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## DIRECTOR'S MESSAGE

Dear IMBS Colleagues and Selected Administrators,

The principal objectives of the IMBS are to create and to advance the growing, quite fruitful relationships that are being discovered between mathematics and the social/behavioral sciences. In promoting these goals, we enjoyed a busy, productive, delightful year.

The most exciting news greeted us at the beginning of the academic year: In a generous act that will ensure a continuation of this intellectual pursuit for generations to come and will support the continuing UCI's international leadership in the mathematical behavioral sciences, our IMBS colleague Jean-Claude Falmagne endowed *three* chaired positions that are directed toward the mathematics of the cognitive sciences! These positions can be expected to carry on the kind of seminal intellectual advances that have been pioneered here at UCI by Duncan Luce, Jean-Claude, and many, many other IMBS members; it will provide new leaders and directions for the IMBS! As part of his generosity, Jean-Claude also included a charitable trust that, eventually, provides a gift for the IMBS. Exciting news!! This contribution will promote the extension of an important academic area.

As for our activities, in addition to standard events such as our discussion groups and weekly colloquia (all discussed in this report), in winter term, a new group was created that involves IMBS members and faculty from Chapman University. This new cluster, which emphasizes the modeling and connections between religion and economics, is a direct consequence of our 2012 IMBS conference "*The evolution of religious and social norms.*" For more information about these activities, see the brief description given in this report and contact Jean-Paul Carvalho.

During this year we also ran seven workshop/conferences; agendas and brief descriptions can be found in this report and videos of most talks can be found on the conference link of <http://www.imbs.uci.edu>; I highly recommend that the reader check out some of them. To offer some added information, our first gathering piggybacked on an opportunity created by Bill Batchelder. Bill brought to UCI some of the top people in the mathematical cognitive sciences for the purpose of an editorial meeting. We took advantage of having this core of talent here on campus by inviting a couple of other experts to be speakers and ran our December "*New mathematical approaches in the behavioral sciences*" conference. This was a diverse and excellent meeting.

To explain the origins of a second conference, the US State Department and the National Academy of Sciences were organizing a visit to the US of a group of distinguished Iranian mathematicians. They asked the IMBS to assist in the planning of the three-week trip and to host a concluding three-day conference with an emphasis on issues of mathematics and education; this meeting was held in late January at the Beckmann Center. It was an interesting time where in addition to several UCI and IMBS members, the presidents of the National Council for Teachers

of Mathematics and the Mathematical Association of America joined us in a free-flowing discussion of mathematical issues that face both countries.

A fascinating issue (and a topic well represented here at the IMBS) that is studied in a variety of disciplines including engineering, computer science, and definitely in the social sciences is to understand how people, or animals, or robots, or ... learn how to interpret signals. Indeed, when looking through this report, you will find aspects of this theme described in the reported activities of Lisa Pearl, Jeff Barrett, Bryan Skyrms, and several others. This “*Reliable signaling*” concern was the theme of a January mini-conference.

A particular delight was a conference on “*Meaningfulness and Learning Spaces*” honoring Jean-Claude Falmagne on his 80th birthday. As true with all of our conferences, rather than describing the past—which here is the pioneering work of Jean-Claude and his coauthors in these stated topics—the emphasis was on what currently is being done in these several branches of mathematical psychology and what should be the agenda for the future. “Learning Spaces,” of course, refers to the mathematical development of ways to understand what material needs to be mastered before something else can be learned; it is central to the ALEXS program developed by Jean Claude that now is helping over a million students each year by placing them in appropriate classes and helping them master new material. Beyond the social sciences, “meaningfulness” is a topic in physics where, in both areas, mathematical ways are created to understand what concepts, variables, etc. are, well, meaningful.

A topic of growing interest in the area of Law is to use mathematical advances coming from the area of social choice to explain court decisions and to understand how and why perversities in our laws can occur. Because the IMBS has a strong core of recognized researchers in the area of social choice and because there is some interest in understanding these connections in our UCI Law School, the IMBS was the natural organization to bring together international specialists from both areas in order to advance these connections. To do so, a March “*Workshop on social choice and law*” brought together experts in social choice, law, and economics to explore these concerns. This was a successful gathering where plans are being made for another conference.

Also in March, the IMBS co-hosted (with the UCI Dept. of Economics) the *Southwest Economic Theory Conference*. This meeting, held in the IMBS conference room, brought together top theorists in mathematical economics coming from the southwest part of the US.

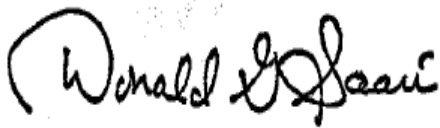
Finally, in May, we had an opportunity to learn what our graduate students have been doing from their presentations at the IMBS “*Luce Graduate Student Conference*.” We were treated to impressive accomplishments where the presentations are becoming more polished each year. Every year this conference attracts students from the business school, the social sciences, mathematics, and even engineering. This year, students from Evolutionary Biology participated (one gave a paper). We expect to continue to expand our reach during the coming academic year.

Beyond conferences, let me call attention to important parts of this report; they are the ones that include the description of what IMBS members have done and some of the recognition that they have received. Of particular interest is one of the first sections, where summaries of research

findings are listed; I highly recommend that the reader check out some of these reports. As for recognition, this ranges from Simon Levin receiving the prestigious *Tyler Prize for Environmental Achievement* (where several UCI faculty donned tuxedos and attended the prize ceremony) and Rein Taagepera earning the 2014 Outstanding Emeritus Award, to the growing reputations (as measured by the increasing number of invitations and published papers) of the new IMBS generation—our younger colleagues such as Jennifer Trueblood, Jean-Paul Carvalho, Joachim Vandekerckhove, and others.

