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The Mathematical Sociologist

Newsletter of the Mathematical Sociology Section of the American Sociological Association

Comments from the Chair ... Barbara Meeker

Inside this issue:

One of my hopes for this year has been to strengthen the 'mathematical' part of Mathematical Sociology by making our subject more visible to and by promoting collaborations with mathematicians. (See the report on the American Mathematical Society/ Mathematical Association of America meetings on pg. 2.) As such, on Monday August 10 from 2:30 to 3:30, I have asked two sociologists who collaborate with mathematicians (Willie Jasso and Phil Bonacich) and a mathematician who collaborates with a sociologist (Gene Johnsen) to talk about their experiences with collaboration in a panel entitled *Collaboration Between Sociologists and Mathematicians*. I hope other Section members who have collaborated on research with mathematicians will also come prepared to talk about the rewards and perils of this kind of work. I think that we have a lot to offer mathematicians; some of our models present intriguing mathematical questions and we have many interesting applications they can have their students work on.

Please plan to come to Section activities at the ASA meetings . In addition to a submitted paper session, there will be a business meeting, the panel mentioned above, a reception which we will co-host with the Rational Choice and the Evolution and Society Sections, and awards will be presented.

Also, please be sure to vote for Section officers. You can vote on-line at the ASA webpage now. We are a small Section, so every vote counts!

Barbara Meeker
April, 2009

Mathematical Sociology for Mathematicians

In January, 2009, four members of the Mathematical Sociology Section presented papers at the annual Joint Meetings of the American Mathematical Society and Mathematical Association of America, held January 5 – 8, in Washington, D. C. This session was organized by Barbara Meeker with assistance from Joe Auslander, who is a member of both AMS and MAA. Our session was well-attended and the audience of mathematicians seemed much interested, asking serious questions and provoking mathematical discussion. This appears to be the first Mathematical Sociology session at these meetings, but we hope not the last. (Mathematical biology usually has at least one session and there sometimes have been sessions on economics.) You can find information on the AMS web page, under 'previous meetings…Washington DC…program. Our session listing from the AMS/MAA program is below.

Monday January 5, 2009, 2:15 p.m.-4:10 p.m.
MAA Invited Paper Session on Mathematical Sociology
Organizer: **Barbara F. Meeker**, University of Maryland, College Park bmeeker@socy.umd.edu
Moderator: **Joseph Auslander**, University of Maryland, College Park jna@math.umd.edu

1046-A1-892 **John Angle*** (angle@inequalityprocess.org), Inequality Process Institute, P. O. Box 429, Cabin John, MD 20818. *A Particle System That Mimics Empirical Income Dynamics.*

The Inequality Process ('inequality' in the sociological sense) was abstracted from an old theory of economic anthropology about why substantial differences of wealth appeared whenever hunter/gatherers acquired a food surplus. Perhaps surprisingly, this stochastic interacting particle system implies a wide variety of statistics of empirical income dynamics at the micro (individual) as well as the macro (distribution) level in industrial societies. The Inequality Process dates from the early 1980's and is similar to an ad hoc modification of the stochastic version of the kinetic theory of gases published in 2000 as econophysics. Since the explanandum of the Inequality Process is much wider and it is grounded in social science, the Inequality Process has replaced the latter particle system as the frontier of the econophysics of wealth and income. (Received September 12, 2008)

Network Implications of social exchange: an overview.
Phillip Bonacich*, University of California, Los Angeles

1046-A1-887 **Phillip Bonacich*** (bonacich@soc.ucla.edu), Department of Sociology, University of California, Los Angeles, Los Angeles, CA 90095-1551. *Network Implications of social exchange: an overview.*

Sociologists have developed a variety of mathematical models to describe the networks created by interdependent actors who must cooperate with others. This paper will review some of the more recent models. (Received September 12, 2008)

Exploring Polarization: the Effects of General Inequality and Subgroup Relative Size on Distance between Subgroups and Dispersion within Subgroups.
Guillermina Jasso*, New York University

1046-A1-893 Guillermina Jasso* (gj1@nyu.edu), Department of Sociology, New York University, 295 Lafayette Street, 4th Floor, New York, NY 10012-9605. *Exploring Polarization: the Effects of General Inequality and Subgroup Relative Size on Distance between Subgroups and Dispersion within Subgroups.*

