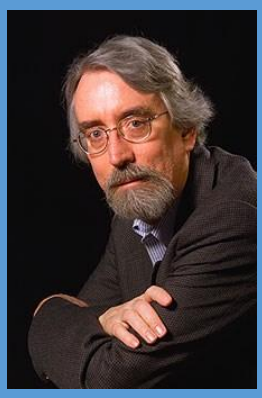
Mathematical Sociologist

Volume 19, Issue 1 **Fall 2015/2016**

Comments from the Chair Douglas Heckathorn



It is a pleasure once again to serve as Chair of the Mathematical Sociology Section. I occupied this role exactly a decade ago, and the changes in the field have been profound. One change involves the emergence during the last few years of "Big Data" as a focus of concern. The analyses include models of network architecture, network diffusion, and network dynamics. A more recent change is the emergence of studies of "Small Data." In sociology, this involves studies of hidden populations via network sampling. Like the studies of big data, the study of small data is interdisciplinary; for example, in 2012, the American Statistical Association held a conference on "Methods for Surveying and Enumerating Hard-to-Reach Populations," and the National Cancer Institute is currently organizing a conference on small data titled, "Small Is Essential:

Inside this issue:

Importance of Subpopulation Research in Cancer Control." (See American Journal of Public Health, 2015). Like the studies of big data, the analyses of small data include models of network architecture, diffusion, and dynamics.

A welcome form of continuity is the continued collaboration with Japanese mathematical sociologists. Before next August's ASA meetings, "The Sixth Joint Japan-US Conference on Mathematical Sociology and Rational Choice" will be held. My hope is that as many of you as possible will attend. As more information on the conference becomes available, I will send it along.

The section's sessions for next August's meetings will involve a small change. As previously, our section's paper session will be an open session. But a difference is that the business meeting will be preceded by a one-hour awards ceremony at which the section's four awards will be presented by the chairs of the award committees, and during which the recipients will have the opportunity to describe their award-winning work. I look forward to seeing you there.

Publications for Mathematical Sociologists

Shank, Daniel B., Yoshihisa Kashima, Saam Saber, Thomas Gale, and Michael Kirley. 2015. "Dilemma of Dilemmas: How Collective and Individual Perspectives Can Clarify the Size Dilemma in Voluntary Linear Public Goods Dilemmas." *PLoS ONE 10(3): e0120379.*

Best Article in Mathematical Sociology

Chair: Amir Goldberg

Elizabeth E. Bruch

"How population structure shapes neighborhood segregation." 2014. American Journal of Sociology 119(5): 1221

Outstanding Graduate Student Paper Award

Chair: James Montgomery

Andrei Boutyline

University of California

"Detecting Shared Cultural Schemas with Correlational Class Analysis: Theory and Methodology."

Outstanding Dissertation in Progress Award

Chair: Matthew Salganik

Jacob C. Fisher

Duke University

"Latent space and social psychological models of diffusion."

Getting to Know Our Award Winners

Andrei Boutyline
University of California, Berkeley

As a mathematical sociologist, I use formal reasoning to tighten the link between theory and method—to understand what should be measured, how to measure it, and what those measurements mean. In my work, I seek to understand the supra-individual aspects of attitudes and tastes, and especially those political attitudes which make up "public opinion." Various sociological accounts conceive of large-scale attitude systems in terms of fields, cultural schemas, belief structures, or partisan ideologies. Though diverse, these accounts all depict attitudes as *structural* phenomena, defined by patterns of relations between cultural, cognitive, or social elements. However, because these accounts cannot be readily examined with standard statistical tools, they remain empirically understudied. In my dissertation, I draw on network analysis, probability theory, statistics and computer science to create novel methodologies for such structural analyses. I use them to provide new insights on attitudes as both individual cognition and macro-scale cultural organization.

