

Presentation abstracts and bio sketches

Day One

CHOICE-THEORETIC MODELS

Dennis Chong, Northwestern University, Department of Political Science

Dynamic Public Preferences

I will discuss how the sensitivity of political evaluations to framing affects our understanding of individual preferences. In particular, the effects of framing appear to undermine the assumption that preferences are consistent. Some researchers have suggested that democratic competition can strengthen preferences and reduce framing effects. I will present some experimental tests of how competition over time between alternative frames affects public opinion depending on how individuals process information.

Dennis Chong is the John D. and Catherine T. MacArthur Professor of Political Science at Northwestern University. He studies American national politics and has published extensively on issues of decision-making, political psychology, social norms, rationality, tolerance, and collective action. Professor Chong is the author of *Rational Lives: Norms and Values in Politics and Society*, a study of value formation and change, group identification, and conflict over social norms and values. He also wrote *Collective Action and the Civil Rights Movement*, a theoretical study of the dynamics of collective action as well as a substantial study of the American civil rights movement and the local and national politics that surrounded it. This book won the William H. Riker Prize given by the Political Economy Section of the American Political Science Association.

Professor Chong's current research on the influence of information and framing in competitive electoral contexts has received several awards, including the APSA's Franklin L. Burdette/Pi Sigma Alpha Prize. An active member of the profession, Professor Chong has been elected to the Executive Council of the American Political Science Association, and he is co-editor of the acclaimed book series, *Cambridge Studies in Public Opinion and Political Psychology*, published by Cambridge University Press.

Dana Nau, University of Maryland, Department of Computer Science

Evolution of State-Dependent Risk Preferences in Social-Modeling Games

There is much empirical evidence that human decision-making is state-dependent: humans are sometimes risk-averse and sometimes risk-seeking, depending on their current situation. An open question is how this kind of behavior, or any other empirically-documented behavior that differs from decision-theoretic expected-value maximization, could arise in human evolution or in the development of human societies.

I'll describe some work that my students and I have done to investigate this question using techniques from evolutionary game theory. In particular, I'll describe our analysis and simulations of several evolutionary games in which agents make sequential decisions between risky and safe choices, including evolutionary lottery games and an evolutionary version of the well-known stag hunt game. Our results show how agents that are sometimes risk-prone and sometimes risk-averse can outperform agents that make decisions solely based on the maximization of the local expected values of the outcomes.

Dana Nau is a Professor of Computer Science and Systems Research at the University of Maryland, and is co-director of the university's Laboratory for Computational Cultural Dynamics. He received his Ph.D. from Duke University in 1979, where he was an NSF graduate fellow. His primary area of research is artificial intelligence, but he has a strong interest in interdisciplinary research. He has more than 300 publications and several best-paper awards, and he is a Fellow of the Association for the Advancement of Artificial Intelligence (AAAI).

Herbert Gintis, Central European University, Department of Economics and Santa Fe Institute

Modeling the Market Economy as a Complex Dynamical System: Implications for Financial Regulation

The Arrow-Debreu general equilibrium model is the centerpiece of modern economic theory, but its dynamics remain virtually unknown. I show that the inability of economic theory to develop a dynamic for a general market economy is due to (a) its vain attempt to model a complex dynamical system as a simple mechanical system, and (b) its assumption that prices are fully known by all economic agents. This perfect information assumption leads to destabilizing correlation in the behaviour of economic agents. When prices are imperfectly known, a dynamic with a globally stable stationary state obtains in otherwise highly unstable economies. I model the economy as a complex dynamical system in which agents learn both from experience and from copying successful others. The dynamics of this system involve large excursions from equilibrium even in the absence of aggregate macroeconomic shocks, although the long-run average behavior of the economy is close to a market equilibrium.

Herbert Gintis (Ph.D. in Economics, Harvard University, 1969) is External Professor, Santa Fe Institute (Santa Fe, NM, USA), and Professor of Economics, Central European University (Budapest, Hungary). He heads a multidisciplinary research project, funded by the European Science Foundation (ESF). The project is part of the European Collaborative Research Scheme's (EUROCORES), research area The Evolution of Cooperation and Trading (TECT), that studies human strategic interaction and social organization from a transdisciplinary perspective. His research group includes economists, computer scientists, biologists, cognitive psychologists, behavioral ecologists, linguists, geneticists, and behavioral game theorists. His web site, <http://people.umass.edu/gintis>, contains pertinent information.

COMPUTATIONAL MODELS

Yoshimichi Sato, Tohoku University, Center for the Study of Social Stratification and Inequality

Does Agent-based Modeling Survive in Sociology?

