### Social Snacking: Friends’ Influence On Adolescent Junk Food Intake

<table>
<thead>
<tr>
<th>de la Haye, Kayla; Robins, Garry; Mohr, Philip; Wilson, Carlene</th>
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<tbody>
<tr>
<td><strong>Social Networks and Health</strong></td>
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<tr>
<td>Adolescents, Social Influence, Friendship Network, Actor-Based Stochastic Modeling, Health</td>
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<td>SUN.AM1</td>
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About half of adolescents’ consumption of low-nutrient, energy-dense (LNED) “junk foods” occurs out of home (Briefel et al., 2009), and research suggests that friends may be an important influence on this behavior. For example, friends have been found to be alike in their intake of snack foods (Feunekes et al., 1998) and high-calorie foods (de la Haye et al., 2010). This longitudinal study tested whether these similarities result from social influence and also explored the underlying psychological mechanisms. Three waves of data were collected over six months in one Grade 8 cohort of Australian adolescents (N = 222; 47% female; M age 13.6), including measures of food intake and related cognitions, and friendships to grademates. Stochastic actor-oriented models were used to test our research questions. The results indicated that participants initially formed friendships with peers whose intake of LNED food was similar to their own. Over time, junk food intake was found to decline overall, although participants’ consumption also became increasingly similar to the consumption patterns of their friends’. Friends’ influence on adolescents’ food intake was not found to be mediated via changes in adolescents’ attitudes, subjective peer norms, or intentions, nor were these measures, or other covariates, found to predict LNED food intake. The theoretical and practical implications are discussed.

### Social Structure Effects on PTSD

<table>
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<tr>
<th>Turner, Justin; McCulloh, Ian; Geraci, Joseph</th>
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<td>health, ergm, social network, centrality</td>
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<td>SAT.PM1</td>
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An individual's position in the social network of an isolated group of people is shown to have a significant correlation with their risk of depression, suicide, and post traumatic stress disorder (PTSD). Some studies have shown a physiological change in isolated individuals over time. We present a study of 500 US Army soldiers in an Infantry Battalion deployed to Afghanistan from January 2010 to January 2011. Social network and mental health data were collected at three time periods. Mental health measures are correlated with centrality scores. Ergm analysis is used to investigate the affects of social structure on mental health. Findings show that isolated individuals who seek social acceptance are at greater risk for depression, suicide, and PTSD. This is especially true in situations where options for social contacts is restricted. Potential treatment strategies are proposed.
**Spatial Impact On Social Network Diffusion: The Case Of Frame Convention On Tobacco Control**

Oh, Yoonkyung; Shin, Heesung

**Innovation, Diffusion, and the Adoption of Technology**

Diffusion, International Networks, Geography

**WED.PM1**

The success of implementing public policy greatly depends on the diffusion of the policy decision and the consequential behavioral changes. In addition to the social network characteristics of the volume of communication or the brokerage, various other factors affect the diffusion of policy and behavior. Especially at the international level, political preferences or socioeconomic status of the nations need to be considered. One of the critical factors is the geographical closeness. Since geographical adjacency often explains the similarity in the environmental conditions among the nations, the concepts of the policy might be easily applied in the adjacent countries. Or, the closeness may increase the volume of communication, which leads the diffusion of policy. This study is to investigate the impact of geographical factors on the policy diffusion at international level, with the case of Framework Convention on Tobacco Control (FCTC). FCTC is the international treaty initiated by World Health organization (WHO) in 2003, to prevent tobacco related death and diseases. FCTC adopting countries are required to sign and ratify the treaty, followed by encouragement to implement legislative enforcements. By 2009, there were over 164 countries that ratified the treaty. Wipfil, Fujimoto, and Valente (2010) found that demographic (higher income and more related NGOs), and social network variables are associated with the adoption status of FCTC. While Wipfil et al. considered the reverse distance between Country capitals as geographical variables, our study expands the model by examining the spatial factors, using Geographically Weighted Regression (GWR), a spatially calibrated regression model embedded in ArcGIS 9.3. The necessary network variables are calculated with UCINET. By introducing the GWR model in examining social network diffusion, this study may contribute more concrete approach to measure the spatial variables.

**Specification And Estimation Of A Relational Event Model For Two-mode Networks With An Application To Organizational Problem Solving**

Tonellato, Marco; Conaldi, Guido; Lomi, Alessandro; Quintane, Eric

**Event-based networks**

**FRI.AM2**

We specify and estimate a relational event model for two-mode networks using data that we collected on problem-solving activities within a community of Free/Open Source Software (F/OSS) developers. Data pertain to a team that included a total of 904 volunteer developers involved at different times in the production of a F/OSS web browser. We reconstructed the two-mode network generated by problem-solving activities undertaken by the software developers on identified software problems (or “bugs”). Each network tie records a voluntary action taken by a developer to engage a specific problem observed during one of the release cycles undergone by the software. The relational event model enables us to examine across different time frames the regularities in action sequences collectively undertaken by developers. Here, the model uses past action sequences towards a given problem to predict its resolution. We discuss the possible implications of our preliminary results for views of organizations as structured social settings that encourage the interaction between problems, solutions and decision makers. By doing so, we aim to provide further insights into the social micro-mechanisms that lead to the endogenous emergence of routinized collective action.
Visual exploration is used in particular to complement and inform modeling and analysis of longitudinal networks. Depending on the type of media available, animation and small multiples of intermediate states appear to be the most common forms of graphical representation. We present an alternative approach in which Tufte's sparklines, Gestalt theory, and matrix representations are combined to design static and compact diagrams. We illustrate on some realistic and well-known cases how such designs leverage human pattern-recognition capabilities to spot patterns in time-varying network data.
**Status And Smoking In Assist. A Longitudinal School-based Study Of Uk Adolescents.**

Steglich, Christian; Holliday, Jo; Mercken, Liesbeth; Moore, Laurence

Network Dynamics

Smoking, Actor-Based Stochastic Modeling, sociometric status

THURS.PM1

The status of an adolescent among his peers is partly determined by the social class he comes from, and partly by popularity among his peers. Previous research has identified a negative relationship between social class and adolescent smoking behaviour, and a positive relationship between peer popularity and adolescent smoking behaviour. If smoking causes adolescents to become more popular, smoking may be perceived as a viable strategy notably for lower class students to gain status among their peers. This study uses longitudinal data collected in the UK-based A Stop Smoking in Schools Trial (ASSIST) to assesses whether a possible association between measures of sociometric status and smoking results from processes of peer selection (smokers gaining status among their peers) or from processes of peer influence (high status students starting to smoke), and which role social class in the form of family affluence plays in these processes. Suggestions for the future development of adolescent smoking interventions will be discussed.

**Stratification And Nested Structure Of Small World In A Friendship Network**

Tomochi, Masaki; Tanaka, Atsushi; Shichijo, Tatsuhiro

Small World Research

Simulation, Small World, Data, Friendship Network, Social Distance, Spatially-embedded Networks

THURS.AM2

We have analyzed effects of spatial and social distance on a friendship network. We used the data obtained from “Tomocom.jp” which is a social network service where approximately 300 undergraduate students living in several areas in Japan are participating. From the data, we have found that spatial and social distance between individuals causes stratification in the friendship network and brings about nested structure of small world. Based on what we have found in the data analysis, we have built a model and successfully replicated the nested structure of small world.
<table>
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<tr>
<th>Structure And Consistency: Assessment Of Social Bookmarking Communities</th>
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<tbody>
<tr>
<td>Mitzlaff, Folke; Atzmueller, Martin; Benz, Dominik; Hotho, Andreas; Stumme, Gerd</td>
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<tr>
<td>Online Social Networks</td>
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<td>Community Detection, Evaluation, Folksonomies, Online Networks</td>
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<td>THURS.PM1</td>
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<td>The growing amount of user generated content in the “Web 2.0” entails an increasing need for personalized access to the wealth of information available in order to prevent the user from getting “lost in data”. Community detection and user recommendation techniques, for example, allow for presenting only content which was provided by “relevant” users. But how to judge whether a group of users forms a relevant community is still difficult, without applying gold-standard data which is rarely available. Focussing on the evaluation of user communities, this paper provides the basis for an appropriate evaluation framework. It tackles the problem by analyzing so-called evidence networks that encompass evidences for user relationships in social bookmarking systems. Our findings suggest that these networks exhibit common community structure. Furthermore, standard evaluation metrics are applied for assessing the contained community structure, giving new insights concerning the networks as well as the metrics. The provided results motivate an approach for assessing communities using such networks.</td>
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<tr>
<th>Structures Of Collaboration Among Movie Technicians</th>
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<tr>
<td>Vernet, Antoine</td>
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<tr>
<td>Collaboration, coordination and cooperation</td>
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<td>Culture, Collaboration, Large-scale Networks, Team</td>
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<td>SAT.AM2</td>
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<td>The aims of this study is to better understand the process of reproduction of work teams over time. The study describes relationships between the core team of technicians (cinematographer, editor, set designer, costume designer), producers and directors. It aims at understanding the influence of recurring collaborations on career outcomes. Using descriptive statistics on large networks and extraction of subnetworks from this network of collaboration (using the information collected during an extensive qualitative research on the careers of movie technicians conducted in France and the US for my PhD, to assure that the subnetworks are meaningful) we study how careers unfold in time and how enduring work teams are constituted. This allows us to investigate the impact of recurring relationships on the duration of one's career and on one's success.</td>
</tr>
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</table>
### Studying Enterprise Community Networks: Dynamic Patterns In Two-mode Networks

Krempel, Lothar

Online Social Networks

Knowledge Networks, Two-mode Networks, Dynamic Networks, Online Networks

**THURS.AM1**

Social media and online social networks are new forms of digital communication that have emerged in just a few years. These digital spaces produce data in so far unknown precision and temporal granularity, they allow to identify actor networks and semantic spaces being linked by activities and interests. Two- and n-mode graphs are suitable formal concepts to explore their dynamics in greater detail, to identify emerging social processes and the coevolution of social and semantic structures empirically. We illustrate the potential by discussing a research design for digital communities and knowledge generation in an enterprise communication system.

### Teaching Sociology As A Community: The Effect Of Creating A Digital Library

Mayorova, Olga V.; Spalter-Roth, Roberta

Academic and Scientific Networks

Academic Networks, Information Technologies, Communities Of Practice

**THURS.PM1**

This paper investigates changes in the size and structure of a teaching and learning network or community among sociology faculty prior to and after the implementation of a new interactive digital library (TRAILS). Scholars of teaching and learning argue that activities designed to improve pedagogy and enhance curricula need to take place within a community of faculty members rather than in individual classrooms. We measure network size and structure by examining the links among faculty that participate in at least 1 of 13 teaching and learning activities. We investigate further whether participation appears constrained or encouraged by academic departments across types of institutions of higher education. We find that 6 out of 10 faculty members can be described as “teaching alone” over three years because they do not gain resources and contacts from the teaching and learning community. In 2008, fewer than 7 percent of participating faculty make up the core of community knowledge producers and gatekeepers. We find that women are more involved than men, while racial/ethnic minorities, early career faculty, and faculty members with PhDs get involved in fewer teaching and learning activities. Faculty members from Research I institutions are most likely to participate by contributing their syllabi, writing articles, and making presentations, but overall they tend to participate in fewer activities than faculty from master’s and baccalaureate schools. We go on to investigate the changes that occur in size, structure, and characteristics of the 2008 teaching and learning community as a result of the first six months of TRAILS.
### Teaching Undergraduates Social Networks Analysis

<table>
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<tr>
<th>McCullough, Ian</th>
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<tr>
<td>Centrality Measures in Social Networks</td>
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<td>ERGM/P*, Centrality, Social Network, Health</td>
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**SUN.AM1**

There has been a significant recent increase in teaching social network analysis (SNA) to undergraduates. Pedagogical approaches for teaching this material, however, is not represented in the literature. The authors have taught 26 iterations of undergraduate SNA to over 350 students across four different academic institutions of varying caliber and have taught the course to military members of various countries. Data has been collected over a five year period. Pedagogical approaches are contrasted in terms of students' understanding concepts, long term retention of material, ability to conduct research, and ability to apply course material. In addition, a review of appropriate SNA topics for undergraduate courses is provided.