My work on belief networks (with Stephen Vaisey) focuses on theories of ideology in which some beliefs are central and others are derived from these more fundamental positions. We formally demonstrate how such structural accounts can be tested by analyzing positions of beliefs in the network of squared correlations. When we apply this method to the 2000 ANES dataset, we find that ideological identity serves as the primary attitude-organizing heuristic, with religious identity possibly playing a similar but weaker role for the politically uninvolved. To search for heterogeneity, we then separately examine belief networks belonging to 44 different demographic subpopulations. These analyses indicate that belief systems of different groups vary in the extent to which they are organized, but rarely vary in the logic around which they are organized. Across all demographic groups, attitude structures either follow the liberal-conservative logic of national politics, or else lack systemic organization.

In a separate project, I develop an improved method for detecting shared cultural schemas in survey data, which is a central methodological challenge in the sociology of culture. Such schemas define which attitude positions "go together," and which are opposed. For example, two individuals could be said to share such a schema if one supports environmental regulation and welfare spending, while another opposes both policies: though the two hold opposing views, they implicitly agree on which stance on environmentalism goes with which stance on welfare. Aside from such examples, existing theoretical reasoning has left the central concept of shared schemas loosely defined. I clarify and extend

this reasoning to arrive at this missing definition. Surprisingly, my analyses demonstrate that the shared schemas sought by current work are simply linear dependencies between survey rows—the relationship usually measured by Pearson's correlation. I then create a correlation-based alternative to the existing computationally intensive method, which both simplifies it and greatly improves its accuracy. My clarified theory also yields testable predictions about schema-based attitude systems which I intend to explore in subsequent work.

In my final dissertation project, I examine political attitudes as positions in a field. If public opinion is a debate between competing ideological camps, do the distributions of mass attitudes suggest that these competitors agree on what issues the debate is actually about? Both sociological practice theories and research on the cognitive demands of survey response suggest that reliably answering survey questions is an acquired cultural skill which requires substantial training to achieve. Thus it follows that respondents' differential skills at answering various questions should reveal which issues their ideological camp prepares them to debate. To address this question empirically, I formally develop a statistical model of conditional response reliability, and implement software to fit such models to panel data using constrained optimization. I find that the terms of the public debate are overwhelmingly in dispute.

While my dissertation develops new approaches to traditional sociological surveys, my other work uses novel computational data to address questions for which traditional data fall short. In my work on political "echo chambers" (with Robb Willer), we ask whether political homophily—the tendency to associate with like-minded others—varies by ideology. Existing findings on personality difference by ideology point us to the prediction that more conservative or more ideologically extreme individuals may be more homophilous than others. Due to a substantial pro-homophily bias in recall and other well-documented problems, this prediction would be difficult to test with survey data. We instead test it on the complete network snapshot of *Twitter*, and find strong support.

I am currently completing my dissertation in Sociology at University of California, Berkeley.

I am a 6th year Ph.D. student in sociology at Duke University, working under the direction of Jim Moody. I received my M.S. in statistical science at Duke University in 2015 and my B.A. in anthropology and history at Washington University in St. Louis in 2008.

My research focuses on improving models for understanding diffusion processes. The ultimate goal of my research is to understand how diffusion processes interact with cohort replacement to produce stability in the culture of a group whose members change over time. The dissertation, which won this section's outstanding dissertation in progress award in 2015 (thank you!), focuses on correcting two important shortcomings in current diffusion models, and uses data from an online enterprise collaboration system (a program similar to Slack) to examine an empirical case of diffusion in a large technology company.

My first dissertation chapter improves diffusion models by reconciling two competing no-

Jake Fisher
Duke University

tions of what network ties mean. Network ties could represent stable conduits for information, or network ties could represent relative social positions (that is, they could be random draws from an underlying social space that governs how we interact). Diffusion studies almost always use the former approach, treating ties as stable conduits, and suggesting that information cannot travel between people who are not connected in the network. While this may be a reasonable assumption in some cases, for many of the cases, the observed network ties are not an exhaustive list of someone's social contacts. For example, if students in a school list their top five "best and closest friends," the people they list are probably a random sample of the other students who sit at their lunch table, and not an exhaustive list of who they listen to.