Agent-based modeling has been gaining popularity in sociology. It is a good tool with which to study self-organization in society such as the evolution of cooperation and the emergence of trust between strangers. Thus it has found a niche in sociology. However, it is another story whether it will evolve and eventually dominate in sociology. A major obstacle to its evolution in sociology is sociological concepts that are difficult to be translated into concepts used in agent-based modeling. Take "social structure" for example. Conventionally, social structure has been defined in two ways in sociology. First, it is equivalent to social network structure. Agent-based modeling is a powerful tool with which to study the evolution of social networks and, therefore, has contributed to the progress of the study of social networks. A second definition of social structure is that it is relations of roles to which actors and resources are allocated. Then it is challenging for agent-based modelers to use the concept of "role" in their models. This is because a role is more complex than an actor or an agent. A role is defined as a bundle of expectations by incumbents of other roles. Thus it is necessary for a modeler to define the relationship between a role and expectations in order to define social structure and study its evolution. In my presentation I will explore this task even though it is just at the first stage of my project.

Yoshimichi Sato is Distinguished Professor of Tohoku University. He received his B.A. and M.A. from the University of Tokyo and Ph.D. from Tohoku University. He had previously taught at Yokohama City University. He was a visiting scholar at the University of Chicago and Cornell University. He was a former President of the Japanese Association for Mathematical Sociology and is currently an Executive Committee Member of the International Sociological Association. He conducts research in social change, trust, and social stratification by rational choice theory, game theory, and agent-based modeling. He has published numerous books, book chapters, and journal articles. His recent publications include three books entitled: *Intentional Social Change: A Rational Choice Theory* (Trans Pacific Press, 2006), *Deciphering Stratification and Inequality: Japan and Beyond* (Trans Pacific Press, 2007), and *Game Theory* (in Japanese, Shinyo-sha, 2008).

Kunihiro Kimura, Tohoku University, Department of Behavioral Sciences

Explaining a Marriage Paradox: Call for the Computer Simulation Studies Based on a Simple Mathematical Model

Kimura (2000) proposed a simple model that would explain the relationship between women's expanding economic independence and the proportion of the unmarried women. An expected value model of women's decision-making as to whether or not to marry was developed and combined with the following two assumptions. The first assumption was that the lifetime income for women and that for

men are subject to a log-normal distribution respectively. The second assumption was that of random matching of men and women. The model has the advantage of enabling us to estimate the proportion of the unmarried women if appropriate data on the variables and the parameters of the model are available. However, a tentative analysis using the data of Japan, 1965-2000, shows that the estimated proportions of the unmarried women cannot replicate the actual trend of the proportions of the unmarried women except for the women aged 30-34 from 1965 to 1980. In order to improve the fitness of the estimation to the actual trend, I would like to propose some alternatives that call for computer simulation studies.

Kunihiro Kimura is Professor of Behavioral Science and Member of the Center for the Study of Social Stratification and Inequality (CSSI) at Tohoku University, Japan. Kimura's main research interest is the integration of mathematical modeling of social decision-making and quantitative analysis of social survey data from the perspective of rational choice theory. He is the author of nine academic papers written in English on topics ranging from collective action, measurement of inequality, gender role attitudes, and sex discrimination. Some of these papers were published in international journals such as *Journal of Mathematical Sociology* and *Quality & Quantity*. His forthcoming work in English is "Sex-Based Discrimination Trends in Japan, 1965-2005: The Gender Wage Gap and the Marriage Bar, " in *Discrimination in an Unequal World*, edited by Miguel Centeno and Katherine Newman, New York: Oxford University Press, September 2010.

William A. Griffin, Arizona State University, Center for Social Dynamics and Complexity

Rules, Agents, Edges and Distributions: Requisite Components for Computational Social Science Models

The value of a computational social science model is singularly determined by its validity. Building a valid model is simple: you start with good data, then construct algorithms (Rules) specifying how the data generators (Agents) influence each other (Edges) and then match your range of outputs (Distributions) to the extant data. It is simple – but not easy. In fact, almost all, even the most well-conceived and constructed models, fail to reproduce the complexities inherent in social phenomena. This talk briefly describes how these four components comprise contemporary modeling techniques necessary to construct insightful, and sometimes valid, models of complex social systems. And why most social scientists fail to use them.

William Griffin is a Professor in the School of Social and Family Dynamics and was one of the founders of the Center for Social Dynamics and Complexity at Arizona State University and served as its initial Social Science Director from 2005 until 2009. He is currently the Vice-President for the Computational Social Science Society (CSSS).