### The Colors Of Closeness

<table>
<thead>
<tr>
<th>Godbout, Melissa; Kennedy, Tracy; Wellman, Barry; Zhang, Yu Janice</th>
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<td>Egocentric Networks</td>
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<td>Communication Networks, Affective Ties, Ego-centered Networks, Differentiated Network, Advice Network, Strong Ties</td>
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**SAT.AM2**

The Community Question has been an important continuing controversy: whether community has declined, expanded or transformed. In 2006, McPherson, Smith-Lovin and Brashears suggested a major decline in two decades of the per capita number of Americans discussing important matters. This reignited concerns about the quality and quantity of Americans' social relationships. Commentators such as Putnam (2000) had long observed that community was falling apart. However, Fischer (2010) noted measurement issues in how the General Social Survey obtained these data. Our Connected Lives study moves beyond the narrow confines of "discussing important matters" to discover and analyze the different ways in which people define closeness. While less than 1/3 of respondents discuss important matters, closeness also comes from routine chatting, kinship, frequent contact (offline and online), etc. We use survey and interview data to analyze which types of closeness tend to co-occur, what "causes" them, and what the behavioral consequences are for different types. We go on to discuss the extent to which closeness is contextual and situational.
The Configuration Of Signed Relations In An Online Social Environment: A Balancing Act

Acton, Ryan M.

Network Theory

Online Networks, Balance Theory, Discrete Choice Analysis

The concept of balance, which traces back to psychologist Fritz Heider (1946), was developed in order to explain a cognitive process within individuals that affects the way they feel about others to whom they are tied. When the relations one has with others 'agree' with each other, that person feels a sense of satisfaction. If, however, those relations are discordant, the individual is motivated to act in ways that reconfigure the situation, either cognitively or structurally, in order to achieve a sense of satisfaction, or balance. Since Heider, numerous scholars have attempted to empirically test, refine, and generalize ideas of balance. This paper investigates the possible choices with which actors are faced and the extent to which actors make those choices in balance theoretic ways. By utilizing signed, relational data from the online community Epinions.com, I study the formation process of several kinds of dyadic and triadic configurations. Mixed support is found with regard to the extent to which actors behave in balance theoretic ways. Results and implications are discussed.

The Contextual Dependence Of Social Network Activation

Samila, Sampsa; Erikson, Emily

Social Capital

Social Capital, Communication Networks, Large-scale Networks, Information

Social networks are ubiquitous in social and economic life. Networks act as conduits of resources such as status and information. While our knowledge about the kinds of network ties used for carrying different types of resources, especially information, has grown considerably, we know very little about when actors choose to rely on the information carried by network ties. Here we outline a theory and empirically study how context affects the choice of actors to rely on the information from their social networks. Using data from the English East India Company's shipping network, we find that the captains were more likely to rely on information carried by social network ties early in their careers but less so later as their own experience grew. Likewise, the level of autonomy enjoyed by the actors has a positive effect on their reliance on network information. Environmental uncertainty also increases the importance of the timely information carried by networks. When the diversity of information carried by networks increases, we find that personal experience becomes increasingly important in deciding what course to take. Our theory and results contribute to our understanding of the role of networks economic and social life.
### The Development Of Japanese Interlocking Directorate Networks In View Of Executive Dispatch

Kanamitsu, Jun  
**Business & Entrepreneurial Networks**  
**Interfirm Networks**  
**THURS.PM2**  
The Japanese interlocking directorate system is different from those of other advanced capitalist countries, and it is not predominant form of corporate governance in Japanese business world. Inter-corporate executive dispatch plays a more important role than interlocking directorship due to the lack of outside directors. Outside directors had been much fewer compared with US, UK, German companies until the revision of the company law in 2002. Although the law facilitates outside directors and that triggered the rapid increase of outside directors in mid-2000s, inter-corporate executive dispatches still function as communication conduits. We introduce a network model of Japanese executive dispatch as a variant interlocking directorate system and traced the development of the Japanese interlocking directorate networks through 1956 - 2010.

### The Diffusion Of Behavior In Clustered Networks: The Complex Effects Of Infection Thresholds

Stark, Tobias; Maes, Michael; Honari, Ali; Flache, Andreas  
**Innovation, Diffusion, and the Adoption of Technology**  
**Diffusion, Social Influence, Agent Based Models, Threshold models**  
**WED.PM1**  
How does the structure of a network affect the diffusion of behavior? Prominent contributions demonstrate that, e.g., viruses and innovation spread farther and quicker if few ties connect distinct clusters (small-world networks). However, it has been argued that the opposite effect may be found for behavior. Behavioral diffusion dynamics may differ because individuals may need to be influenced by multiple network partners. Highly clustered networks consist of many redundant ties, which fail to promote the diffusion of a virus. However, they may be crucial for the spread of behavior. Centola recently studied the spread of behavior in online networks. He found that behavior spreads farther and quicker in clustered networks with a high diameter compared to random networks. This suggests that many participants needed to be influenced by multiple network partners to adopt the behavior. However, in this experiment, diffusion cascades were triggered by “infecting” a single participant, implying that there were at least some participants who adopted the behavior even when only a single network partner tried to infect them. Thus, the question arises which distributions of infection thresholds promote the diffusion of behavior in clustered networks. We developed a computational model of Centola’s experiment and studied the effects of different infection threshold distributions. A core finding of our experiments was that the empirical result could only be replicated with relatively few threshold distributions. We tested whether including additional theoretical assumptions, about, for instance, agents’ learning curves or immunity, helps explaining the empirical pattern.
The Duality Of Homophily: Relating Attributes To Networks

Melamed, David; Schoon, Eric; Breiger, Ronald L.

2-Mode Networks
Methods, Homophily, Two-mode Networks, Profile Similarity
SAT.AM1

Based on new analytic strategies introduced in Ronald L. Breiger’s INSNA keynote address, we developed a network of actor attributes based on General Social Survey (GSS) data. Specifically we turn the conventional cases-by-variables matrix inside out, generating a cases-by-cases matrix that has heretofore received little attention. The diagonal of this matrix (i.e., the projection matrix in a regression context) is informative for regression diagnostics and for relating the cases to some outcome; however, we focus on the off-diagonal cells in the matrix that relates the cases to each other. By clustering on the matrix of cases-by-cases we identify groups of cases that are similar in their profiles across the attributes. We apply this innovative two-mode analysis to ego network data from the GSS, predicting overall homophily and specific types of homophily—age, race and education—in respondents’ networks. Our results suggest that a model incorporating clusters based on the “usual suspects” (e.g., race, sex, education, age, etc.) indeed predicts instances of homophily even after controlling for the usual suspects (treated as linear additive effects). We discuss which attributes yield a significant contribution to the formation of each identified cluster, and the effects that the clusters have on the homophily outcomes. We conclude with how our research builds on and fits with the tradition of homophily analysis of social networks, and we discuss future directions of the profile similarity methodology.

The Dynamics Of Degree Distributions In Flow Networks: Power Laws Without Rich-get-richer-based Algorithms

Chu-Shore, Jesse C.; Chu-Shore, Catherine J.; Bianchi, Matt T.

Network Dynamics
Null Models, Power Law, Degree distributions, Flow Networks, Random Graph Models
THURS.PM2

Power-law degree distributions have been found to characterize a wide range of complex networks, and there is a growing literature on how this topology might arise. However, this literature does not consider an important class of network: those in which links represent flow of some quantity from node to node. In these networks, throughput—and thus maximum outdegree—depends on how much flow it receives from “upstream” portions of the network. Likewise, link dissolution and node death are likely to have cascading consequences for “downstream” nodes and links. Network structure and flow dynamics are thus interdependent, but the literature does not address this issue. Here, we introduce a new category of random graph model for flow-type networks, and describe the conditions under which a power law degree distribution is likely to emerge. Our contribution is novel in that the power law does not depend on network growth or the rich-get richer attachment rules which are the basis of other models in the literature.
The Effects Of Social Networks, Procedural Justice, And Negative Affectivity On Workplace Social Exclusion Behavior: The Moderating Role Of Formal Hierarchical Rank

Grosser, Travis J.; Sterling, Christopher M.; Labianca, Giuseppe (Joe)

Organizational Networks

Intra-organizational Networks, Organizational Behavior, Power-Approach Theory, Social Exclusion

SAT.AM1

We examine the structural, perceptual, and affective antecedents of workplace social exclusion behavior. We define workplace social exclusion behavior as the physical exclusion or avoidance of others in the workplace. Data were collected from 153 employees of an organization located in the United States. Findings indicate that Burt’s (1992) measure of constraint in the network of instrumental social ties is negatively related to social exclusion behavior. We also find that perceptions of procedural justice are negatively related to social exclusion behavior while negative affectivity is positively related. Additionally, we find that formal organizational rank moderates the relationship between network constraint and social exclusion behavior such that network constraint has a stronger effect for individuals of low rank. The same moderation effect holds for the relationship between indegree centrality and social exclusion behavior. Finally, we find that rank moderates the relationship between procedural justice perceptions and social exclusion behavior such that procedural justice perceptions have a stronger effect for individuals of high rank. Results provide general support for Power-Approach Theory (Keltner, Gruenfeld, & Anderson, 2003).

The Effects Of Teachers' Network On Students' Non-random Assignment

Kim, Chong Min; Frank, Kenneth A.; Spillane, James P.

Education, knowledge and learning networks

Social Network, Education, teachers’ social network, students’ non-random assignment, academic achievement and economic status

SUN.AM1

Research has shown that class composition impact students’ learning contributing to different academic achievement and that there are students’ non-random assignment between and within schools. Additionally, studies indicate that the gain score could be affected by students’ non-random assignment, which might produce selection bias and misleading conclusions (Rothstein, 2009). Although random assignment is an essential condition for statistical control especially when conducting value-added models, value-added models have not taken teachers’ social network into consideration; networks might affect non-random assignment and thereby violate a core assumption of value added modeling. We examine yet another source of non-random assignment; that is, the effects of teachers’ social network on the non-random assignment of students to classrooms. Our research question is this: Do teachers’ social ties affect non-random assignment of students to teachers with respect to students’ previous academic achievement and their socio-economic status? The results indicated that teachers’ social networks affected non-random assignment of students to teachers with respect to students’ previous academic achievement but not their socio-economic status. Specifically, teachers’ advice network about English/Language Arts (ELA) was a significant factor in explaining the non-random assignment of students to their teachers with regard to mathematics and ELA academic achievement. Our findings indicate that teachers’ social network can affect students’ learning by influencing class composition, which are non-random assignment of students to their teachers with regard to previous academic achievement.
### The Evolution Of Knowledge Creation In A Large-scale Online Community: Collaboration As A Socially Embedded Process

Lee, Seunyoon; Kisselburgh, Lorraine; Matei, Sorin A.

**Knowledge Networks**

Collaboration, Email Networks, Equivalence, Knowledge exchange, Wellness Partners

**THURS.AM2**

There has been an increasing emphasis on the study of collaborative communities and networks in the production of knowledge. Current research on the structures of co-authorship and knowledge communities focuses on the end products of knowledge (e.g., final documents, citations, etc.), and how these products indicate relationships between knowledge community members. The dynamic processes of knowledge production as a large-scale collaborative effort, embedded within a social community, are not yet well understood. Using a set of longitudinal records of Wikipedia editorial activities from 2001 to 2008, this project examines the patterns in which knowledge collaboration ties among co-editors are embedded in their social and communicative interaction. Specifically, we aim to uncover how embedding in the network structures leads to specific contribution patterns and behaviors. Co-editing collaboration is captured through the revision history of articles. Communication ties are established through talk pages within the articles, representing the community behind knowledge creation. The evolution of these multiplex networks as well as the role of contributor attributes in the process is modeled through Exponential Random Graph Models (ERGM). The results of the project provide insights into the dynamics of knowledge collaboration in a large-scale online community and the ways in which social relationships influence the process of knowledge production. The project has implications for the capabilities as well as limitations of emerging forms of online collaboration within established social structures.