My dissertation chapter integrates these approaches by creating a model for diffusion when the ties represent positions in social space. Practically, the approach is simple. Using a latent space model, I find the predicted probabilities of a tie between each pair of people, and then treat those predicted probabilities as the network in a diffusion study, rather than the observed ties. This applies a small amount of smoothing to the network, allowing people to be connected to others who they were not connected to in the observed network with some small probability. Although my dissertation chapter illustrated this with data from a network of adolescents in a school, this method should work for any type of network where the predicted probability of a tie can be generated, and I plan to extend the method with future work.

My second dissertation chapter improves diffusion models by considering how allowing bits to change as they diffuse influences a diffusion process. Very little of the current diffusion literature considers how people's cognitive biases influence a diffusion process. A growing literature in social psychology, however, shows that people modify the information they receive in predictable ways. For example, in a transmission chain experiment, Hunzaker (2013) showed that people are more likely to remember and retell stereotype-consistent information than stereotype-inconsistent information. To model this, I created an agent-based model where a person who is confronted with information that contradicts what he or she already believes will change some of the information. By simulating this process, I hope to capture one aspect of how schemas can influence the ultimate outcome of a diffusion process.

My third and final dissertation chapter considers an empirical case study of diffusion, the use of a software tool among people in a large technology company. In particular, I focuses on when people stop using the software. Although there is a long literature on when people start using innovations, almost no research has considered when people abandon innovations. In part, this lacuna occurred because of a lack of data – we measure when people buy a new product, but we do not measure when people throw away a product that they bought. With new, online data, however, we can identify when people stopped using an innovative piece of software, as well as when they started using it. My dissertation chapter looks at whether the diffusion of innovations process can also work in reverse – that is, can a few people abandoning an innovation cause a cascade?

Apart from my dissertation, I also consider statistical models for networks and network sampling, and how groups cohere and continue over time. My work has considered topics ranging from RDS, to an internship at Google's People Analytics, where I studied work teams. I enjoy collaborating with mathematically inclined coauthors, so if you have a study idea, you should definitely get in touch!

A Call for Nominations

Mathematical Sociology Outstanding Dissertation in Progress Award

Deadline: **2/1/2016**

This award provides a grant of $1,500 to meet some of the scholarly expenses of a student whose dissertation employs mathematics in an interesting, imaginative or ingenious way to advance sociological knowledge. The applicant should submit a copy of his or her approved dissertation proposal, with a list of any requirements added by the graduate committee. The packet should also include a letter of support from the student's sponsor, which describes the student's qualifications for the completed task and the potential importance of the project. The requirements include membership in the ASA and the mathematical sociology section during the period to be covered by the grant. Please send a copy of the dissertation proposal and a nomination letter by February 1, 2016 to:

Committee:
Matthew Brashears (brasheam@mailbox.sc.edu)

Mathematical Sociology Outstanding Article Publication Award

Deadline: **2/1/2016**

This award honors an article that has made an outstanding contribution to mathematical sociology. Eligible articles must have been published during the three years prior to the award year. Please send a copy of the article and a nomination letter by February 1, 2016 to:

Committee:
Kitts, James A. jkitts@soc.umass.edu

Mathematical Sociology Graduate Student Paper Award

Deadline: **2/1/2016**

This award is presented for the best paper written by a graduate student that makes a significant contribution to mathematical sociology. Papers can be published or unpublished. The submission can consist of a dissertation chapter, but not the entire dissertation. The submission must have been written or published during the three years prior to the award year. The author/first author must be a graduate student at the time of submission, and all authors must be graduate students when the paper was written. Nominations and self-nominations are welcome. Please send a copy of the paper and a nomination letter by February 1, 2016 to:

Committee:
James Montgomery jmontgom@ssc.wisc.edu

Mathematical Sociology Harrison White Outstanding Book Award

Deadline: **2/1/2016**

This award honors the book that has made an outstanding contribution to mathematical Sociology. Eligible books must have been published in the four years prior to the award year. Nominations must come from members of the American Sociological Association. Nominations and self-nominations are welcome. Please send a copy of the book and a nomination letter by February 1, 2016 to:

Annual Report for the Mathematical Sociology Section

For membership year 2014-2015

Prepared by Phil Bonacich, Past Chair

Section Governance

Committees were appointed and successfully conducted their business.