Trained as a clinical, for the past 25 years, his research has focused on measuring and modeling the micro-social structures observed in couples, families, and young children. Models are used predominately to investigate how behavioral signatures, generated by aggregating relevant dyadic interactions, can be used to create system level descriptors and classifiers. Analytic strategies have ranged from event-history and time-series analysis to hidden-markov models, and for the last decade, agent-based models (ABM). He has developed agent-based models of the sequential behavioral features associated with married couples, the structural nuances seen in families with an ill child, and preference tendencies among 3 to 5 year-old children forming friendships. His general publications range from two books on family therapy to the behavioral processes observed in families with an asthmatic child, and most recently, agent-based modeling for theoretical biologists.

RATIONAL AGENTS AND SYSTEM DESIGN

Gürdal Arslan, University of Hawai'i, Department of Electrical Engineering

Design of Cooperative Systems

We will overview some of the recent developments in the design of cooperative (multi-agent) systems, defined as systems of interconnected autonomous agents optimizing their own local objectives yet accomplishing a global objective. Cooperative systems design is a recent research theme that received significant attention primarily due to interest in designing "smart" vehicles with intelligent and coordinated action capabilities to achieve a system-wide objective. Other applications include multi-vehicle search and target assignment for military mission planning, multi-sensor deployment for anti-submarine warfare, cooperative multi-user MIMO signaling in wireless communication systems, distributed optimization in VLSI routing, congestion management in transportation systems.

There are two key issues in designing such systems: 1) designing local objectives, i.e., telling the autonomous agents what to optimize, and 2) designing negotiation algorithms, i.e., telling the autonomous agents how to optimize. Recent research shows that game theory

is the most natural framework to analyze and synthesize cooperative systems. We will review some of the core concepts and tools provided by game theory to address those key issues involved in designing cooperative systems.

Gürdal Arslan received Ph.D. degree in electrical engineering from the University of Illinois at Urbana-Champaign, in 2001. From 2001 to 2004, he was an Assistant Researcher in the Department of Mechanical and Aerospace Engineering, University of California, Los Angeles. In August 2004, he joined the Electrical Engineering Department at the University of Hawaii, Manoa. His current research interests lie in the design of cooperative (multi-agent) systems using game theoretic methods. Recent applications of his research include autonomous resource allocation for mission planning, multi-sensor deployment, traffic management, and cooperative multi-user MIMO signaling in wireless communication systems. He is a member of the IEEE Control Systems Society and he received the National Science Foundation CAREER Award on Cooperative Systems Design - Stochastic Games Approach in May 2006.

Anna Nagurney, University of Massachusetts, Department of Finance and Operations Management

Network Design -- From the Physical World to Virtual Worlds

In this talk, I will present recent research on the design of networks from different perspectives (centralized/cooperative vs. decentralized/competitive). The approach is sufficiently general to capture the network designer's multicriteria-decision-making behavior. I will illustrate how this theoretical and computational framework can be applied to physical networks, ranging from transportation to telecommunication ones, as well as to logistical ones (including supply chains). I will also discuss issues of redesign, as well as network integration, with applications as varied as corporate mergers and acquisitions and humanitarian logistics operations.

I will then overview how networks such as social and knowledge ones can also be subject to network design (and even be integrated with physical networks) and discuss the unique challenges of network design in virtual worlds.

Anna Nagurney is the John F. Smith Memorial Professor in the Department of Finance and Operations Management in the Isenberg School of Management at the University of Massachusetts Amherst. She is also the Founding Director of the Virtual Center for Supernetworks and the Supernetworks Laboratory for Computation and Visualization at UMass Amherst. She is an Affiliated Faculty Member of the Department of Civil and Environmental Engineering and the Department of Mechanical and Industrial Engineering at UMass Amherst. She received her AB, ScB, ScM, and PhD degrees from Brown University in Providence, Rhode Island. She devotes her career to education and research that combines operations research / management science, engineering, and economics. Her focus is the applied and theoretical aspects of network systems, particularly in the areas of transportation and logistics, critical infrastructure, and in economics and finance.

Her most recent book, with Q. Qiang, is *Fragile Networks: Identifying Vulnerabilities and Synergies in an Uncertain World*, published in 2009. She is also the author of *Supply Chain Network Economics* published in 2006. She has authored or co-authored 8 other books including *Supernetworks: Decision-Making for the Information Age*, *Financial Networks*, *Sustainable Transportation Networks*, and *Network Economics*, edited the book, *Innovations in Financial and Economic Networks*, and authored or co-authored more than 135 refereed journal articles and numerous book chapters.

INTEGRATING SOCIAL THEORY INTO COMPUTATIONAL MODELING

Barry Silverman, University of Pennsylvania, Department of Electrical and Systems Engineering

Toward an Extensible Repository of Socio-Cognitive Models: Challenges for Synthesis

If one is to have realistic and reliable models of the effects of influence operations upon societal dimensions, one must find ways to integrate scientific know-how across many disciplines. Science tends to be reductive, specialized, and siloed. Labs that study anxiety/stress do not also study impacts of non-lethal crowd control methods, and those specialists know little about political coalition dynamics. Yet, each of the social, behavioral, economic, etc disciplines has something of value to contribute if we are to realistically model communities and their stakeholders.