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### The Evolution Of The German Board-director-network From 2006 To 2009: A Longitudinal Analysis

Brennecke, Julia; Rank, Olaf N.; Tuschke, Anja

**Poster Session**

Interlocking Directorates, Siena, Affiliation Networks, Germany

**SAT.PM3**

For a long time, the German business landscape has been characterized by a network of large enterprises being connected through numerous interlocking directorate ties. In recent years though, due to different institutional alterations, changes within the network took place. Yet, fine grained analyses of the change process are rare. In the present study, we investigate the evolution of the German interlocking directorates network between 2006 and 2009. We apply a stochastic, actor-oriented approach (SIENA) to draw conclusions on the mechanisms driving change within the network. Analyzing the board-director affiliation network, we take into account organizational-level attributes of the companies (e.g., industry or size) as well as individual-level attributes of the directors (e.g., education or experience) as determinants of structural change. We find that ties are not created nor dissolved arbitrarily. The observed changes follow certain structural patterns that are determined by network-endogenous as well as attribute-based properties. All in all, it can be shown that cost benefit considerations of the involved companies influence the change process. In addition to that, social motives of the directors seem to play a role for the creation of ties. We contribute to research on interlocking directorates by shedding light on patterns of structural change within the German board-director network and by emphasizing the influence of company and director attributes on network evolution.
### The Formation Of Social Capital And Bridging Ties In New Urbanist And Standard Suburban Subdivisions

**Cabrera, Joseph F.**

Social Capital

Social Capital, Social Cohesion, Urban Sustainability, Community, Sense Of Place, Urban Planning

**FRI.AM1**

This paper examines the network structure of a new urbanist subdivision (NUS) and an adjacent standard suburban subdivision (SSS). The study seeks to understand the differences in bridging ties and the diversity of social connections between the two populations. The research on diverse social connections is motivated by new urbanist principles that suggest NUSs will promote more diverse social interactions than SSSs. The findings suggest that NUS residents have more bridging ties than SSS residents. Furthermore, they suggest that NUS residents have more diverse social connections than SSS residents. These results support the hypothesis that NUS strategies, such as diverse housing and granny flats, help to promote diverse social interactions. In addition, an examination of the new urbanist designs incorporated into this NUS indicate that only mixed-use zoning, specifically the neighborhood center businesses, promote bridging ties.

### The Geographically-aware Networks In An Amazon Urban Space

**Moutinho Duque de Pinho, Carolina; Pinho, Carolina M.; medeiros, Liliam C.; Amaral, Silvana; Fonseca, Leila M.; Escada, Maria I.; Monteiro, Antônio M.**

**Poster Session**

Network Analysis, Spatial Analysis, Brazil, Spatially-embedded Networks, Urban Space

**SAT.PM3**

The urban space in Amazon assumes distinct forms from the other Brazilian urban centers because of the distinguishable territorialization that were carried out there in the 60’s. The dynamic of this urban space depends on the technical and social networks which might change the form, the type and number of settlements in this space. Following this context, we are proposing a theoretical and methodological approach to understand the Amazon urban space as a non-contiguous space that articulates different spatial typologies (rural settlements, villages, cities) in a territory-network within a municipality. Each node (zonal territory) of this network incorporates the urban praxis (urban way of file) and/or the socio-spatial fabric in different levels in according to its role in political-economical regional and national spaces. The study area is São Félix do Xingú municipality, located in the south region of Pará state, which is one of the most dynamic regions of the Amazon, and, therefore, is experiencing an intense territory transformation. In this paper we assess the Territory-network hypothesis through the analyses of educational commuting data of 2009 and the road network. Educational commuting is used as a proxy of territory network in urban space context. Our aim is to test if the spatial position of a municipality settlement in a road network implies different roles in the educational commuting network. For this the different types of settlements are the networks nodes and the roads and the commuting flux of students are the networks edges.
This paper reviews current knowledge about the structure of the international telecommunications network and how it has changed over time as a result of the process of globalization, historical events and changes in telecommunications technology. Then, it presents the results of a longitudinal network analysis (1978-2008) in which nation-states are the nodes linked by the frequency of telecommunications, operationalized as the number of minutes of telephone calls between countries as reported by TeleGeography. The global telephone network in 2008 may be described as having a center-periphery structure with the North American and Western European countries at the center, and less economically developed countries at the periphery. This is consistent with World Systems Theory. However, the peripheral nations are also clustered into regional/cultural groups — Latin America, Asia, Islam, and the former Soviet Republics. Over time, the integration of the global community, the breakup of the Eastern Bloc, the reintegration of Hong Kong into China and the bursting of the dotcom bubble have resulted in major changes in the pattern of global telephone flows. The network has become denser and more highly centralized, although these trends have not been monotonic. Since 2000, there has been a decline in the rate of change in international telephone network. This decrease is most likely due changes in telecommunications technology, the adoption of the Internet and VoIP.

Transactive memory consists of 'meta-knowledge about what another person knows, combined with the body of knowledge resulting from that understanding' (Lewis 2003:588). There are three processes underlying the transactive memory system (TMS): (1) the level of directory updating, or so called expertise recognition, (2) the level of information allocation, which implies the degree to which people pass on information to the other, and (3) retrieval coordination, which is aimed at communication to retrieve information and the ease of knowledge retrieval. This study investigates how the embeddedness of dyads in the communication network structure of a professional service firm influences the awareness of expertise, the willingness to share information and the perception that others will provide information. More specifically, we test whether individual centrality in the communication network and dyadic measures of embeddedness influence the transactive memory processes, controlling for attributes such as gender, and whether they participate in similar projects or are part of similar teams. The study is conducted in a consultancy firm with 138 employees, who operate mainly on the public and not-for-profit market.
The Impact Of Different Non-response Treatments On The Stability Of Blockmodels

Nidarši, Anja; Ferligoj, Anuška; Doreian, Patrick

Analyzing Network Data / Blockmodeling

Missing Data, Generalized Blockmodeling, Block Model Analysis, Non-response, Measurement error

SAT.AM2

Blockmodeling, in both its traditional and generalized versions, is a widely used set of methods for delineating the fundamental structure of social networks. Often, there are measurement errors in the network data that are analyzed by blockmodeling and other procedures. Blockmodeling, as a positional approach, may be especially vulnerable to the presence of measurement error. Yet, we do know much about this vulnerability. Here, we focus our attention on respondent non-response as a source of measurement error. There are data processing responses to treating this form of measurement error that include: the complete case approach, reconstruction of missing data and imputation methods. We examine the impacts of these data processing responses on blockmodel images by comparing the block structures of ‘known’ networks and networks established from them by the introduction of various types of non-response patterns. The comparisons are made by using two indices: the Adjusted Rand Index and the proportion of incorrectly identified block types. We start with some real data sets to get a sense of the problem and move to simulated networks to obtain a more general set of comparisons. There are a variety of different results regarding the impacts on blockmodel images. While these depend on the specific treatments of non-responses, the worst response is to do nothing about the measurement error which, unfortunately, appears to be the default approach used most often when blockmodeling is attempted.

The Impact Of Habitus On Network Structure

Hennig, Marina; Kohl, Steffen

Network Theory

Actor Network Theory, Ego-centered Networks, Network Structure

THURS.AM2

Our last presentation at INSNA XXX in 2010 focused on the relationship between the network analysis and Bourdieu’s theory of habitus and social space. In that context, the concept of habitus not only connects objective and subjective relations, but can also be seen as both, an expression of the social structure of society and a precondition for the repetition of practices in network structures. Here, habitus as a deep structure is considered a cause for certain thoughts and actions, and also for interactions between people. The aforementioned theoretical concept was empirically examined by surveying a sample of 53 respondents in Berlin, Germany, in 2010. Here, the habitus of the social milieu and the types of sociability of the respondents has been operationalized as elements of habitus, and put in relation to the ego-centered networks of respondents. As a result, we can show that both factors have an impact on respondents network structures, the social milieu, and the types of sociability. The social milieus point to the position in social space as examined by Bourdieu. Types of sociability in comparison, appears to have its origin in the network structure itself. The aim with this talk is to present the empirical results from the aforementioned study. We will also show that the exchange of symbolic and of material goods on implies the different specifications of material and symbolic goods of the actors, and also the differences of social relationships and infrastructure for this exchange.
### The Impact Of Opinion Leaders On The Risk Behaviors Of Homeless Youth: Results Of Dyadic Analyses

Green, Harold D.; Kennedy, David P.; Tucker, Joan S.; Zhou, Annie Z.

**Adolescent Friendship Networks**

Adolescents, Personal Networks, Peer Influence, Homeless, Substance Abuse, Popular Opinion Leaders

**FRI.AM2**

In a previous study investigating opinion leaders’ impact on the risk behavior of homeless youth, we found that the risk behavior of opinion leader (OL) subgroup members is correlated with respondents’ risk behavior, controlling for respondent and network characteristics. That is, the proportion of OLs and the proportion of OLs with a particular characteristic predicted respondent risk behavior. These findings led to multi-level dyadic analyses that explore what alter characteristics might directly impact a respondent’s risk behaviors. This study investigates a respondents’ exposure to risk and the likelihood he or she will drink with or do drugs with one of their network alters. We find that few respondent characteristics, network structure characteristics, network composition characteristics or network subgroup characteristics are predictive of these risk factors, but that alter characteristics are very predictive. In brief, it is not only alter characteristics (e.g., gender, homeless status, perceived risk behaviors), but also their structural position (e.g., alter degree, being an isolate) and their membership in multiple OL subgroups (core group, those whose opinions matter, community opinion leaders) that are predictive in these models. Further, network position is less predictive of these risk factors than OL subgroup membership. These models will be presented in further detail with attention to the relevance of the findings for intervention design.

### The Impact Of Peer Social Networks On Adolescent Alcohol Use

Mundt, Marlon P.

**Adolescent Friendship Networks**

Adolescents, Friendship Network, Peer Effects, Peer Influence, Co-Evolution Model, Actor-Based Stochastic Modeling

**THURS.AM2**

**Background:** Adolescent alcohol abuse is a pervasive public health problem. Friends’ alcohol drinking predicts alcohol use for middle and high school students. Previous adolescent alcohol research, however, lacks estimations of peer effect dynamics beyond ego-net structures. Methods: The analysis evaluates adolescent drinking in the first two waves of the National Longitudinal Survey of Adolescent Health (Add Health). Add Health participants selected up to 5 male friends and up to 5 female friends from a school roster and self-reported their alcohol use. The sample consists of 5236 adolescents at 58 schools. The estimation uses RSiena to simulate the co-evolution of adolescent friendship networks and adolescent alcohol drinking from Wave I to Wave II while controlling for age, gender, parental drinking, and family bonding. Results: Meta-analysis showed significant selection effects in tie creation driven by the tendency to choose friends based on similar alcohol consumption (b=1.11, p <.001). Statistically significant factors that controlled for network endogeneity are tendency to reciprocate friendship (b=2.61, p<.001), and tendency to choose friends of the same gender (b=0.35, p <.001). Meta-analysis demonstrated significant influence effects in ego drinking behavior determined by alters’ alcohol use (b=0.26, p<.001). Statistically significant factors that controlled for behavior endogeneity are age (b=0.16, p<.001), parental drinking frequency (b=0.06, p<.001) and family bonding (b=0.12, p=.002). Conclusions: Selection and influence processes simultaneously drive creation and maintenance of alcohol behavior within adolescent peer networks. Alcohol abuse prevention efforts may need to target peer groups.
The Influential Power Of eWOM Distribution In Virtual Communities

Wang, Jyun-cheng
Poster Session
Diffusion, Dynamic Networks, eWOM
SAT.PM3

Online product reviews reflect the perceptions of consumers and these reviews are regarded as eWOM. Online product review platforms provide a place to collect cumulative product reviews. People who have joined online product review website establish their friends and fans network. The fans can see all behaviors their friends do and thus be influenced. We take a cosmetics product review platform as our analysis target and we investigate each ego network and identify different characteristics of star network type, e.g. the contacts among alters, the triads of alters. We analyze different interactive types of ego network and the adoption of ego’s opinions. We identify the characteristics of ego network pattern and the influential power of friend network. The diffusion of eWOM is important issue for companies to know their customers and the likeliness of their products. In this study, we investigate time factor and the distribution of eWOM, so we investigate the dynamics of eWOM distribution through members' social networks. Cosmetics products send trial samples to potential consumers before they launch the product to the market. They will ask consumers who get free samples to write their product reviews for testimony. The product review generates rate and the reply frequency of pre-launch and post-launch are not the same. We observe eWOM diffuse rate, contact frequency and influential power to identify important factors which determines the success of cosmetics product.