Committee on Nominations: Entire Council

Harrison White Outstanding Book Award: Chair, Noah Friedkin

Committee for Best Article in Mathematical Sociology: Chair Amir Goldberg

Committee for Graduate Student Paper Award: Chair, James Montgomery

Committee for Outstanding Dissertation in Progress Award: Chair, Matthew Salganik

Business Meeting

42 people attended

AGENDA OF MATHEMATICAL SOCIOLOGY BUSINESS MEETING:

Discussion of our relation with proposed new section on “Analytical Sociology”

Discussion of budget, led by John Skvoretz, Treasurer. Decision is made not to increase award for student dissertation but to let the fund grow.

Harrison White Outstanding Book Award Committee; This year, no award.

Outstanding Article Publication Award: Elizabeth Bruch, Sociology, Complex Systems, & Population Studies, University of Michigan for "How population structure shapes neighborhood segregation." *AJS; American Journal of Sociology* 119, no. 5 (2014): 1221.

Graduate student Paper Award: Andrei Boutyline, University of California, Berkeley, “Detecting Shared Cultural Schemas with Correlational Class Analysis: Theory and Methodology."

Outstanding Dissertation in Progress Award: Jacob C. Fisher, Duke University, Department of Sociology, "Latent space and social psychological models of diffusion."

Report on Newsletter, Pamela Emanuelson, Newsletter Editor
Report Regarding Website: Matthew Brashers
Welcoming of Douglas Heckathorn as the new Chair

Coleman Career Achievement talk, Phillip Bonacich, “Dynamic Models for Eigenvector Centrality: The True, the false, and the Ugly.”

Section Council Meeting

Members Present: Phillip Bonacich (Chair), Jane sell (Past Chair), Douglas Heckathorn (Chair-Elect), Pamela Emanuelson (Newsletter Editor), John Skvoretz (Treasurer), Damon Centola (Council), Amir Goldberg (Council), James Kitts (Council), Matthew Salganik (council), Mikhail Teplitskiy (Student Council member)

Agenda and Notes:

Treasurer's report. Discussion of pros and cons of increasing the award for graduate dissertation award. Recommendation that members contribute money to the section over and above the dues.

Discussion of recruitment of a second newsletter editor.

Agreement that Coleman Award Speech should be given by recipient in the same year in which it is awarded.

There was a general discussion of merging with the proposed Analytical Sociology Section. The sentiment of the Council was negative. The success or even formation of the new section is not guaranteed, and Mathematical Sociology has a history and loyalty that is worth preserving.

State of the Section Budget

Math. Soc. Dissertation Award (Fund=73, Section=37)	
ENDING FUND BALANCE 12.31.13	$180,901.07
Interest Income	$ 3,375.14
Awards	-$3,000.00
ENDING FUND BALANCE 12.31.14	$181,258.03

Math. Soc. Section Account (Section=37)	
ENDING FUND BALANCE 12/31/15	$2,010.00
Section Allocation	$1,012.00
Other Income	$0
AM Reception	-$1,845.00
Award Expenses	-$0
AM Other Expenses	-$0
ENDING FUND BALANCE 08/31/15	$1,177

Statements, Notes, Observations

The reception remains a large expense even though we hold joint receptions with other sections. Despite the added expense, we have chosen on-site rather than off-site because of the advantages of greater publicity and because multiple on-site receptions near each other can more easily be visited.