Many of these disciplines are filled with reasonable 'paper-based' theories supplemented with survey and event data to support them. But these theories have not been implemented within a detailed socio-cognitive agent-based modeling and simulation framework where macro-behavior emerges from micro-decision-making. Implementation is valuable since it serves to test the theories, expose their strengths and weaknesses, and uncover gaps in behavior that the theories do not explain. In general, science is often advanced by a

combination of reductive analysis and synthetic usage. The goal of this effort has been on the latter, though many applications of our default model library exist that correlate highly with the real world communities that have been modeled.

It would be ideal for social scientists to author and update the default models for analysis of communities and stakeholder scenarios without the need for programmers in the middle. Yet there are no agent based worlds where scientific models are being deployed and there is no need for programmers. My research is trying to change that. For the past dozen years my students and I have been culling best of breed theories from the social and behavioral literatures and seeking to synthesize them within a socio-cognitive agent architecture. This talk addresses some of the challenges of trying to create a MatLab for Social Sciences, a library of models that are easily tuned by non-programmers to new situations, and/or that are readily swapped for alternative theories and models thought to better explain mechanisms in that situation.

Barry G. Silverman (basil@seas.upenn.edu), is a Professor of Systems Science and Engineering at the University of Pennsylvania. He is a Fellow of IEEE, AAAS, and the Washington Acad. of Science, and sits on the board of several organizations and journals in the intelligent systems fields. Barry's research over the past 34 years has largely been on socio-cognitive modeling of intelligent software agents able to interact as humans would do (ie, illustrating a descriptive, not normative, model of behavior). He has culled models from the literature on human physiology, stress, emotion, personality, culture, factional and relationship dynamics, and socio-politico-economic behavior. These have been synthesized to produce agent-based sims of ethno-political situations around the world; insurgency, crowd, and leader simulators; and several role playing games (RPGs). As a result of all this work, Barry is also the author of over 140 articles, 13 books/proceedings, over 100 technical reports, 7 copyrighted software systems, a boardgame, and several research and teaching excellence awards from ORSA, IEEE, AAAI, BRIMS.

David L. Sallach, Argonne National Laboratories, Center for Complex Adaptive Agent Systems Simulation

Modeling Trans-Scale Social Processes

Social processes exist at multiple levels and their effects influence and shape interacting processes at diverse levels. The influence within and across levels can be expressed using propensity fields, an innovation introduced by Popper, that combines causality and probability theory. One advantage of propensity theory is the ability to express and integrate significantly different theoretical conclusions. Full social models require at least five levels: 1) a generic typology, 2) a theory template, 3) social conjunctures, 4) historical configuration, and 5) empirical dynamics. The generic typology is the most abstract level at which the model can be expressed. A theory template provides a mechanism within which multiple social theories can be expressed and compared. The specific theory template used in this paper requires as a key criterion that each component is cross-scale. The conjunctural level is the location of middle range theories and situated generalizations. What is here called the configuration level moves from types to instances. That is, rather than nations, institutions, collectivities and movements, there are specific nations, particular movements, etc. Finally, such 'instances' engage in the actual interactions that create observable empirical and historical dynamics. As the latter actions and events are mapped to the typological theory, the progression from abstract to concrete social phenomena is completed. Since social processes at a given level can influence the processes at any other level, social modeling needs to support a 'folding' and 'unfolding' of analytical focus. What tie multiple strata together are the propensities at each level, and these can be integrated and incorporated into other relevant levels. Thus, the folding mechanism provides a means of simultaneously expressing, exploring and controlling social complexities. Such a mechanism provides a controlled scoping capability that has long been needed in the area of social analysis, and is now becoming available in the form of increasingly sophisticated computational social models.

David L. Sallach is a social theorist and computational sociologist who is currently senior Social Scientist at Argonne National Laboratory, where he also serves as Associate Director of the Center for Complex Agent Systems Simulation. He was Director of Social Science Research Computing at the University of Chicago from 1998-2003 and, earlier, taught sociology at the Indiana University Bloomington and Washington University in Saint Louis.

CONTENT ANALYSIS AND OPINION MINING/SENTIMENT ANALYSIS

Kimberly A. Neuendorf, Cleveland State University, School of Communication

Extending the Utility of Content Analysis via the Scientific Method

This paper discusses how a careful consideration of the goals and standards of the scientific method can provide options for extending the utility of content analysis, including computer aided text analysis (CATA) and human coding techniques. Content analysis has long been applied primarily as a discrete research technique describing characteristics of communication messages. Via adherence to the rigorous standards of science, and through inventive application, the methods of content analysis may be utilized in combination with other empirical methods to effect predictions, and ultimately to achieve explanatory power. This paper also addresses the unprecedented opportunities presented by the availability of massive corpora of online communications, particularly the natural language of social networking.