The Network Dynamics Of Status: Selection And Influence

Torlò, Vanina; Torlo, Vanina J.; Lomi, Alessandro
Elite networks
SAT.PM2

This paper examines status both as an antecedent and a consequence of social networks in organizations. One way in which status is an antecedent to network ties concerns the tendency of individuals of similar status to select each other as partners, a phenomenon known as status homophily. Status is also a consequence of social networks because individuals connected by network ties tend to be considered as similar in terms of status. These mechanisms of status-based selection and network-based influence are distinct in principle, but in practice they tend to produce the same observable outcome: individuals of similar status connected by network ties. In this paper we show how mechanisms of status-based selection and network-based influence can be identified empirically and disentangled in a longitudinal analysis of social networks among 75 students enrolled in a professional management degree. Results show strong evidence in support of the hypothesis of status assimilation: status flows through network ties. As a consequence, we find that the status of individuals in the sample analyzed becomes progressively assimilated to the status of their network contacts. We report weaker evidence of status-based selection: individuals of similar status do not necessarily choose each other as network partners. We find that this result obtains because status affects the propensity to send or receive network ties in a way that is contingent upon the specific kind of relational setting engaging individuals. For example, high status individuals tend to be popular as advice partners, but avoided as friends.
### The Network Structure Of Competition Between Multipoint Rivals

**Palliotti, Francesca; Mascia, Daniele; Lomi, Alessandro**

**Organizations and Networks**

**Healthcare, Mutual Forbearance, Actor-Based Stochastic Modeling**

SAT.PM2

Organizations competing simultaneously across multiple markets, product lines, customer segments, or spatial locations are multipoint rivals. Almost regardless of the specific setting for the encounters, extant research reveals that multipoint rivals enjoy increased growth rates, experience improved survival chances, are able to charge higher prices, and control more stable market shares. If competition across multiple markets is universally beneficial why don’t all organizations increase their degree of multipoint contact with their rivals to share the benefits of mutual forbearance? This question shifts the focus of attention from the consequences of multipoint competition to its antecedents. To examine this issue, in this paper we use data that we have collected on multipoint contact between hospitals across twenty‐five major diagnostic categories during the period 2003‐2007. We estimate stochastic dynamic agent-based models that specify the conditional probability of change in multipoint contact as a function of the presence of collaborative network ties, institutional and organizational characteristics of the hospitals, and endogenous network mechanisms. In direct support of the mutual forbearance hypothesis, we find that reciprocation and the existence of prior network ties make organizations more likely to enter market segments already occupied by rivals. We find, further, that multipoint contact is more likely to be established between organizations sharing the same rivals, i.e., between structurally equivalent organizations. Finally, we find that multipoint contact is characterized by significant self‐reproduction tendencies: high levels of multipoint competition lead to further increase in multipoint contact. We take these results as evidence that access to the benefits that mutual forbearance potentially affords is controlled by network‐based mechanisms of relational coordination between organizations.

### The Network Structure Of Cooperation In Voluntary Dilemmas

**Scholz, John T.; Ahn, T. K.**

**Collaboration, coordination and cooperation**

**Dynamic Network Analysis, Experiments, Cooperation, Co-evolution, Collaboration Network, Coordination Games**

FRI.PM2

Social capital theory argues that cooperators in the large class of dilemmas often appear in clusters, but is unclear about whether clustering enhances cooperation or cooperators seek each other to create clusters. We report voluntary exchange experiments in which subjects select their partners and play iterated prisoners dilemma games. We describe a cooperative quit‐for‐tat strategy that quits any relationship after a defection, consider the structural implications of this strategy, and show that this strategy is consistent with the experimental results. We argue that selection produces the observed clustering, but that this result is dependent on the limited population size and limited length of the experiment. When cooperators seek other cooperators, the structure of cooperation will depend on population size, characteristics of the search for new partners, and the time horizon for cooperators.
### The Paradox Of Connection: Social Networks Of Parents Living In Extreme Poverty

**Bess, Kimberly D.; Doykos, Bernadette**

Qualitative and Mixed Method Network studies

Social Support, Social Capital, Mixed Methods, Parenthood, Urban Neighbourhoods, Poverty

SAT.PM1

Families living in extreme poverty face the daunting task of leveraging limited resources to provide for their children’s health, education, and safety. While social networks theoretically represent important sources of social capital that can benefit families, many parents in high-crime urban neighborhoods report that they avoid connecting with others. Social relationships are perceived simultaneously as costly and a potential threat to survival. We examine this paradox in a study of the social support networks of parents involved in a 10-week parenting program. As part of a broader neighborhood-based education initiative, Tied Together aims to break patterns of isolation and connect families to resources. Using a mixed-method approach we examined change in parent networks over time. We employed a network mapping process to collect pre- and post-program data of 30 participants’ social support networks and also conducted semi-structured post-program interviews with parents. Through interviews we investigated participants’ perceptions of their networks and how program participation affected their relationships to neighbors and the community. Our analysis of network data yielded five distinct patterns that reveal subtle changes in types of actor and ties. Analysis of interview data revealed connections that were less apparent in the quantitative data suggesting the ambivalence parents experience in relationship to their own networks. This study raises questions about the role of alternative settings as venues for the development of social support networks among parents living in extreme poverty as well as the limitations of such interventions in the absence of capital.

### The Personal Networks Of Homeless People Living In Los Angeles County: An Investigation Of The Multiple Levels Of Unprotected Sex

**Kennedy, David P.; Tucker, Joan; Green, Hank; Wenzel, Suzanne; Munjas, Brett; Zhou, Annie**

Egocentric Networks

HIV Risk, Personal Networks, Homeless, Multilevel Models

FRI.AM2

This paper will present analyses of over 700 personal networks of homeless people in Los Angeles County to better understand the social context of unprotected sex. We use multi-level modeling with a one-to-many dyadic analysis design to investigate the predictors of sex without condoms between homeless respondents and particular individuals. Previous studies have investigated condom use primarily at the individual level. This paper will examine predictors of unprotected sex at multiple levels: the partnership (e.g., characteristics of partners, such as perceived risky characteristics; characteristics of relationships with these partners, such as level of commitment to the relationship and relationship quality; history of abuse within the relationships; co-occurrence of substance use and sex), the individual respondent (e.g., demographic characteristics; depression; beliefs about condoms, pregnancy, and HIV), and the respondent’s social network (e.g., compositional characteristics, such as level of risky behavior in the network; structural characteristics of the network, such as density, number of components, number of isolates, etc.). We will also analyze the association between alter level network characteristics (degree centrality, being an isolate, betweenness, etc.) and likelihood to engage in unprotected sex with this partner. To further explore the context of risky sex and our initial findings, we will present analysis of qualitative data collected with a sample of homeless respondents who were shown their personal networks and asked to describe the characteristics of components, isolates, and key alters who influence their decisions about sex and substance use.
The Prestige Status Of An Academic Department And Its Niche-position
Yim, Min; Feld, Scott L.

Organizations and Networks
Academic Networks, Inter-organizational Networks, prestige status, Niche, Niche-positioning
SUN.AM2

This paper investigates whether the prestige status of an academic department affects its choice of engagement in niches (specialty areas) within the scientific discipline. It was found that more prestigious departments tend to be engaged in more central specialty areas in the discipline. The prestige status of each PhD granting sociology departments was measured by the eigenvector centrality in the “job-placement network,” where a node is each department and the directed link is defined as the placement of PhD who graduated from one department into another as the faculty. The centrality of each specialty area in sociology was measured by eigenvector centrality from the network of membership-overlapping network, where each node is a specialty section in the American Sociological Association (“Sociology of Population”, “Crime”, etc.) and the value of the tie between two specialty areas is defined as the number of sociologists from the PhD granting departments who are members of both specialty sections at the same time. The data were gathered from the Directory Book and the Department Guide of the American Sociological Association 1997 and 2007. The prestige status of a department as of 1997 was positively associated not only with the average centrality score of the specialty areas engaged by its faculty members as of 1997, but also with that among newly-recruited members between 1997 and 2007.

The Relative Effect Of Node, Manageable And Serendipitous Network Characteristics On The Performance Of R&d Consortia
Smit, Alexander; Smi, Alexander C.; Meeus, Marius T.; Raab, Joerg; Chappin, Maryse M.

Innovation, Diffusion, and the Adoption of Technology
Innovation Networks, Two-mode Networks, Interorganizational Networks, Cooperation, R&D, Serendipitous Networks
THURS.PM1

In current research on organizational performance, very often it is either explained by organizational characteristics such as absorptive capacity or resource availability, or by showing the influence of certain network positions (e.g. centrality). The relative explanatory power of characteristics that are specified at different levels is a question that has gained importance in network research. The aim of this paper is to unravel this relative explanatory power. Focusing on R&D consortia, which are collaborations of two or more organizations with the goal of utilizing basic scientific knowledge, we distinguish between (1) characteristics of consortium managers (e.g. experience) and the project (e.g. the money available to run the project), (2) network characteristics that can be managed by this consortium manager (e.g. direct ties and accompanying partner diversity) and network characteristics that cannot be managed by consortium managers but emerge because the manager’s partners are also collaborating with others (e.g. the centrality of the consortium within the larger serendipitous consortium network). We draw on a new 2-mode dataset that contains information on ~1.800 projects conducted in the period 1981-2003 in which individual scientists (~900) work with different organizations (~2.400) to utilize basic scientific knowledge. Our first results suggest that the relative explanatory power of serendipitous network characteristics is lower compared to that of the characteristics of the managers and the projects and the characteristics that can be influenced by these managers.
The Return Of Quality Of Social Capital And Job Skill: Gender Differences In Taiwan

Peng, Li-Hui; Hsung, Ray-May

Social Capital

Social Capital, Labor Markets, Gender

SAT.PM2

The gender differences on the wage return has been continuing, though women have had little difference from men in terms of educational attainment. There are still some gender differences after school along the career paths. This study attempts to examine two mechanisms to cause the differential return by gender: quality of social capital and job skill. The data were from the 3280 cases of Social Capital Survey in Taiwan in 2004, and we only used 2407 cases of currently employed respondents for our analyses. Quality of social capital was measured by the number of access to prior good social capital (accessed social capital before entering into current job) with positions of greater or equal 60 Treiman’s occupational prestige score. The job skill included the knowledge depth (measured by months of requiring special training to be qualified for current job besides the education obtained from school) and the knowledge creation (measured by how often respondents apply new ideas or actions at their work). Men tend to access to better quality of social capital and possess better job skill which caused better return of income than women after controlling all other essential variables. The return of quality of social capital and job skill is greater for men than for women. The education contributed the major return for women.

The Rise And Fall Of Leaders In Leadership: A Network Perspective

Doty, Daniel; Murase, Toshio; DeChurch, Leslie A.

Academic and Scientific Networks

Knowledge Networks, Academic Networks, Leadership, Knowledge Evolution, Co-authorship Network

THURS.AM1

Research on leadership is one of the original and most enduring concentrations within organizational science. It has seen numerous theories and perspectives rise and fall over more than 60 years of consistent and rigorous conceptual and empirical study. With this, a very large group of scientists have become linked to one another through their work spent on this topic. This loose collaboration of authors, institutions, and theories may be clearly conceptualized as a single multimodal scientific network. Analyzing this network longitudinally in relation to corresponding events within the science (e.g., major paradigm shifts, high-profile publications, etc.) will allow light to be shed on the life cycle of these theories, research programs, and the science as a whole. The goal of this research is to identify the dynamic network characteristics that correspond with the development of new theories, their ingratiation into the science, and (for many) their ultimate decline. For instance, certain high-profile publications on a topic (e.g., handbook chapters, top-tier journal reviews, meta-analyses, etc.) may provide critical points in time which drastically shift the collaboration patterns between authors and institutions. Conversely, the causality may actually be reversed, in that such high-profile publications do not exist until a certain collaborative “tipping-point” is reached. Through the cataloguing of the vast majority of leadership oriented, peer reviewed journal art
### The Role Of Offline Status In An Online World: At The Intersection Of Two Related Communities Of Practice

**Dennen, Vanessa P.**

**Online Social Networks**

On-line Communities, Academic Networks, Blog Networks, Communities Of Practice

**THURS.AM1**

When people meet in different settings, do they replicate the same social structures and hierarchies? Or do online, pseudonymous networks allow for the possibility to break out of traditional face-to-face structures, even when individuals self-identify with the same titles and characteristics? This paper examines the interplay or overlap of membership in two topically related communities of practice – one in a face-to-face work setting and the other existing via a blogging network. The people in question are academics or academics-in-training who are active bloggers in a journalistic vein (e.g. they write about the daily happenings in their professional and often also their personal lives). Through their blogging network, which primarily consists of sole-authored blogs written under pseudonym, they share personal stories (on their own blogs) and offer advice and support to their fellow bloggers (via comments). Data for this study were collected via interviews, surveys, and a review of blog and comment archives. Network analysis techniques are used to demonstrate how the social and power structures of the online network are similar to but do not quite replicate the social and power structures of the offline world. Discourse analysis techniques are then used to help explicate the reasons for these differences. Wenger’s (1998) Community of Practice theory, with its presentation of five community trajectories, serves as a theoretical framework for classifying an individual’s status as both an academic and as a blogger.