The Previous Year

Overview

The arrangement to publish the talks of the Coleman Lifetime Achievement Award winners in the Journal of Mathematical Sociology has been implemented with the inclusion of Jon Skvoretz' s Coleman talk in the journal.

Recruiting and Retention Efforts

We hope that our graduate student paper and dissertation awards attract graduate student members

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Communications Strategy

We have a newsletter and a web page. The web page is undergoing a revision at the current time.

The Coming Year

There has been some discussion over beginning to plan for another joint North America/Japan Mathematical Sociology Conference. There have been five such conferences, the last being held in Denver in 2012.

Elections and Nominations

The pervious chair is the Chair of the Nominations Committee. All Council members and officers constitute the Committee.

Plans for the coming year.

We plan to continue to use the Business Meeting for talks by award winners.

Statements, Notes, Observations

Members continue to feel a strong sense of identity as mathematical sociologists and as members of the section.

Social Interaction and Society
Perspectives of Modern Sociological Science

ETH Zurich, May 26 – 28, 2016
Organizer: Chair of Sociology at ETH Zurich (Prof. Dr. Andreas Diekmann)
in collaboration with the Section of Model Building and Simulation of DGS

Social and strategic interaction is the basic element in explanations of how society works.

People imitate habits, fashions, customs and norms, and learn from other people's behavior. Opinions spread throughout society by characteristic patterns and the "law of imitation" (Tarde) drives the social diffusion of innovations like norms, attitudes or the adoption of new technologies. Strategic behavior considers other actors' goals and opportunities and often leads to far reaching consequences that were not intended by rational or boundedly rational actors. Competing models from game theory, behavioral game theory, rational choice theory, and bounded rationality theory with evolutionary models based on principles of learning and imitation were developed to account for explanations of social interactions and its consequences on the macro level of society.

The aim of the conference is to bring together diverse perspectives on modeling social interaction, on deriving hypotheses from theories of interaction and on empirical tests of hypotheses in various fields of applications.

We welcome contributions on (but not restricted to) the following topics:

How actors make decisions. Theoretical models and empirical research from experimental studies, field experiments and surveys

Models of social interaction. New models from game theory, evolutionary models, bounded rationality, models of social diffusion, etc. to explain actors' behavior and social processes

Impact on society. Consequences of individual actions and interactions

Methods. Methodological problems, problems of experimental studies, problems of assessing causality in survey studies, the use and misuse of 'big data', and simulation studies

Applications of models and theories of social interaction in various fields like social norms, law and crime, social stratification, environmental problems, population studies and other fields

Contributions (title, abstract, and, if available, manuscript) should be submitted no later than

January 31st, 2016

to the conference office, indicating the kind of contribution you are applying for: a conference presentation or a poster session.

Conference office:

irene.urbanek@soz.gess.ethz.ch

INTERNATIONAL NETWORK OF ANALYTICAL SOCIOLOGISTS

9th INAS Conference – June 3 and 4, 2016 in Utrecht, The Netherlands

Theme: "Understanding institutions and sustainable cooperation"

Organizers:

Vincent Buskens, Rense Corten, Wojtek Przepiorka, Department of Sociology, Utrecht University Andreas Flache, Michaël Mäs, Rafael Wittek, Department of Sociology, University of Groningen

Keynote speaker: Delia Baldassarri (New York University)

CALL FOR ABSTRACTS

Deadline: February 1st, 2016

Analytical sociology is a general approach to explaining the social world. It is concerned with phenomena such as social network structures, patterns of segregation, collectively shared and diffused cultural ideas, and common ways of interacting in a society. The mode of explanation is to specify in clear and precise ways the mechanisms through which social phenomena are brought about. Parts of analytical sociology focus on action and interaction as the cogs and wheels of social processes, while others consider the dynamic social processes that these actions and interactions bring about. At this year's INAS conference we want to highlight the role of institutions in shaping social interactions and social processes as well as the mechanisms promoting sustainable cooperation.