Kimberly Neuendorf (Ph.D., Michigan State University) is Professor of Communication at Cleveland State University. Her research emphases include content analysis methodology, audience responses to moving image media, new technology adoption, and media treatment of marginalized populations. She is the author of over 100 journal articles, book chapters, and research reports. Her book, *The Content Analysis Guidebook*, was published by Sage Publications in 2002.

Bing Liu, University of Illinois – Chicago, Department of Computer Science

Opinion Mining and Sentiment Analysis: NLP meets Social Sciences

Opinion mining or sentiment analysis is the computational study of people's opinions, appraisals, and emotions toward entities, events and their attributes. In the past few years, it attracted a great deal of attentions from both academia and industry due to many challenging research problems and a wide range of applications. It has also spread from computer science to management science and social science, which indicates its importance. From a practical point of view, opinions are useful because whenever we need to make a decision we want to hear others' opinions. This is not only true for individuals but also true for organizations. However, there was almost no computational study on opinions before the Web because there was little opinionated text available. With the explosive growth of the social media content on the Web in the past few years, the situation is completely changed. People can now post product reviews, and express their views and opinions on almost anything in forums and blogs, and at social network sites. These opinions not only present a technical challenge to computer scientists but also provide a fertile ground for social science research as authors of opinions are social actors in the virtual world. Their behaviors, interactions and postings affect the real world. In this talk, I will first give an introduction to opinion mining as a natural language processing (NLP) problem, and then show a demo of an opinion mining system. After that, I will describe some social aspects of opinion mining with the purpose of stimulating discussions among computer scientists and social scientists so that new and collaborative research may be formulated.

Bing Liu is a professor of Computer Science at the University of Illinois at Chicago (UIC). He obtained his PhD in Artificial Intelligence from the University of Edinburgh. Before joining UIC in 2002, he was with the National University of Singapore. His past and current research interests include classification based on associations, interestingness of patterns and information, learning from positive and unlabeled examples, Web data extraction, and opinion mining (or sentiment analysis). He has published extensively in these areas. He has also written a textbook titled *Web Data Mining: Exploring Hyperlinks, Contents and Usage Data*.

On professional services, Liu has served as associate editors of *IEEE Transactions on Knowledge and Data Engineering*, and *SIGKDD Explorations*, and is on the editorial boards of several other journals. He also served or serves as technical program chairs of IEEE International Conference on Data Mining, ACM Conference on Web Search and Data Mining, ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, SIAM Conference on Data Mining, ACM Conference on Information and Knowledge Management, and Pacific Asia Conference on Data Mining. In addition, he has served extensively as area chairs and program committee members of leading conferences on data mining, Web mining, and natural language processing. Further information about him can be found at <http://www.cs.uic.edu/~liub>.

EXTENDING MEASUREMENT AND INTERPRETATION OF UNSTRUCTURED SOCIAL DATA

R. Kelly Aune, University of Hawai'i, Department of Speech Communication

Status on Research Testing Communicative Responsibility Theory

Grice developed a Theory of Conversational Implicature and invoked the Cooperative Principle to explain how communicators are able to achieve levels of understanding via the appropriate use of implicature and inference-making. However, ordinary conversations display significant variance in the extent to which communicators employ implicature and inference-making or explicit messaging and interrogation when attempting to create understanding. Aune developed a Theory of Communicative Responsibility (CRT) to extend Grice's Theory of Conversational Implicature and explain some of the variance in conversational implicature and inference-making. CRT posits that individuals in communicative situations make systematic judgments of the extent to which each party is responsible for contributing to the process of creating understanding in a communicative event. These judgments, in turn, affect the extent to which communicators engage in implicature and inference-making during the communicative event. The results of a developing line of research testing hypotheses drawn from the principles of CRT are reviewed. Research to date has demonstrated that 1) communicators do make systematic judgments of communicative responsibility; 2) that these judgments affect message production in systematic ways; 3) that communicator behavior not consistent with judgments of communicative responsibility can negatively affect perceptions of communicator behavior; and 4) that although the concept of communicative responsibility appears to have cross-cultural relevance and affects communicative behavior in similar ways, judgments of communicative responsibility are affected by communicators' culture. The latter findings are of particular significance to the present workshop as they illustrate how ordinary conversations are structured to meet the demands of communicative responsibility, and explain how deviations from responsibility affect perceptions of communicators and the relational messages they appear to be sending. Future directions for CRT research in deception, misunderstanding, and conversational repair are discussed.