Polarization involves two activities: distance between subgroups increases, and dispersion within subgroups decreases. Two questions that arise concern the effects of the magnitude of inequality and the relative sizes of the subgroups on the two activities of polarization. This paper addresses these questions, analyzing classical probability distributions as well as mixtures of distributions.b (Received September 12, 2008)

Mathematical Models of Talking in Discussion Groups
Barbara F. Meeker*, University of Maryland College Park

1046-A1-895 Barbara F. Meeker* (bmeeker@socy.umd.edu), Department of Sociology, University of Maryland, College Park, MD 20742. *Mathematical Models of Talking in Discussion Groups.*

or many years researchers studying face-to-face interaction in small groups have documented a regular process of development of inequality in the amount of talking. Also, persons who talk more have been reliably documented to have more influence on group decisions. This talk surveys a variety of mathematical approaches including Markov chains and dynamical systems that have been applied to this phenomenon. (Received September 12, 2008)

Math Soc Section's Dissertation Grant Award Growing

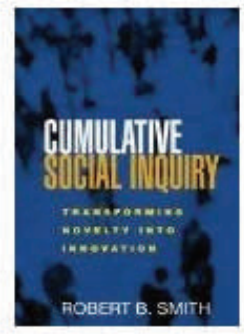
In the Fall/Winter 2008/2009 edition of the *Mathematical Sociologist*, a request for donations went out with the goal of reaching $100,000. With that increase, it would be possible to increase the amount of the award to a more significant amount. At this time, we would like to thank everyone that screwed up their courage and opened up their pocketbooks. As of the end of 2008, Section Treasurer James Moody has reported sending three new contributions on to the ASA for the Math Soc dissertation award totaling $11,200.00.

Just a reminder, donations are always welcome and can be sent to James Moody at the address shown below. Please be sure to memo your check to ASA with "Math Soc Section Diss. Grant."

Prof. James Moody
Department of Sociology
332 Soc/Psych Building
Duke University
Durham, NC 27708

Book Highlight on: Robert B. Smith

The author received his Ph.D. in sociology from Columbia University. He taught political sociology and research methodology at the University of California, Santa Barbara, and has extensive experience in applied research. In addition to this book, his publications include theoretical and empirical articles on political and social processes and the three edited volumes of *A Handbook of Social Science Methods*. At present, he is completing *Multilevel Modeling of Social Problems: Elements of a Causal Perspective*. Contact Information: telephone, 617-491-6217; email, rsmithphd@comcast.net; and address, 3 Newport Road, Cambridge, MA 02140.



CUMULATIVE SOCIAL THEORY: TRANSFORMING NOVELTY INTO INNOVATION

Cumulative Social Inquiry (Guilford Publications, 2008) explores strategies and examples for the transformation of novelty into innovation. Novelty here means original topics and new perspectives for inquiry. Innovation here means empirically sound theories, evidence-based policy recommendations, and new methods that advance social inquiry. The process of cumulative social inquiry takes novel topics and insightful perspectives as inputs, refines these ideas through chains of theoretically-driven cumulative empirical research, and produces as outputs innovative analytic theories and evidence for policy studies—it transforms novelty into innovation.

Empirical development can sharpen theorizing; empirical studies can shape social policies. Facilitating empirically sound theories and evidence-based policy, this book aims to ameliorate three impediments; namely, the gaps between theory and data, qualitative and quantitative research, and novelty and innovation. To connect theory and data, it offers social structural theorizing; to integrate qualitative and

and quantitative studies, it explicates mixed-methods research; and to transform novelty into innovation, it advocates cumulative social inquiry. Social inquiry that is cumulative can transform the novel but scattered studies of contemporary social science into innovative research programs, policy-relevant empirical evidence, and theories that explain results.