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### The Role Of Structure Of Behavior In Adopting A New Technology

**Kim, Sang-Joon**

**Innovation, Diffusion, and the Adoption of Technology**

Culture, Transitivity, Life Course, Individual Experience, Structure of Behavior

**THURS.PM2**

This study argues that each individual has his/her own structure of behavior, which affects his/her adoption of new ideas. From a phenomenological perspective, I posit that an individual’s behavior is culturally constructed in the life course, it is not atomized but structured as a coordinated system within a person, and thus the structure of behavior plays a critical role in facilitating to adopt new ideas. Specifically, when individuals respond to a new idea with their own interconnected previous behaviors, they are likely to adopt the idea if the coordinated behaviors are compatible to it. Based on this argument, I examine whether the structure of behavior can have a significant effect on the adoption of VoIP (Voice over Internet Protocol) in the individual level. To identify the structure of behavior in the individual level, I newly measure behavioral connectedness, defined as how densely an individual’s behaviors are interconnected in terms of the compatibility of a new idea, by using the definitions of transitivity and density in the social network analysis. The logistic regression model shows that the behavioral connectedness is significantly related to the probability of accepting the new technology. It means that the internal fit among institutionalized behaviors is important in investigating behavioral responses to a new technology. Finally, this study tells us that an individual’s behavior is repeatedly coordinated and re-organized in response to new ideas, and the structure of behavior can be an important micro-level factor to facilitate macro-level changes.
### The Small World Phenomena Of Patent Citation Networks: The Case Of Semiconductor Industry In Taiwan, 1976-2007

Hsung, Ray-May; Lu, Ke-Wei; Yang, Hui-ju

Small World Research
Small World, Innovation, Patent Citations
THURS.AM2

We built up the two-mode networks with patents and their cited patents for semiconductor industry in Taiwan from 1976 to 2007. Then, we constructed the affiliation networks of the overlapped citation networks among patents. There were very few patents until 1993 in semiconductor industry in Taiwan. The average shortest path distance and average clustering coefficients for the largest components in the affiliation networks from 1993 to 2007 were computed. The average shortest path distance and average clustering coefficients for the random graph over time also were computed. During the period of 1999 to 2001, the small world phenomena with large average clustering coefficients and low average shortest path distance were getting significant. It meant that the innovation system measured by patent citation networks during that period seemed to be more efficient in terms of knowledge acquisition. This period was the new stage of technological innovations in the semiconductor industry. This study implied that whether the most innovative period was more likely to occur in a system with small world phenomena.

### The SNA Observer: A Tool For Collecting Real-time Longitudinal Sna Data

Hansberger, Jeffrey T.

Poster Session
Data Collection, Social Network Analysis, Longitudinal Analysis
SAT.PM3

Longitudinal social network data is needed to understand the dynamics, adaptation, and evolution of networks over time, particularly when the mode of interaction is face-to-face communication. Traditional means of collecting social network analysis (SNA) data that include questionnaires are often not appropriate for collecting this type of dynamic data. In order to push the field of social and dynamic network analysis beyond the analysis of discrete snapshots of interactions and speculating on what occurs between those snapshots, an observational SNA data collection tool called the SNA Observer was designed. The SNA Observer collects longitudinal data and allows for longitudinal analysis of interactions among people and information technology or artifacts. The tool was designed for the Apple iPad tablet computer for its mobility and touch screen ease of use and is freely available through Apple’s App Store. The tool is used to collect relational data as to who is talking to whom, the direction of the communication flow, and the duration of the communication events along with the ability to record contextual notes of critical events or information. The comma separated value (CSV) output has been designed to work easily with a number of common SNA tools such as UCINET and ORA and can be easily transferred from the iPad to a computer for analysis without reformatting of the data. The tool offers advantages in flexibility, mobility, and efficiency for longitudinal data collection focused on coordination across agents.

**Pak, Susie J.; Halgin, Daniel S.**

<table>
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<th>Elite networks</th>
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<td>Economic Networks, Historical Networks, Financial Networks, Affiliation Networks, Ethnic Relations, Elites</td>
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SAT.PM2

In this paper we study the elite network of J.P. Morgan & Co. before the Second World War. J.P. Morgan & Co. was the most important investment bank in the United States in the early to mid-twentieth century. Becoming a partner in the firm, then an unlimited liability private partnership, was akin to receiving a “golden ticket” to the center of American finance and society, and Morgan partners were generally understood to be men of “high social standing.” Despite this fact, most historical studies of the bank, the economic networks have been carefully studied, but the partners’ social ties have been virtually ignored. The paper studies the Morgan bank’s network from a unique database of affiliation ties created from the bank’s syndicate books, partnership agreements, interlocking directorates, the Social Register, New York, and qualitative data. It argues that elite economic networks were not organized entirely around the economic motive and demonstrates the importance of non-economic ties to the organization of the bank’s economic relationships. Of particular interest is the bank’s relationship to the German-Jewish bank of Kuhn, Loeb & Co., the Morgans' primary competitor in the field of investment banking.

### The Structure Of A Community Elite Affiliation Network

**Cornwell, Benjamin**

<table>
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<th>Elite networks</th>
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<td>Two-mode Networks, Affiliation Networks, Community Networks, Elites</td>
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SAT.PM2

Local elites are often portrayed as cohesive groups of powerful actors who are connected to each other through exclusive clubs and organizations (though sometimes in factions). I explore this idea using original data that were collected during in-person interviews with 312 elites in a large Midwestern city in 2001-2002. Participants were asked to name up to 10 local clubs or organizations to which they belonged, which resulted in a list of over 600 organizations. I use the data to construct and analyze a two-mode network of elites’ community organizational affiliations. Analyses reveal a high level of interconnectedness in the network, but little cohesion. Much of the interconnectedness stems from elites’ involvement with a pre-set list of 20 primarily community-wide voluntary organizations that was provided to participants during the interview. When these are removed, some isolates and several small components materialize, but most elites remain connected to a large component that spans outward in different directions from a loosely connected core. I close by examining the relationship between elites’ positions within this network and other elites’ perceptions of their influence within the community.
### The Structure Of Consensus: Cohesion And Hierarchy In Peer Networks

Gauthier, Gertrude R.

**Networks and Culture**

Culture, Cohesion, hierarchy

SUN.AM2

This paper presents the effect of density and hierarchy on normative consensus. I present a two-by-two typology of social networks characterized by their level of density and hierarchy (low-low, low-high, high-low, high-high). I use the ergm package to simulate networks that characterize the four cells with empirically realistic values. I measure the diffusion potential of the simulated networks to make hypotheses about the level of normative consensus that would be reached in an actual network with the same structural features. Finally I test these hypotheses on adolescent networks from the AdHealth dataset that most closely match the structural features of the simulated ones.

### Three-stage Enabled Self-organization Of Interorganizational Networks: The Case Of Td-scdma Standard-setting Alliance

Tan, Justin ; Wang, Liang

**Innovation, Diffusion, and the Adoption of Technology**

Network evolution

THURS.PM2

This paper examines how self-organization co-exists with and gradually replaces authority intervention as the driving force behind interorganizational network evolution, eventually transforming an engineered network into an emergent process. Mixed methods are employed to triangulate qualitative and quantitative data from interviews, field studies, and government/industry archives. A longitudinal study of the standardization process of TD-SCDMA technology reveals that an engineered-emergent transition is possible when the triggering entity adopts enabling leadership. We close by outlining a set of propositions on network structure at both the macro- and micro levels, and suggesting directions for future research.
Typical techniques for visualizing changes in dynamic networks involve either keeping nodes in fixed positions throughout or interpolating between snapshots of static network layouts. In the first case, the visualization does not make use of information about how the graph changes over time, while in the second case the resulting animations can be difficult for the user to interpret because the positions of nodes can change dramatically from one frame to the next. We introduce techniques for generating layouts of dynamic graphs that make explicit use of the time component in the data, leading to a smoother layout that highlights changes in network structure while ensuring that node positions do not change too much over time. The techniques are illustrated using the IkeNet social network of military officers, and the results are compared to other longitudinal visualization techniques.
### Time Heterogeneity In Stochastic Actor-oriented Models: An Empirical Test On Problem-solving Dynamics In An Open Source Software Project

**Conaldi, Guido; Tonellato, Marco**

Organizational Dynamics

Network Dynamics

Organizational Development, Two-mode Networks, Open Source, Stochastic Actor- Oriented Models, Social Mechanisms, Time Heterogeneity

WED.PM2

How do organizations induce and coordinate individual action toward collective goals? The interest of organizational and sociological scholars in this question has been renewed by the emergence of communities of production composed by volunteers who can choose which task to take on, why and when. Relatively little is known about the social micro-mechanisms that drive individual action and ensure coordination between interdependent tasks when traditional market-based and hierarchy-based mechanisms of coordination are unavailable. In previous research we applied stochastic actor-oriented models to analyze one of such communities. We showed that decisions of individuals to take on specific tasks are influenced by their local network neighborhood through feedback mechanisms, which shape the different levels of engagement across individuals, and balancing feedback mechanisms, which affect the different popularity of tasks. In this study we investigate whether the effect of these local network structures on the association of individuals and tasks varies according to when it unfolds in the life-cycle of the project. In order to address this question we analyze the same Free/Open Source Software (F/OSS) community of our previous study. We reconstruct the two-mode network generated by problem-solving activities undertaken by 135 software developers on 719 software bugs during an entire release cycle of the software. We estimate new stochastic actor-oriented models by allowing the effects of local networks structures to be heterogeneous over time. We discuss the differences with previous restricted models and their implications for the understanding of social micro-mechanisms underpinning the emergence of endogenous coordination in communities of production.

### Together In Perfect Harmony? The Collaborative Creation Of Scientific Knowledge In Virtual Organizations

**Binz-Scharf, Maria C.; Paik, Leslie**

Academic and Scientific Networks

Scientific Networks, Mixed Methods, Collaboration, Co-authorship Network, Ethnography, Knowledge Creation

FRI.AM2

Research scientists have become increasingly dependent on collaborations across laboratories and organizations to maintain their productivity. While there is a growing body of research on the co-production of knowledge in collaborative settings, little is known about how that process happens in virtual organizations (VOs). The common assumption among researchers is that VOs speed up existing ways of producing scientific knowledge. Drawing on ethnographic and bibliometric data of 300 molecular biologists dispersed in laboratories across the world, this paper offers some findings that partially confirm but also challenge that assumption. VOs do facilitate traditional modes of collaboration, as scientists can e-mail results to one another and find new partners to exchange data resources or ideas. Yet they also alter the ways that scientists do their work. On-line databases actually shift the modes of production somewhat as the scientists can generate new hypotheses based on the collated information about genes, proteins and mutant stressors. Moreover, new standards in publication with on-line supplements and increased pressures to discover “something new” effectively slow down peoples’ knowledge production. At the same time, as much as VOs do affect scientific knowledge, some things remain constant: intralab routines, hierarchy within and across laboratories, interpersonal factors of trust and communication as well as institutional factors related to each lab’s home university.
Towards An Algorithm For Fitting Event-based Models
Stadtfeld, Christoph; Robins, Garry; Pattison, Philippa
Event-based networks
Dynamic Network Analysis, Event Data, Algorithms, Model selection
FRI.AM2
Researchers conducting explorative analysis of social network data with structural models like event-based models, cross-sectional (ERGM) or longitudinal (SIENA) models are usually confronted with finding a good model fit. On the one hand, there are many potential structures that have a significant effect on the dependent network and hence improve the model. On the other hand, an exploratory model should not be overspecified but quickly identified and easy to interpret. The model of interest, which is supposed to describe the observed data appropriately, can be retrieved algorithmically. A brute-force algorithm can help finding the best model solution. However, even for simple classes of models (e.g., those only including triadic structural effects) such an algorithm is often computationally inefficient. From a graph-theoretical point of view, the different substructures in a network are interdependent. In a directed network, for example, a reciprocal dyad consists of two single arcs. If the test of those two single arcs returns no significant effect, a test of the full dyad is redundant because it will also be insignificant and hence has no added value. It generally makes sense to start model fitting of exploratory analyses with simple single-arc structures. The estimates of these structures give hints on which of these structures should be combined or removed from the model. Some ideas towards a faster algorithm for fitting event-based models are discussed.