R. Kelly Aune is Professor and Chair of the Department of Speech at the *University of Hawaii at Mānoa*. Dr. Aune teaches undergraduate courses in verbal and nonverbal communication, and graduate courses in message processing and research methods. His research focuses on issues of message processing, including inference-making, implicature, miscommunication, and deception. Currently Dr. Aune is conducting a series of studies testing his Theory of Communicative Responsibility which offers an explanation for variance in how direct or indirect communicators can be across situations, and how much implicature and inference-making they engage in.

Tony Mullen, Tsuda University, Institute for Mathematics and Computer Science

A Strife of Interests: Challenges for Sentiment Analysis of Informal Political Discourse

In recent years, informal political discourse has become an ever more important feature of the intellectual landscape of the Internet. Identifying political bias or "sentiment" in this discourse is of interest for a variety of reasons, including as a factor in determining the reliability of posters in terms of authority and truthfulness and as an indicator of trends and tendencies in political thought. I describe several experiments in identifying the political orientation of posters in an informal environment. The results of the work described indicate that the most promising approach is to augment text classification methods by exploiting information about how posters interact with each other. I also discuss some of the ways in which political sentiment identification differs from traditional opinion classification and some of the particular challenges that political sentiment analysis presents.

Tony Mullen is an associate professor of computer science at Tsuda College in Tokyo. Prior to this, he was a postdoctoral research fellow at the National Institute of Informatics in Tokyo. He received his Ph.D. for work in statistical parsing at the University of Groningen in the Netherlands. His natural language processing-related research includes work in named-entity extraction, ontology development, and sentiment analysis. In addition to this he is active in such diverse areas as computer-assisted language learning, information visualization, and computer graphics and art.

Robert Hanneman, University of California at Riverside, Department of Sociology

Applying Modality and Equivalence Concepts to Pattern-Finding in Social Process-Produced Data

Large amounts of detailed data are routinely generated by ongoing social processes. Managing and mining such data treat them as "objects" and "relations." These ideas strongly parallel the way that social network analysts conceive of social structure. Modality (roughly, distinguishing multiple classes of social actors or nodes in networks), and equivalence classes (roughly, distinguishing general patterns in the ways that objects in classes are related to one another or to objects in other classes) have proven to be very useful in helping social network analysts to think about complex relational structures among social objects. Generalized "block models" of multi-

modal social networks provide one tool for designing searches to identify patterns. The ideas are illustrated by descriptions of how a number of social process produced data might be approached (e.g. Medline, game logs, relational data bases of transactions and summarized transactions). Some suggestions are offered regarding the types of tools necessary to exploit the approach.

Robert Hanneman is a Professor of Sociology at the University of California, Riverside. He has done work in non-linear systems modeling and agent-based modeling for formal theory construction, and social network analysis. Among his current projects are modeling emergent synchronization in world-systems of societies; agent-based models of co-evolution of cooperation of cultural diversity and network topology; and, various statistical and social network studies in organizational sociology and higher education. During 2010-2011, he will serve as the chair of the mathematical sociology section of the American Sociological Association.

MEASUREMENT AND INTERPRETATION OF ONLINE SOCIAL PHENOMENA

Bo Pang, Yahoo!, Research

A Web of Opinions: Sentiment Analysis in the Context of Online Communities

The field of opinion mining and sentiment analysis, which deals with the computational treatment of opinion, sentiment, and subjectivity in text, has recently attracted a great deal of attention. This is in part triggered by the drastic surge in the amount of opinion-oriented information available online. People share their viewpoints and personal experiences via forums and blogs, and are in turn influenced by opinions from total strangers over the Internet. The growing popularity of online communities, however, presents new opportunities of connecting these strangers in meaningful ways and provide more informative analysis of their opinions and sentiments. In this talk, we discuss the challenges for developing more socially-aware sentiment analysis systems.

Bo Pang is a research scientist at Yahoo! Research. She obtained her PhD in Computer Science from Cornell University in August 2006. Her primary research interests are natural language processing, information retrieval, and machine learning. Her past work include sentiment analysis, paraphrasing, querylog analysis, and computational advertising. She published a book-length survey *Opinion mining and sentiment analysis* with Lillian Lee in 2008. More info at www.research.yahoo.com/~bopang and www.cs.cornell.edu/people/pabo.