Because of the increased sizes of social science disciplines and changes in personal tastes, many social inquirers no longer contribute to ongoing social research programs, which incrementally advance systematic theorizing and research practice. Rather, they value novel perspectives, original topics of study, and new approaches. All disciplines now value novelty and originality but these words have diverse meanings, depending upon the field. As defined by many sociologists, instead of valuing the development of empirically sound, innovative theories based on cumulative research programs, these norms of originality have resulted in a blossoming of many unique sociological flowers. This disciplinary quest for novelty has contributed to the absence of cumulative sociological knowledge. Social theorists have lamented this lack not only because it impedes theoretical progress but it also makes evidence-based policy recommendations more difficult to achieve. *Cumulative Social Inquiry* offers strategies that the various specialty groups can follow for the transformation of their novel but scattered studies into innovative empirical theories and systematic empirical evidence that can guide social policy.

Cumulative Social Inquiry urges researchers to develop, formalize, and quantify the ideas that may be implicit in qualitative writings. By showing how researchers have built quantitative studies on the results of qualitative theorizing and research, and how theorists have developed theories that account for empirical data, the chapters aim to advance cumulative knowledge. Theorists can explicate qualitative texts to produce empirically delimited theories. From these logically interconnected sets of propositions they can derive new implications and then test these consequences empirically. These theories may be abstract and general, composed of linked theoretical concepts, or historical, consisting of linked substantive variables.

Because such theories are based on empirical data and have at their core a system of relationships, they can guide further theoretical and empirical inquiries thereby closing the gaps between theory and data, quality and quantity, and innovative knowledge and societal change.

What is New?

Because *Cumulative Social Inquiry* develops new approaches for making social inquiry more cumulative, collaborative, and innovative, it should interest mathematical sociologists, other social scientists, and students. These innovative features are unique:

- A rich explication of the paradigm concept that discusses how different disciplinary values influence social inquiry.
- Systematic reviews of successful classic and contemporary research programs.
- A thorough exposition showing how qualitative and quantitative approaches can be articulated to produce mixed-methods studies.
- Numerous examples showing how qualitative data can inform survey research thereby improving the latter's fit validity.
- A selective review of qualitative and quantitative social structural theories at four levels of analysis: micro, meso, macro, and the world.
- Unification of statistical and process models as structural methods.
- A detailed exposition of how cumulative research programs have bridged novelty and innovation.

The books Conclusion emphasizes that basic research skills enhance innovative ability and that even findings from scattered social inquiries can lead to innovations. Specialists in the cumulation and synthesis of research studies—cumulationists—could systematize the empirical propositions, develop innovative simulation models and mathematical theories based on the findings, and then test the implications of their new theories empirically. This new evidence-based knowledge could help guide social and political change.

Social Computing: An Opportunity for Mathematical Sociologists
By Sun-Ki Chai

As you might have inferred from the emails sent to this section, there are a rapidly growing number of conferences and workshops whose focus is on applying computer science to the analysis of society and culture. These include the *Conference on Social Computing, Behavioral Modeling, and Prediction* <http://www.public.asu.edu/~huanliu/sbp09/> in Phoenix a month ago and the *International Conference on Computational Cultural Dynamics* <http://www.umiacs.umd.edu/conferences/icccd2008/>in College Park , MD on September of last year, both sponsored by the association for computing machinery (the equivalent to ASA for computer scientists). This August's *IEEE Conference on Social Computing* <http://cse.stfx.ca/~socialcom09/> is sponsored by the main professional organization for Electrical and Computer Engineers. New conferences are being created regularly, such as the upcoming Human Behavior-Computational Modeling and Interoperability Conference <http://www.csiir.ornl.gov/HBIOC/>sponsored by Oak Ridge National Laboratory. Likewise, major computer science conferences now often host sizable social-science related workshops, exemplified by the upcoming *Workshop on Social Networks, Applications and Systems* <http://www.cs.uml.edu/~glchen/snas09/>.

Why are so many computer scientists becoming interested in social analysis? One answer is that this is where the funding sources are moving. There seems to be a meeting of the minds in the portals of government that solving the pressing problems of the world requires the channeling of more resources into the study of human societies. The most notable example is the US Department of Defense's recent Minerva Research Initiative, which includes plans to spend $50 million per. year for research on society and culture, but this change in thinking had already been reflected for the past few years in major requests for proposals generated by government agencies. Another answer is that the rise in the answer has turned computing from a solitary activity to intrinsically social one. The rise of online forums, blogs, content sharing and social networking sites has made this clear, hence much of contemporary computer science research already contains a social analysis component.