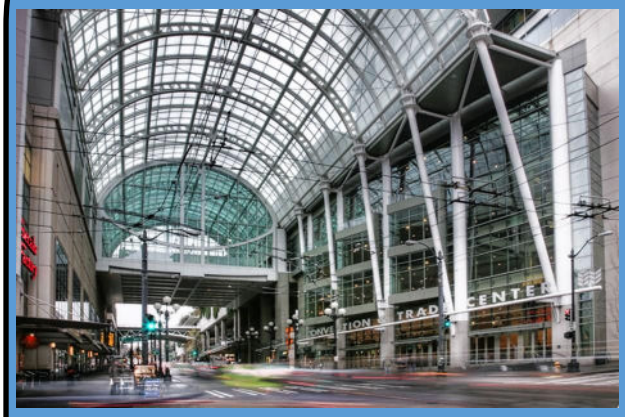
We welcome papers using any qualitative or quantitative methods that allow for the study of social mechanisms and the complex social dynamics they give rise to. In addition, we welcome purely theoretical papers dealing with central aspects of the explanatory approach of analytical sociology. Papers might address the overall theme of this conference, but do not necessarily need to do so. Depending on the submissions we will organize one or more sessions around the conference theme, in addition to a concluding session that will feature a panel discussion on the topic.

Please submit your abstracts (and only abstracts) of 200-500 words via the conference website http://inas2016.sites.uu.nl/ no later than the February 1, 2016. Your submission should contain the following elements:

1) title
2) name and e-mail address of presenting author
3) complete list of author(s) and their affiliation(s)
4) abstract (200 – 500 words)

Acceptance notes will be sent out no later than February 20, 2016. For more information on practical details such as location, hotel, etc. please visit http://inas2016.sites.uu.nl/. Conference registration will be opened on this site after the call for abstracts' deadline has passed. If you have any questions, please do not hesitate to send an email to inas2016@uu.nl.

American Sociological Conference



Washington State Convention Center

The 111th ASA Annual Meeting will be held August 20-23, 2016 in Seattle, WA at the Washington State Convention Center and the Sheraton Seattle Hotel. The Submission Portal is now open until January 6, 2016 @ 3pm EST. This year the section has one open-admission session seeking papers that describe advances in mathematical sociology organized by Douglas Heckathorn. Furthermore, the business meeting will open with a one hour awards ceremony where winners will have the opportunity to share their award winning research.

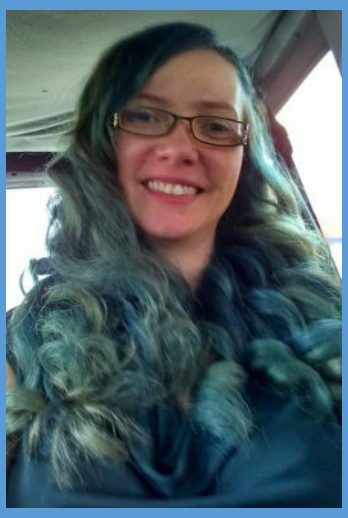
Mission Statement of the Mathematical Sociology Section

The purpose of the Mathematical Sociology Section of the American Sociological Association is to encourage, enhance and foster research, teaching and other professional activities in mathematical sociology, for the development of sociology and the benefit of society, through organized meetings, conferences, newsletters, publications, awards and other means deemed appropriate by the Section Council. The Section seeks to promote communication, collaboration and consultation among scholars in sociology in general, mathematical sociology and allied scientific disciplines.

Thank you for your timely contributions to the Fall/Winter Issue of the *Mathematical Sociologist.* Please continue to send us your announcements, articles, book reviews, conference announcements, etc. The more you are involved with the newsletter, the better it will be.

Please feel free to send us your comments, concerns, corrections, or any ideas you have for the newsletter.

Have a great winter and watch your email for future newsletter editor requests.



Newsletter editor: Pamela Emanuelson, Email: Pamela.emanuelson@ndsu.edu