Twitter, A Medium For Social Mobilizing?: An Exploratory Study On The Use Of Twitaddons.com In South Korea
Choi, Sujin; Park, Jiyong; Park, Han Woo
Online Social Networks
Twitter, Social Media, Civil Society, media use
FRI.AM1
Twitaddons.com, launched in March, 2010 in South Korea, allows Twitter users to organize a thematic party (“dang” in Korean) and discuss any specific topics with the followers of that party. With its growing adoption, some parties are organized for civic engagement in political and social issues on Twitaddons.com. Observing this movement which has been rarely discussed by previous studies, whose focuses were mainly on Twitter’s social networking function, the present study addresses the use of Twitter for social mobilization in our daily life. This study attempts to explore i) what attributes party organizers have, ii) whether their relationships with general Twitter users and with party members are different from each other, and iii) how party organizers’ attributes and relationships with members have affected the formation of shared values of the party. These questions are examined through measuring the ego-profiles of party organizers and their conversational and content-sharing activities as well as conducting a semantic network analysis on parties. 12 parties — classified as politically, socially, and commercially oriented groups — are selected for these analyses, based on the number of members, activeness, and social and ideological stances. The data gathering period is from March, when Twitaddon.com was introduced, to the end of September, 2010. Additionally, a case study of ‘Cho-pae-gongsaa,’ a party which explicitly claims for the closure of the Chosun Ilbo — the main Korean daily newspaper, well known for its conservative and pro-government editorial status — is conducted for better understanding of the party’s innate dynamics for mobilization.
Two-mode Projection And Data Loss

Everett, M G.; Borgatti, S P.

Mathematical and Statistical Network Models

Two-mode Networks, Data, Projection

FRI.PM2

The standard projections take a two-mode binary matrix A and construct AAT and/or ATA and then analyze these. If our matrix A is an actor by event matrix then the former is an actor by actor matrix in which the entries are the number of events pairs of actors attended together, and the latter is an event by event matrix of the number of actors common to both events. The projections are actually similarity matrices derived from the rows and columns of the data matrix A. In the binary case these are counts of the number of times the rows (or columns) have a one in common. One of the criticisms of using projections is that there is a loss of structural information and it is true that using either AAT or ATA alone does lose structural information. However, it is not clear how much information is actually still embedded in the projections and to what extent data is actually lost. A closer examination of this issue suggests that relatively little information is lost and even less is lost if we consider both projections together. This suggests a different approach to analyzing two-mode data namely to analyze both projections and combine the solutions.

Unconventional Weapons And Drug Smuggling: A Dual-network Configurational Analysis Of Terrorist Organizations

Schoon, Eric; Asal, Victor; Breiger, Ronald; Melamed, David; Milward, H. B.; Rethemeyer, R. K.

Criminals, Gangs, Terrorists, and Networks

Organizations, QCA, Covert, Dark Networks

SAT.AM1

Terrorist organizations are violent and often motivated politically—but this does not make them drug smugglers. Drug smuggling is an activity that many see as immoral and problematic for organizations trying to claim moral superiority over their opponents and who are likely to see themselves as “the good guys.” Indeed, most terrorist organizations do not engage in drug smuggling. In this paper we focus on chemical, biological, radiological, or nuclear weapons (CBRN) acquisition or use, drug smuggling, and terrorist action. We examine how these activities intersect across 395 terrorist groups. To begin, we assess how key organizational attributes influence the probability of these organizations engaging in drug smuggling using logistic regression. However, in this paper we argue for moving beyond these conventional analytic methods, by linking actors and attribute data to two-mode network analysis, configurational methods (as in Charles Ragin’s QCA framework), and barycentric correspondence analysis (as recently proposed by Ronald Breiger). Using our methods we provide a visual map of the intersection of all the variables, and simultaneously all the actors in our study, while identifying key conjunctions of variables that enable us to predict drug smuggling. A key finding is that, while the (degree) centrality of terrorist organizations within a network of inter-organizational alliances clearly has an impact on their involvement in drug smuggling, this connectivity must be combined with other variables, in the multiple paths that we identify that are most likely to lead to drug smuggling.
Uncovering Cohesive Groups

Freeman, Linton

Network Methods
FRI.AM1

Since 1998, when social network analysis became part of physics, there has been a revolution in the field. More articles are published. Wider applications are proposed. And new approaches to traditional problems are developed. Among traditional problems in social network analysis is concern with cohesive groups. Since the 1930s we have attempted to specify their structural properties and we have developed procedures to uncover them in data sets (cf. Moreno, 1934; Davis, Gardner and Gardner, 1941; Forsyth and Katz, 1946; Luce and Perry, 1949; Beum and Brundage, 1950; Homans, 1950). Since the revolution, that thrust has continued and expanded. Physicists have produced new definitions of cohesive groups and they have proposed new algorithms for uncovering them. In physics, however, cohesive groups are called “communities.” The physicists have also enlisted the help of computer scientists in this endeavor. But, in computer science, cohesive groups or communities are called “clusters.” Here I will review some of the most used of these new approaches. In particular, I will focus on cohesive group-community-cluster finding algorithms (eg. spinglass, edge betweenness, leading Eigenvector, label propagation, walktrap, markov clustering, k-clustering). By applying them to classic social network data sets, I will explore their potential for uncovering structural groups.

Understand And Guide Scientific Research Team Assembly Through Social Network Analysis: Mapping, Recommender System, And Optimization

Huang, Meikuan ; Huang, Yun ; Devlin, Hugh ; Fazel, Maryam ; Liu, Jordan ; Contractor, Noshir

Applying Social Network Analysis to Clinical and Translational Science in four CTSA Institutions

ERGM/P*, Scientific Networks, Team Formation, Recommender, Scientometrics
SAT.AM2

This paper reports on a series of two studies to understand and optimize scientific team assembly in Clinical and Translational Science using scientometric and archival data. First, we report on an p*/ERGM study using co-authorship and citation networks to understand the precedents and outcomes of teams collaborating on proposals. Prior collaboration is a key team assembly factor which has been found to have mixed effects on group performance. Based on theories of transactive memory, homophily, and prior collaboration, this study examines how prior co-authorship, citation, and citation similarity influence team formation and success in scientific research groups. We collected scientometric and archival data of 101 research proposal teams with a total of 185 scientists who competed in 2 rounds of grant competitions in 2009 hosted by a Clinical and Translational Sciences Institute located in a Midwestern university. We tested ERGM models in PNet and found that there is a predominant network structure in the successful teams that members are likely to collaborate with those they have a coauthorship relationship with. Second, guided by MTML framework, we report on the implementation and evaluation of a recommendation system (powered by C-IKNOW) using such metrics as co-authorship, affiliations, citation history etc, to help researchers more efficiently find collaborators.
Understanding The Different Facets Of Relationships In Social Media For The Enterprise

Daly, Elizabeth M.; Ehrlich, Kate
Organizations and Networks
Organizations, Social Media
SAT.PM2

Social media enables a variety of relationships when deployed in an enterprise including social relationships, colleague relationships and information discovery relationships. Social relationships involve reciprocated connections that can include both work related and personal interactions. Colleague relationships are likewise reciprocated and focus more on business related content. Information discovery relationships may in contrast be asymmetric, where users may gain new knowledge through a following connection or benefiting from content contributed by other users without any action require on the part of the expert. Information seeking relationships have a different property where the user may require some action on the part of the informant such as a response to a request for information. The rich social environment in the enterprise enables us to understand the different facets of these symmetric and asymmetric relationships and their underlying purpose. In this talk we present the results of a study that used data from social media usage in an enterprise to extract relationships based on social connections, collegial connections and information discovery connections. We examine the properties in order to help understand the differences between these relationships and highlight the important role social media can play in not only enabling these relationships, but supporting them.

Underwriter Peer Network And Ipo Performance

Chuluun, Tuugi; Eun, Cheol
Business & Entrepreneurial Networks
Inter-organizational Networks, Financial Networks, Securities Markets, Information
WED.PM2

We examine how underwriter peer network affects the performance of initial public offerings (IPO) using measures from social network analysis. IPO refers to the first issuance of a company’s common stocks to the public, and information production is one of the key functions of underwriters in this process. We explore the impact of underwriter peer networks on a sample of U.S. IPOs issued between 1974 and 2007. The network measures are constructed using ties that underwriters form with each other when they work together in the syndicates of public securities issued in the U.S. during 1970-2007. Our results show that IPOs are more likely to experience offer price revision when they are underwritten by book managers with large networks, ties to well-connected underwriters and bridging positions between other underwriters. The likelihood of offer price revision also increases when the book managers’ networks include partners with similar geographical or industrial specialization and display greater interconnectedness among the partners. These finding imply that more networked book managers significantly contribute to pre-IPO price discovery. All these network characteristics also lead to higher post-IPO stock returns. Finally, the effects of book manager networks are greater for younger firms with higher information asymmetry and during periods with lower deal volume.
Unequal Access To Urban People As A Form Of Social Capital: Findings From A Study Of Friendship Networks Among Chinese College Students
Tang, Zhenyu; Feld, Scott L.
Friendship networks
Social Capital, Homophily, Friendship Formation, China, college students, inequality
WED.PM1

Employment opportunities in China are highly concentrated in large urban areas, and control over those opportunities is therefore concentrated in people in those urban areas. Living in large urban areas oneself and having access to other urban people therefore provide indirect access to the greater benefits of those large urban places. In particular, college students from large urban areas start with better access than their fellow students. Ties to other students from large urban areas can be a further resource. This study examines factors affecting college students’ ties to others from large urban places. We collected and analyzed data on about 200 students from Peking University (PKU). We find substantial homophily such that students from large urban areas have more friends from similar places. We found that common foci of activity and preferences for homophily could not account for much of this pattern. We found relatively small differences in choices of foci of activity, and widely shared preferences for associating with urban friends. However, we found that a surprising number of college students maintained friendships in college with people they knew before college, largely from the same types of backgrounds as themselves. And, we suggest that the required reciprocity of friendship combined with the largely shared preference for associating with urban friends means that while everyone wants urban friends, urban people are more accepted as friends by other urban students. We conclude with further considerations about the difficult problem of attempting to provide equal access to social capital.

Unique Features Of Corrupt Police Networks
Lauchs, Mark; Keast, Robyn
Criminals, Gangs, Terrorists, and Networks
Structure Variation, Dark Networks
SAT.PM1

Not all networks create organisational structures. Recent work has demonstrated that corrupt police networks operate within the shadows of a host organisation - the Police Force (Lauchs, Keast and Yousefpour forthcoming). Since they operate under the radar, corrupt police networks are argued to be low density, centrality and path distance; a decentralised but non-linear group formed around their roles, but not command structure, within the police agency. This paper compares and contrasts the structural properties and operational practices of generalised criminal networks those with that of a corrupt police network. It draws on data from the Fitzgerald Inquiry into Queensland Police Misconduct and related publications. A preliminary descriptive theory of corrupt police or blue line networks will be generated.
Using A Web-based Survey To Elicit Inter-organizational Network Information: Findings From The Community Partners In Care Study Administrator Surveys

Stockdale, Susan E.; Horta, Mariana; Mendel, Peter J.; Jones, Felica; Dixon, Elizabeth; Chung, Bowen

In-person interviews are the usual method for collecting information on social networks, but conducting the interviews and coding the data is time-consuming and costly. In the Community Partners in Care (CPIC) study, we designed and fielded a web-based survey to elicit data on inter-organizational networks from community agency and program administrators. We ran 2 versions of the survey to explore reliability and data quality issues associated with different ways of eliciting network information: asking respondents to list partners and then describe attributes of partnerships vs. asking them to describe attributes of partnerships as each partner is nominated. In particular, we were interested in whether the “listing first” method would result in ego-centric networks with larger outdegrees, as has been found with in-person network interviews, and whether the organization names respondents typed into open-ended list items would be of sufficient quality to identify existing community agencies. We also explore whether controlling for administrator/agency characteristics explains the reliability and quality differences we observed between the 2 web-survey versions. We found that web-based surveys yielded data with comparable quality and reliability as compared with in-person network interviews, but more time and follow-up than had been anticipated was required to obtain a good response rate and ensure high quality data. We discuss challenges we experienced with web-based surveys, including software “bugs”, uncertainty regarding the organizational unit respondents provided information for, and the inability to verify (through interviewer follow-up probes and questions) partner organization and program names and other information elicited from the network questions.