Huan Liu, Arizona State University, Department of Computer Science and Engineering

Building a Social Media Tool for Sociological Studies

Millions of people use social media such as blogs and social networking sites daily and many of them do so regularly as an augmented means to their social activities. Innovative characteristics of social media enable people to communicate and engage in unprecedented social activities exclusive to social media. Studying sociological patterns in social media poses new challenges because (1) social media is different from conventional media of communications, (2) established theories in conventional media need further validation before they can be applied, and (3) social media data can be large-scale, noisy, and change unpredictably. However, social media also provides an exciting and unique environment for us to perform unparalleled sociological studies. In this talk, we present our initial work in collaboration with social scientists and cultural anthropologists. We learn their needs for studying subjects in social media, what their challenges are, and what hypotheses they would like to investigate. In the process, we have built a working platform for (1) collecting data in the blogosphere, (2) tracking blogs of particular interests, and (3) facilitating comparative data analysis. We report our progress in building and expanding this investigator-centered social computing tool – BlogTrackers that can detect key topics of discussions, identify influential bloggers, track topics over time, and search blogs.

Huan Liu is a professor of Computer Science and Engineering at Arizona State University. He received his Ph.D. from University of Southern California and Bachelor of Engineering from Shanghai Jiao Tong University, worked at Telecom Research Labs in Australia, and taught at National University of Singapore before he joined ASU in Year 2000. Huan Liu has been recognized for excellence in teaching and research in Computer Science and Engineering at Arizona State University.

His research interests are in data/web mining, machine learning, social computing, and artificial intelligence, investigating problems that arise in many real-world applications with high-dimensional data of disparate forms such as social media, modeling group interaction, text categorization, bioinformatics, and text/web mining. His research has been sponsored by NSF, NASA, AFOSR, and ONR, among others. His well-cited publications include books, book chapters, encyclopedia entries as well as conference and journal papers. He serves on journal editorial boards and numerous conference program committees, and is a founding organizer of the International Conference Series on Social Computing, Behavioral Modeling, and Prediction in Phoenix, AZ (SBP08 and

SBP09). His professional memberships include AAAI, ACM, ASEE, SIAM, and IEEE. He can be contacted via <http://www.public.asu.edu/~huanliu>.

Sun-Ki Chai and David Chin, University of Hawai'i, Departments of Sociology and Information and Computer Science

Integrating Social Science Theory and Methods into Social Computing: The CCPV Project Web Analyzer

In the CCPV project, we seek to develop an integrated system based on the following components and tasks: (1) formulation of an integrated model of culture and action based upon the grid-group model of cultural representation, coherence model of preference and belief change, and rational choice model of action, (2) application of this general model to predict levels of ethnic conflict via a middle-range model that includes three stages: ethnic group formation, group interaction, and post-interaction identity change, (3) implementation of the model into an agent-based simulation, using utility function-based bounded rationality techniques to determine ethnic group boundary, action, and identity choices, (4) creation of the first constructionist ethnicity dataset that describes demographic, cultural, and socioeconomic characteristics of ascriptively defined groups around the world, including those that are still latent (yet to be activated for collective action), as well as active groups, (5) development of a web crawler and specialized site analyzers to locate virtual communities on the web and to extract their attributes using social network, cultural, and rationality theories and constructs, as well as content analysis. to guide crawl and analyze results., (6) incorporation of output of crawler output and the constructionist dataset, as well as existing structural data into the agent-based simulation, (7) testing the assumptions of the model through computer-mediated experiments involving formal games, and (8) testing of applications of model through ethnic case studies, field experiments on multi-ethnically divided populations represented in contemporary international conflict, and cross-national statistical analysis. We focus on (5) in particular as an example of the integration of social science theories and social computing techniques.

Sun-Ki Chai is Associate Professor at the Department of Sociology, University of Hawai'i. He is principal investigator and project director for the Coherence-Based Modeling of Cultural Change and Political Violence (CCPV) project. He has a BS in Mathematical Sciences, an MS in Computer Science, and a PhD in Political Science, all from Stanford University. His main theoretical interests are the study of formal, computational models of culture, as well as their integration with choice-theoretic models of action and network models of structure. His main substantive interests are in international development, with more specific studies on the social construction of ethnic identity and its role in collective action and conflict, as well on the role of cultural institutions in the economic development of East Asian industrializing economies.

Dr. Chai is the author of the book *Choosing an Identity: A General Model of Preference and Belief Formation* (University of Michigan Press, 2001), characterized as "an incredibly ambitious book" and "an exciting and sophisticated view of decisions" by the *American Journal of Sociology*, and the co-editor of the book *Culture and Social Theory* (Transaction Publishers, 1998). He has published articles in journals in the disciplines of sociology, political science, and economics. He has received several extramural grants totalling about \$2 million in the area of cultural and behavioral modeling. His website may be found at <http://www2.hawaii.edu/~sunki/>.
Return to top...