Why is so little of the new funding for social analysis going to social scientists since this is, after all, our area of expertise? Here are two plausible reasons for this: The first is the lack of familiarity that most social scientist have with the process of locating and applying for funding from the wide range of government departments and agencies who have been sponsoring this research. As a starting point, this problem can be dealt with by the regular perusal of the Grants.gov omnibus site looking particularly for the BAAs or Broad Agency Announcements that signal major initiatives. The second reason is more complicated—typically, the RFPs one will find in this area are aimed at incorporating social knowledge into technology, usually software tools and applications. This means that whatever social knowledge is being provided usually needs to be formalized so that it can eventually be converted into algorithms used to develop software. A primary example of this is the recent Human, Social, Cultural and Behavioral Modeling programs (HSCB), which coordinate efforts across all DoD agencies to develop a "science base and associated technologies for modeling human, social and cultural behavior." (HSCB Spring 2009 Newsletter p. 1). The emphasis on technology and modeling means that social scientists with mathematical skills are going to be in the best position to take advantage of these opportunities.

This also means that social scientists will need to team up more often with the computer scientists and engineers that currently dominate this realm of "sociocultural modeling" and form the vast bulk of attendees at the kinds of conferences previously listed. While computer scientists in the field of social computing will often make use of concepts, theories and techniques borrowed from social science (e.g. game theory and social network theory), their depth of understanding of these methodologies is typically quite shallow. The need for the participation of more social scientists in social computing research is often noted by computer scientists, but there is more specific need for both social and computer scientists who not only possess technical skills but also have the broad knowledge and flexibility necessary to engage in interdisciplinary research. This provides an opportunity for mathematical sociologists, whose

technical skills are often more eclectic and flexible than those of mathematical social scientists in other fields. I have been trying to find ways to encourage more mathematical sociologists to participate in social computing conferences, but with only mixed results so far. The potential payoff is great in terms of possible opportunities for funding since they provide good opportunities to network not only with computer scientists, but also with representatives from the major donor agencies. For instance, I have been funded by the Air Force Office of Scientific Research BAAs and will soon be receiving an HSCB grant in collaboration with ASU funded by the Office of Naval Research, in part as a result of information and relationships gained from these types of conferences.

Beyond the question of funding, however, this work offers an opportunity to enter an exciting interdisciplinary field in which social science knowledge is incorporated into technology that can potentially affect everyday life. Computer science has become more and more "social" in its concerns with every passing year, yet much of the work in this area exists in a kind of vacuum in which the research knows little about the relevant research on the social field for which she is developing a new application. Hence, if more mathematical sociologists open themselves to social computing research, the resulting software technologies are likely to be better both in addressing users' present needs and in their, larger, long-term effects on society.

The Sunbelt Conference: A Bit of Encouraging News

The 29th annual Sunbelt Social Network meetings were held in San Diego (Mar. 10-15). Attendance at these interdisciplinary meetings has been growing rapidly in recent years, and particularly the attendance of practitioners and students; in addition to large numbers of regular faculty.

This year, 146 people registered themselves as students. Thirty self-identified as being in Sociology programs (and a further 33 didn't say, but many might also be sociologists). Many others came from applied social science fields that are increasingly using formal graph-based approaches to problems of social support, diffusion, policy formation, and the like.

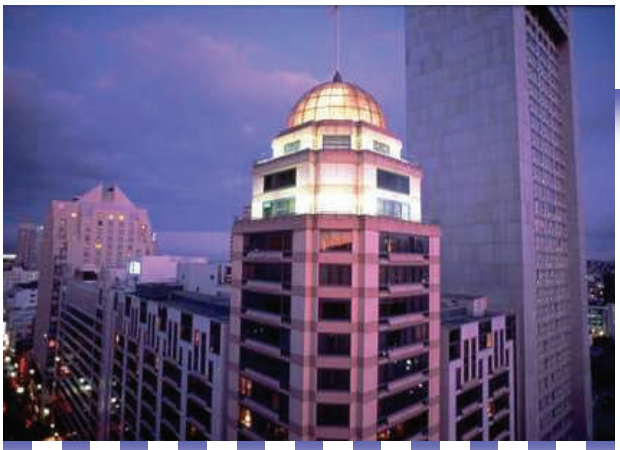
It is very encouraging to see the large numbers of new sociologists working in this specialty area of mathematical sociology. And, it is particularly encouraging to see the wide diversity of their substantive interests in both theory and application of formal methods.