Using Dialog For Community Detection In Virtual Worlds

Shah, Fahad; Sukthankar, Gita

Massively multi-player online games and virtual environments provide new outlets for human social interaction that differ from both face-to-face interactions and non-physically-embodied social networking tools such as Facebook and Twitter. We aim to study group dynamics in these virtual worlds by collecting and analyzing public conversational patterns of users grouped in close physical proximity. To do this, we created a set of tools for monitoring, partitioning, and analyzing unstructured conversations between changing groups of participants in Second Life, a massively multi-player online user-constructed environment that allows users to construct and inhabit their own 3D world. Although there are some cues in the dialog, determining social interactions from unstructured chat data alone is a difficult problem. Linkages between SL actors are inferred offline by partitioning the unstructured data into separate conversations; by combining spatio-temporal cues with a semantic analysis of the dialogs in public chat data, we can construct an approximate social network of the users from our dataset of 80,183 separate utterances. In this study, we evaluate different partitioning algorithms for dividing the network into communities and demonstrate how knowledge of the community structure can be used to refine the semantic labeling of the dialogs.
**Using Ergms To Map Online Clandestine Behavior To Offline Criminal Activity**

Keegan, Brian; Ahmad, Muhammad; Williams, Dmitri; Srivastava, Jaideep; Contractor, Noshir

Criminals, Gangs, Terrorists, and Networks

ERGM/P*, Criminal Behavior, Virtual World, Covert, Collaboration Network, Multiple-network Studies

SAT.AM1

The analysis of criminal and clandestine organizations presents unique theoretical and methodological problems. However, empirical analyses of these organizations’ structures have received scant attention because data is necessarily hard to obtain. Contemporary studies have been handicapped by data that effaces the embeddedness of these organizations within larger licit social interactions and a reliance on descriptive, single-level methods rather than using generative and confirmatory models for multi-level analysis. Because the covert actors in online worlds must balance the demands for efficiency against secrecy as in the offline world, it may be possible to map behavior and social organization from the online back to the offline. We integrate exponential random graph methods to compare how the organization of “money launderers” in a massively multiplayer online game differ from drug traffickers in the real world. Our results have implications for understanding how task demands and technological affordances impact the social organization of crime.

**Using Social Network Analysis To Increase Utilization Of An Inner City**

Ross, Paula; Boardley, Debra; Eckert, Jeanette; Hallsky, Sarah

Networks and Economics

Peer Influence, Community, neighborhoods

THURS.AM2

The organization known as the YMCA has recently changed its name to the Y and has increased services focusing on strengthening communities through youth development, healthy living and social responsibility. The purpose of this study was to use social network analysis to increase community participation and utilization of a Y located in an economically depressed area in a large Midwestern city. This study collected data on the networks of Y members. Data collected was used to identify individuals whose reported ties suggested potential influence within the Y and within the neighboring community. A roster survey was used. In the first step, the Y generated the names of individuals who had used the Y in the past year. To be included in the roster, individuals had been to the Y at least 50 times (about once a week) and have the same home zip code as the Y. Individuals indicated who they worked out with at the Y, who they socialized with outside the Y, and from whom they would seek advice. The results of the roster survey identified a small group of key individuals. This group was convened as an advisory committee with the purpose of improving utilization of the Y. This committee was given incentives to ensure participation in the group. The committee gathered information from the community and also to distributed information to the community with respect to the programs and services offered at the Y. Data on the effectiveness of this strategy is still being collected.
### Using Social Network Analysis To Map Family Stories Of Autism In An Urban Context

Solomon, Olga; Mary, Lawlor; Fujimoto, Kayo; Poulson, Marie; Yin, Larry; Valente, Thomas

**Social Networks and Health**

Qualitative Approaches, Family, Autism, Health

**FRI.PM1**

In this study we interviewed several families regarding their experiences with autism in an urban context. Family narratives reflect their experiences with getting information about autism, access to services, and coping with the everyday challenges of having an autistic child. Social Network Analysis (SNA) was used to map family relations and connectivity to resources concerning diagnosis and services using ego-centric techniques. Results show that families varied quite considerably in the composition and use of family and friends for accessing the resources to autism diagnosis and services they need after the diagnosis is received.

### Using Social Network Analysis To Understand Household Vulnerability And Resilience

Cassidy, Lin; Barnes, Grenville

**Social Influence and Support**

Resilience, Adaptive Capacity, Rural Communities, Betweenness Centrality, Africa

**SAT.PM1**

In this paper we examine resilience and vulnerability as two opposite poles of the adaptability of social-ecological systems. In order for poor, marginal rural communities to adapt to the vagaries of climate change and other more local stresses, they will need to become more resilient. This will entail enhancing the capacity of communities to cope with ‘shocks’ such as droughts or economic crises without changing their fundamental identity. We analyze a community in rural Botswana to uncover how different households make use of social networks to deal with three major shocks identified by community members - livestock disease, crop damage, and human disease and death. Habu is a community that has already experienced more than its fair share of shocks, having survived the ravages of cattle lung disease (CBPP), HIV-AIDS, and crop damage due to a burgeoning elephant population in the area. We surveyed 145 households in the community of Habu using a structured questionnaire that focused on demographics, livelihood strategies and social networks. A measure of resilience was derived from demographic characteristics and livelihood strategies. Within each of the three shock categories we analyzed social networks relating to information, labor, food and money exchange. We used centrality measures (degree and betweenness) as proxies for connectivity and examine the relationship between connectivity and resilience.
Many-to-one matching markets exist in many different forms, such as college admissions, matching medical interns to hospitals for residencies, assigning housing to freshman students, and the classic firms and workers market. In these markets, externalities such as complementarities (colleges caring about diversity) and peer effects (students wanting to attend the same college as their friends) severely complicate the preference ordering of each agent. Further, past research has shown that externalities lead to serious problems in market stability and algorithms for finding matchings. We propose a formulation of the many-to-one matching market where the effects of externalities are derived from an underlying social network. Within this framework, we prove the existence of a stable matching in every many-to-one market, and we give bounds on the worst-case social welfare of any stable matching.
### Using Weak-ties For Problem Solving: Methodical Knowledge Exchange In Social Networks

**Konert, Johannes; Göbel, Stefan; Steinmetz, Ralf**

**Online Social Networks**

Difficulties of problem solving in a domain, where users have the factual knowledge, are mostly ascribed to missing methodical knowledge (and practice). In contrast to the common approach to consult expert networks, we suggest a solution where users can find content for methodical approaches and best practices for the current problem at hand in (one of) their online social networks. To find and suggest this User-generated Experience Content (UEC), we choose an algorithmic approach taking into account parameters for optimization like level of trust, context of the searching user and quality of the found UEC. Here one hypothesis is that UEC from peers is easier to understand due to a shared social context and common sense between the users. We presume that this results in a lower frustration in problem solving, shortens the time needed and increases the learning effect for the person facing the problem. We evaluate the use of this peer-based UEC suggestion approach in several projects. First application is in the context of game-based problems (challenges) in levels of Serious Games connected to Online Social Networks like Facebook. We will discuss further projects and possible applications.

### Validating Trends – The Typology Of Relational Embeddedness Network Data Survey

**Hite, Julie M.; Waakee, Ingrid; Hite, Steven J.; Sudweeks, Richard; Walker, Timothy D.**

**Collecting Network Data**

The Typology of Relational Embeddedness Network Data Survey (TRENDS) measures the extent and type of relational embeddedness within dyadic ties. By identifying seven different types of relational embeddedness, based on Hite’s (2003) typology, TRENDS assumes that relational embeddedness is a multidimensional construct rather than simply dichotomous. Measuring the variability of relational embeddedness across ties can better facilitate its use as a dependent or independent construct in network research. After extensive piloting, we report on the validation of TRENDS at the dyadic level (for individual, independent dyadic ties) in the context of the external ties of faculty in higher education. Construct validity, addressed using confirmatory factor analyses and item analysis, both supported and further informed Hite’s (2003) typology. Criterion-referenced validity was supported through factor analyses of TRENDS items and literature-based survey items for the constructs of embeddedness and strong ties. Second, we report on a validation study of TRENDS at the network level (the combination of non-independent dyadic ties), in the context of a multiple-department college network in higher education. Construct and criterion-referenced validity were again assessed. In addition, at this network level, issues of accounting for actor, alter, and dyadic non-independence are addressed. The results of these studies indicate that, at both the dyadic and network levels, TRENDS provided a valid instrument for the measuring the extent and type of relational embeddedness. This instrument can facilitate the study of relational embeddedness as either a dependent or independent construct.
### Validation Of A Network-based Survey Instrument: Multilevel-models Of Factor And Item Analysis Of Attribute Level Data

**Walker, Timothy D.; Hite, Julie M.; Sudweeks, Richard; Olsen, Joseph; Hite, Steven J.**

**Collecting Network Data**

**Methods, Statistical Methods, Network Data, Embeddedness, Validation Methods, Strong Ties**

**THURS.AM1**

This paper reports on the use of multi-level (or hierarchical-linear) models of confirmatory factor analysis and item-response theory analysis to inform a network survey instrument validation study. Multilevel modeling (MLM) allows for the estimation of various group level effects in quantitative analysis. In network settings MLM facilitates the identification, and quantification of various sources of nonindependence. By quantifying possible effects from actor, alter, dyadic, and sub-group membership nonindependence on attribute data, MLM methods provide the researcher with more robust evidence of construct validity and scale reliability. This study compares the use of MLM models of factor and item analysis, with traditional tools of exploratory factor analysis and classical test theory item analysis. This comparison is accomplished in the context of a validation study of the TRENDS instrument. TRENDS is designed to test a multiplex theory of relational embeddedness and has been validated in an iterative process in a population of higher education faculty.

### Venture Capital Firms: Birds Of A Feather That Flock Together, Really?

**Gay, Brigitte**

**Network Dynamics**

**Network Dynamics, Small World, Centrality, Venture Capital, Syndication, Network Models**

**THURS.PM1**

Transaction networks in the venture capital industry are built up through the extensive use of syndicated investing. The cohesive nature of the network structure of venture capital (VC) syndicates has been demonstrated. Many studies emphasize that VC firms resemble “birds of a feather that flock together” and that VC syndicates networks form a “Small-World” structure. These results by definition negate the fact that some firms may actually shape and control the whole network. The analysis of the power structure of VC networks has therefore been generally neglected. Moreover how network structure responds to the cyclical nature of the VC industry has not been analyzed. We try here to decipher the power structure of VCs syndicates through the dynamic study of VC lending in the biotech industry from 1988 to 2008. Our study design is grounded in a set of structural methods and models developed in social network research and statistical physics. We demonstrate that though the macro-feature of VC networking, cohesion and repeat ties among incumbent firms, stay hallmarks of VC syndication, the network structure continually changes under the control of hubs that deploy syndicate networks like flexible meshes to ‘capture’ biotech companies. Importantly, different categories of hubs time their strategy and respond to technical change and the cyclical nature of the VC industry differently. A unique finding is also that the network evolves from a “Small-World” to a “Scale-Free” architecture. This finding, and the use of an extensive set of network metrics, gives new insights into complex network dynamics.
### Viable And Non-viable Models Of Cross-sectional And Longitudinal Network Data

Schweinberger, Michael  
Exponential Random Graphs  
Statistical Methods, ERGM/P*, Simulation, Statistical Models, Sensitivity Analysis, Longitudinal Social Network  
SUN.AM1

It is well-known (Frank and Strauss, 1986, Wasserman and Pattison, 1996) that models of network dependence were inspired by models of spatial dependence in statistical physics and spatial statistics, e.g., the Ising model (Ising, 1925). Less well-known is that the Ising model and more general models need to satisfy stability conditions to ensure meaningful, physical behavior. We argue that some of the same stability conditions need to be satisfied by models of network dependence. Models which do not satisfy stability conditions suffer, in general, from excessive sensitivity and near-degeneracy, and in special cases, the subset of the parameter space corresponding to non-degenerate distributions is a linear subspace of the full parameter space. These characteristics of unstable models hamper both simulation and statistical inference. We give a wide range of examples, including the Markov models of Frank and Strauss (1986) and the curved exponential family models of Snijders et al. (2006) and Hunter and Handcock (2006). We discuss the extension of these results to longitudinal network models, including the discrete-time Markov model of Hanneke et al. (2010) and the continuous-time Markov model of Snijders (2001).