David N. Chin is a Professor of Information and Computer Sciences at the University of Hawaii. He received his B.S. from M.I.T. and his Ph.D. from U.C. Berkeley where he developed UC, the UNIX Consultant, an intelligent agent that answers questions about the UNIX operating system and infers a model of the user's knowledge of UNIX from the interaction. David is an internationally recognized expert in the field of user modeling. He has served on the editorial board of the international journal, *User Modeling and User-Adapted Interaction* since its inception in 1990 and has guest edited six special issues including two on empirical evaluation. He was the program and local arrangements chair of the 2nd International Conference on User Modeling in 1990, the general chair of the 5th International Conference on User Modeling in 1996, the general chair of the 18th International Conference on User Modeling, Adaptation and Personalization in 2010, and a program committee member of the 4th, 7th-10th Conferences. Dr. Chin has been the PI or co-PI on 20 grants/contracts totaling \$3.9 million. He is currently serving as his department's Associate Chair and has previously served as Vice-Chair (2006-7) and then Chair (2007-8) of the University of Hawaii at Manoa Faculty Senate.

INTERGRATIVE PROJECTS AND STATEMENTS

Joseph Woelfel, University of Buffalo SUNY, Department of Communication

Three Essays on Networks, Measurement, and Rationality

Science is not the work of isolated individuals, but a social network that extends in time from Pythagoras and Aristarchus of Samos through Copernicus, Galileo and Newton to modern scientists like Einstein and Feynman. The core culture of this network includes the idea of understanding through ratios and proportions, and its measurement model is comparison to a standard.

Social scientists in general do not belong to this network, and instead trace their heritage from Socrates, Plato and Aristotle through Popper, Pearson, and S. S. Stevens. The core culture of this network includes the idea of understanding through categories, and its measurement model is much more vague, being defined as assignment of numbers to observations according to some rule.

Attempts to apply the social science measurement model to simple physical problems fails, but, contrary to the common belief among social scientists, application of the physical science measurement rule to social phenomena works well. Examples of how to apply the comparative measurement rule to cognitive and cultural processes are provided.

Joseph Woelfel has served on the faculty of the University of Illinois, Michigan State University, and the State University of New York at Albany, where he was Professor of Communication and Director of Research and Founding Fellow of the Institute for the Study of Information Science. He was the former Chair of the Department of Communication at the University at Buffalo. Professor Woelfel was a Senior Fellow at the East West Center in Honolulu, a Fulbright scholar in the former Yugoslavia, and Senior Fellow at the Rockefeller Institute of Government at the State University of New York.

Professor Woelfel is the author of numerous books and articles, including *The Measurement of Communication Processes: Galileo Theory and Method*, with E. L. Fink. He is a principle developer of extensive computer software, including the suite of Galileo programs, which are widely used worldwide in academic, political and private sector research for measuring attitudes, beliefs, market positioning, and designing strategies for modifying them, and CATPAC, a text analysis program utilizing artificial neural technology. Current biography can be found in Who's Who in America, Who's Who in Communication and the Media, and Who's Who in The World.

Klaus Krippendorff, University of Pennsylvania, Annenberg School for Communication

The Growth of Cyberspace and the Rise of Design Culture

Obviously, the increasing number and power of computers and their networking into the World Wide Web has changed the nature of social interaction and culture. A pressing issue is to conceptualize these sea changes. An early conception of computers as information processors led to the perception of the emerging society as an information society. Social computing is often associated with the notion of information.

I want to argue that the notion of information has undesirable social entailments and the idea of an information society is only addressing a small part of what computation encourages, a part that hides the political dynamics we are witnessing.

I will define the concept of cyberspace, make an audacious effort to estimate its growing size, suggest that it ushers a design culture into being, and hope to elucidate some epistemological properties of this culture. Some of these properties challenge renaissance conceptions of science, systems, and computation, but should appeal to those concerned with computation supported social networks.

Klaus Krippendorff, Grad. Designer (HfG Ulm); Ph.D. in Communication (U. of Illinois); is the Gregory Bateson Professor for Cybernetics, Language, and Culture at the University of Pennsylvania's Annenberg School for Communication. He is a Past President of the International Communication Association (ICA), elected Fellow of NIAS, AAAS, ICA among others; recipient of the Norbert Wiener Medal for contributions to cybernetics; and member of the editorial boards of numerous academic journals.

He contributed over a hundred articles and book chapters on human communication theory, methodology in the social sciences, cybernetics, and design; edited *Communication and Control in Society*; *Design in the Age of Information*, and authored *Content Analysis*; *Information Theory*; *A Dictionary of Cybernetics*; *On Communicating, Otherness, Meaning, and Information*; and *The Semantic Turn, A New Foundation for Design*. He applies his scholarly interest in human communication to design and relies on his design experiences in advancing studies of communication, emancipation, and culture. Above all, he is exploring the role of conversation and discourse in the social construction of realities.