Information about the Mathematical Sociology Section Sessions at the ASA

Section on Mathematical Sociology Invited Panel Collaborations between Sociologists and Mathematicians

Mon., Aug. 10 2:30-3:30 Session Hilton San Francisco

Organizer, Presider: *Barbara Meeker,* University of Maryland—College Park
Panelist: *Guillermina Jasso,* New York University
Panelist: Phillip Bonacich, University of California—Los Angeles
Panelist: Eugene C. Johnsen, University of California—Santa Barbara



Mathematical Sociology Business Meeting.

Mon., Aug. 10 3:30-4:10 Meeting Hilton San Francisco

Chair: *Barbara Meeker,* University of Maryland—College Park

Section on Mathematical Sociology Paper Session: New Directions in Mathematical Sociology.

Mon., Aug. 10 4:30-6:10 Hilton San Francisco

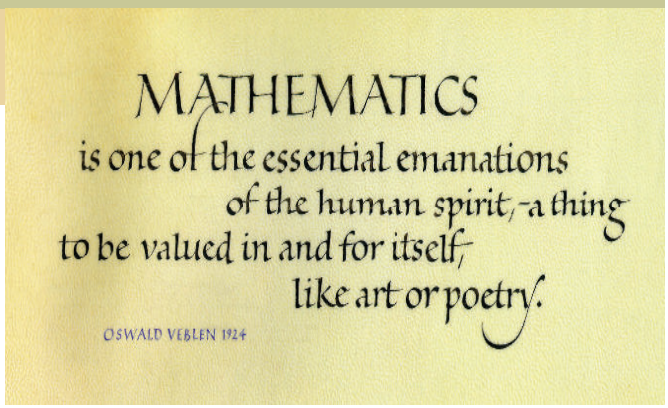
Organizer and Presider: *David G. Wagner*, State University of New York—Albany
A Generalized similarity Model for Relational Data *Balazs Kovacs*, Stanford University
Demonstrating Nonlinear Effects of Chance with a Model of Social Class Inheritance *Robert F. Szafran,* Stephen F. Austin State University; *Jerry L. Williams*, Stephan F. Austin State University
Status Cues, Standards for Competence, and Graded Characteristics *M. Hamit Fisek*, Bogazici University
The Strength of Free Riding *Damon M. Centola*, Harvard University

Joint Reception: Section on Mathematical Sociology; Section on Rationality; Evolution and Sociology

Monday Aug. 10 6:30-8:10 Hilton San Francisco

A Request for Information and Call for Papers

Are any sociologists interested in the mathematical logic of Charles Sanders Peirce? Have you written about Peircian semiotics from a mathematical sociology perspective? Do you have ideas about bio-informatics applied to sociological data, perhaps from a Peirican Pragmatist perspective? Are your perhaps interested in Benjamin Peirce? I am trying to put together an edited volume on Peirce and social science. If you answered yes to any of the above, please contact Prof. J. I.(Hans) Bakker at hbakker@uoguelph.ca (519 824-4120 ext. 53545). www.semioticsigns.com



Greetings from the Editor!

Thank you all for your timely contributions to our Spring 2008/2009 Newsletter!

Please continue to send in your announcements, articles, book reviews, 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 Spring and Summer, and watch your e-mails for future newsletter editor requests!

A Brain Teaser: The Sociology Baseball Dream

The only assignment of positions that satisfies all eight statements is the following: Simone de Beauvoir as first baseman, W.E.B. Du Bois as shortstop, Emile Durkheim as second baseman, Charlotte Gilman as center fielder, Erving Goffman as right fielder, Karl Marx as pitcher, C. Wright Mills as left fielder, Talcott Parsons as third baseman, and Max Weber as catcher.