### Virtual Brokerage And Closure: Assessing Player Social Capital In A Massively Multiplayer Online Game

Shen, Cuihua; Monge, Peter; Williams, Dmitri  
Online Social Networks  
On-line Communities, Social Capital, Structural Holes, Brokerage, On-line Game, Closure  
THURS.AM1

Recent years have witnessed growing scholarly interest in evaluating the implications of internet and various social media on the creation and maintenance of social capital. This study takes a structural approach to examine the effects of bridging and bonding social capital as network brokerage and closure. Taking advantage of a unique dataset with both server logs and user survey over a nine-month period, this study constructed social networks among players of EverQuest II, a large Massively Multiplayer Online Game, and examined the effects of virtual brokerage and closure on task performance and trust. It illustrates an alternative way to define and operationalize online social capital structurally, and also contributes to the literature on the tension between bridging and bonding and their respective effects on instrumental and socioemotional goals in contemporary media environments. In addition, this study shows that relations established in virtual worlds may still demonstrate the same brokerage and closure effects originally found in offline social worlds, thus providing initial construct-validity evidence that virtual world networks can be used as parallel for understanding real world social dynamics.
### Visual Data Collection Of Social Networks

Gamper, Markus; Kronenwett, Michael; Schönhuth, Michael

**Qualitative and Mixed Method Network studies**

Visualization, Mixed Methods, Vennmaker

**FRI.AM1**

In this presentation we discuss potentials and limitations of collecting, representing and analyzing network data by using network maps. We discuss different types of network maps and their advantages and disadvantages respectively. A selected example of migration research provides us with an opportunity to demonstrate a digital network map. At the end we take a look in the future of visual data collection of social networks.

### Viszards XXXI Session

Batagelj, Vladimir; Borner, Katy; Brandes, Ulrik; Hong, Seok-Hee; Johnson, Jeffrey C.; Krempel, Lothar; Lerner, Juergen; Mrvar, Andrej; Pfeffer, Juergen

**Viszards session**

Visualization, Visual Analytics, Transportation Networks, Time Networks, Socio-technical Network, Large network dynamics

**THURS.PM2**

Viszards sessions started at Sunbelt XXII with different analyses and visualizations of the media coverage of the September 11 terrorist attacks. At the following Sunbelts we continued with: XXIII: 'The Summer Joker' network; XXIV: the players market of the football World Championship 2002; XXV: KEDS (The Kansas Event Data System); XXVI: IMDB (The Internet Movie Database) networks; XXVII: Wikipedia; and XXVIII: networks from Web of Science; XXIX: Bibsonomy; and XXX: Music 'social networks'. With this year's session we are continuing this tradition. Rather than a series of contributions on related subjects, this session features a single, joint presentation by all contributors. Our aim is to demonstrate the richness and power of network analysis, in particular when supported by visualization. We therefore present a multi-perspective analysis of a single data set, utilizing a broad range of visualization methods. This year's viszards will analyze the data about the flight arrival and departure details for all commercial flights within the USA in years 1987 to 2008.
Banzhaf (1965) argued that voting power was not proportional to voting weights, nor even linear. He did not consider that different coalitions might be more or less likely, or that different people might be able to make use of structural power differently. A priori power indices assign an advisor to a dictator no power. These measures offer no insight into the political reality. An advisor has power if he can influence the dictator. Few votes are taken without discussion of the alternatives. Voters try to convince others to vote their way. A social influence network determines the likelihood of each outcome. Network centrality measures are designed to measure actor importance in a social network, but they do not account for a voting rule. It is not a function of the voter's own preference, but only of the preferences of other voters. It uses an influence network to determine the likelihood of each coalition, so it is comparable to centrality measures as well as power indices. I use several examples to illustrate the measure and show its usefulness, in particular the US Supreme Court and Council of the European Union.

Most research on social bond formation has argued that status-attraction and self-selection (homophily) narrow the pool of suitable persons, and then within the remaining set, the quality of social interaction is such that some persons "click" and form bonds while others do not. But what does it mean for persons to "click" and how is that accomplished? This paper uses techniques from computational linguistics to study how different features of speech – e.g., lexical (word usage), prosodic (pitch), and dialogue acts (backchannel) - are used differently by men and women to establish a sense of social bonding. To study dating conversations we collected original data on multiple speed dating events using surveys on dating decisions and interpersonal perceptions and audio recordings for information on speech acts. We then analyze these data using dyadic data analysis (Kenny, Kashy and Cook 2006) and discern which speech styles are more or less associated with a sense of "clicking" and tie formation (i.e., date selection).
When Social Research On Networks And Genetic Data Conflict: Why Might People With Genetically-similar Strains Of Stis Have Considerable Sexual Network Distance As Determined Through Surveys?

Friedman, Samuel R.; Sandoval, Milagros; Mateu-Gelabert, Pedro

Social Networks and Health

Methods, HIV/STD, Infectious Disease, Sex Networks, Social-ecological Networks, Social Network Theory

FRI.AM1

Studies of gonorrhea and HIV have found that network distance and genetic distance are not well correlated. This has been hypothesized to be due to respondents’ not naming some sex partners or to researchers’ failing to recruit partners who were named. Indirect transmission of pathogens between people who never have sex with each other is another possible explanation for this phenomenon. This can occur at group sex events if someone’s body parts or sex toys carry infectious material between one of his or her partners and another partner. Such indirect transmission chains might extend across several partners and several hours, so such indirect transmission might connect two people who were never at the same event at the same time. Prior research by Friedman et al (2008; 2010), Gazi et al 2008, Krauss et al (2006), Njue et al 2009, Rothenberg et al 1998, and Zule et al (2007) shows that group sex is common in heterosexual and mixed contexts as well as LGBT contexts. This possibility shows the importance of collective nodes or events for social network research. Collective nodes can greatly increase concurrency and bridging. “Shooting galleries” have been shown to be important for HIV transmission dynamics in the networks of injection drug users, for example. On an epidemiologic level, it poses a difficult challenge: to assess the probability of indirect transmission and the factors that affects this probabilities. Parameters from such studies could become part of mathematical models of transmission dynamics across networks and group sex events.
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<td>Lock, Gwen E.</td>
<td>Who Shares? Exploration Of Managerial Knowledge Sharing Practices In British Columbia’s Ministry Of Health Services</td>
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**Knowledge Networks**

Communication, Organizational Change, Knowledge Transfer, Public Organizations, Information

THURS.AM2

Over the next decade, the public sector will experience significant loss of operational knowledge from an aging managerial workforce. To effectively manage knowledge, organizations must first understand its knowledge resources and sharing practices. The aim of this work was to surface which factors enabled or inhibited knowledge sharing between managers in the Ministry of Health Services’ information management and information technology division. A mixed-methods case study approach using social network analysis and interviews was used to explore managerial knowledge sharing practices, an approach used by previous researchers including Adkins (2008), Birk (2005), Cross and Parker (2004), and Schultz-Jones (2007). The research questions explored the characteristics of an effective knowledge sharing network, contrasts between different managerial knowledge sharing practices, and perceived knowledge sharing enablers or inhibitors. Social network analysis was used to understand and visualize informal workplace relationship networks for 41 managers who worked in strategic, business, and operational managerial roles. In-depth interviews for 18 managers were used to understand their preferred knowledge sharing approaches and underlying rationale. Findings indicated that managers who used a variety of communication styles, preferably face-to-face, and knowledge exchange roles, such as brokerage, were more effective in sharing complex knowledge. Managers who were able to shift to a variety of brokerage roles, such as representative, consultant, or liaison were able to act as knowledge brokers within and external to the division’s managerial network. The absence of key enablers, such as face-to-face engagement, proximity, multiple communication styles, and an inflexible organizational structure were perceived knowledge sharing barriers. Adkins, D., 2008. The use of social network analysis to measure knowledge sharing in the New York State project management community of practice. [Doctoral dissertation, University of Albany, State University of New York, 2008]. (UMI No. 3319548). Birk, S. M., 2005. A mixed-method study using social network analysis to identify an organization’s knowledge capabilities and communication paths. [Doctoral dissertation, University of Idaho, 2005]. (UMI No. 3178900). Cross, R. Parker, A., 2004. The hidden power of social networks: Understanding how work really gets done in organizations, Boston: Harvard Business School Press. Schultz-Jones, B. A., 2007. The intersection of social networks in a public service model: a case study. [Doctoral dissertation, University of North Texas, 2007].
Why Do Experts Look Dumb Sometimes?
Johnson, Jeffrey C.; Griffith, David; Clough, Lisa; Ambrose, Will

Knowledge Networks
Diffusion, Knowledge Evolution, Climate Change
THURS.AM1

There is a general expectation that expertise involves a solid grasp and understanding of some knowledge domain. Further, we expect experts to have higher levels of knowledge domain competency relative to non-experts. However, caution should be exercised in applying such a common sense generalization when viewing knowledge and knowledge acquisition as dynamic rather than static. There are conditions under which the foundations of knowledge must change to meet the influences of shifting realities (e.g., climate change). During these dynamic periods of change, expertise can appear marginalized due to the emergence of new knowledge derived from expert experience. Under such conditions expert knowledge seems to deviate from the status quo or the generally held view since by the very nature of their expertise they are the first to comprehend and incorporate new knowledge into their own system of beliefs and understanding. Here expert knowledge stands in contrast to conventional views making experts appear dumb. This paper examines expertise among Inupiaq hunters and fishers under conditions of climate change. Expertise, as determined by centrality in reputed knowledge networks, appears to not be related to a competent understanding of cultural ecological knowledge or the standard shared cultural understanding. However, once various change indicators that challenge conventional thought are taken into account, expert knowledge foreshadows the dynamic changes to come and, in fact, legitimates reputations of expertise.

Why Do Organizations Network The Way They Do? An Examination Of Networking Patterns Among Self-benefitting Ngos
Pilny, Andrew; Atouba, Yannick

Organizational Networks
ERGM/P*, Inter-organizational Networks, Collective Action, Non-governmental Organizations, Advocacy Organization
FRI.PM1

Self-benefitting NGOs primarily exist to serve their own members. Nevertheless, these NGOs still form coalitions and network with one another to gain access to critical resources, shape public opinion, and lobby on behalf of their members. However, the networking patterns among these organizations have not received much attention in the organizational literature. Moreover, while the organizational literature is rich in information about why organizations form ties, it is less rich in information about why they form those ties the way they do. This study seeks to fill those gaps in the literature. It uses a multi-theoretical, multi-level framework and Exponential Random Graph Modeling to examine the endogenous and exogenous influences on the structure of a communication network among 56 self-benefitting NGOs. The results indicate that endogenous mechanisms like centralization and transitivity, and exogenous attributes like subdomain influence, organizational type, media attention, and age influence the probability of communication ties being present. However, the principle of reciprocity did not influence communication ties, suggesting that the inherent self-interested nature of self-benefitting NGOs may impact the logic of their interorganizational networks. Furthermore, media attention was highly correlated with perception of organizational influence. Implications for future research are drawn from the results.
This paper investigates the under exposed relationship between institutional environment and network emergence (see Powell 1996, Owen-Smith & Powell 2004 for examples on this neglected stream of research). We raise the questions of whether and how institutions not merely influence emerging network structure, but also mediate the relationship between network structure and performance. In the process, we discuss the historical and cultural contingencies that create these institutions of network growth, and hence make network structures and the economic functioning of networks different from place to place. The analysis is based on collaboration networks from the film industries of Hollywood and Bollywood. The predominantly meritocratic institutional environment of Hollywood leaves each individual to fend for him/herself based on abilities, connections and luck. Contrary to this, the institutional environment of Bollywood is dominated by nepotism in the form of altruism among kin (Dawkins 1976), where kin has both genetic and social components. Comparison of these two industry networks facilitates analyses of effects of network centrality, status, and previous collaborations under different institutional frameworks. Our findings indicate that the nepotism dominating Bollywood increases the value of repeated interaction which leads to a tight knit network structure. This coincides with a stronger association between high status and centrality. Based on these findings we conclude that network emergence under an institutional environment dominated by nepotism leads to a tight knit, clique based network structure which restrains possibilities for sourcing knowledge and talent from all parts of the network.
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