A very busy year with many accomplishments that would not have been possible without the help, activity, advice, and hard work of Joanna Kerner, our IMBS administrator. She moved into this position prior to the beginning of the academic year, shortly after Janet Phelps retired, bringing her warm personality, interest in people, and dedication to detail and excellence. Joanna is the one who deals with, and solves, the many IMBS issues that arise each day, she plays a strong role in the planning and carrying out of our many conferences, activities, and talks, and she does an excellent job administrating the Institute! Our deep thanks, Joanna!

Sincerely,

A handwritten signature in black ink that reads "Donald G. Saari". The signature is written in a cursive style with a large, prominent initial "D".

Donald G. Saari  
Director, IMBS

## I. ORGANIZATION AND ADMINISTRATION

### A. Administration

The Director of the Institute for Mathematical Behavioral Sciences is Professor Donald G. Saari. He reports both to the Dean of the School of Social Sciences and to the Vice-Chancellor for Research. An Executive Committee for consultation and decision-making regarding the long-term direction of the Institute assists the Director, (section B below).

The staff of the Director's office consists of an Administrator, Joanna Kerner. Presently, some bookkeeping and personnel matters are being taken care of by the School of Social Sciences.

Director:	Donald G. Saari, 2003-present
Previous Directors:	R. Duncan Luce, Founding Director, 1989-1998 William H. Batchelder, 1999-2003
Graduate Director:	Louis Narens
Administrator:	Joanna Kerner

### B. Executive Committee 2013-14

Carter Butts, Professor of Sociology  
Michelle Garfinkel, Professor of Economics  
Geoff Iverson, Professor of Cognitive Sciences  
Michael D. Lee, Professor of Cognitive Sciences  
Mark Machina, Professor of Economics, UC San Diego  
Anthony McGann, Associate Professor of Political Science  
Brian Skyrms, Professor of Logic and Philosophy of Science  
Hongkai Zhao, Professor of Mathematics

## II. RESEARCH

### A. Current Research Programs

There are 65 members of the Institute for Mathematical Behavioral Sciences (IMBS) and their research interests are listed in Appendix A.

The IMBS is roughly partitioned into five research clusters. These are listed below and should be considered as informal intellectual groupings, rather than formal structures.

#### ***Measurement Theory, Foundational Issues, and Scaling Models:***

Barrett, Batchelder, Burton, Falmagne, Lefebvre, Maddy, Narens, Romney, Skyrms, and Weatherall

***Statistical Modeling:***

***Cognitive:*** Baldi, Batchelder, Doshier, Eppstein, Falmagne, Iverson, Lee, Pearl, Riefer, Romney, Smyth, Steyvers, and Yellott

***Economic:*** Brownstone, Poirier, Saari, and Small

***Sociological/Anthropological:*** Boyd, Butts, Faust, Freeman, and White

***Individual Decision Making:*** Birnbaum, Keller, Machina, Narens, Saari, and Trueblood

***Perceptions and Psychophysics:***

***Vision:*** Braunstein, Chubb, D’Zmura, Hoffman, Iverson, Palais, Romney, Sperling, Srinivasan, Wright, Xin, Yellott, and Zhao

***Psychophysics and Response Times:*** Brownstone, Falmagne, Iverson, Jameson, Narens, and Yellott

***Social and Economic Phenomena:***

***Economics and Game Theory:*** Branch, Brownstone, Brueckner, Burton, Carvalho, Frank, Garfinkel, Komarova, Kopylov, Levin, McBride, Poirier, Saari, Skaperdas, Skyrms, and Small

***Public Choice:*** Carvalho, Cohen, Glazer, Grofman, Kaminski, Keller, McGann, Taagepera, and Uhlaner

***Social Networks:*** Batchelder, Boyd, Butts, Faust, Freeman, Noymer, Romney, and White

***Social Dynamics and Evolution:*** Butts, Frank, Huttegger, Johnson, Narens, Romney, Saari, Skyrms, Smyth, Stern, and White

**B. Publications**

The members who have replied report a total of 271 journal publications (published or in press) for the current academic year. These are listed in Appendix B.

The IMBS has a technical report series that is available to all members and qualified graduate students who are submitting a paper to a refereed journal or book. The series editor is Donald Saari. Appendix C lists the technical reports issued during the academic year. Technical reports since 1993 can be found under “printed resources” on the Institute’s web site at [http://www.imbs.uci.edu/imbs\\_technical](http://www.imbs.uci.edu/imbs_technical).

**C. Public Talks and Colloquia**

IMBS members actively participated in numerous off-campus research seminars and conferences. The members who replied gave a total of 289 talks listed in Appendix D. Their awards and achievements for this year can be found in Appendix E.

**D. Summaries of Research Findings**

An important aspect of the Institute is the research conclusions developed by its members. What follows is a sample of what has happened this year.

## *Measurement Theory, Foundational Issues, and Scaling Models*

### **Jeff Barrett**

One of my papers this year ("Description and the Problem of Priors" Erkenntnis) shows how effective prior probabilities might coevolve with the use of language. Here there is no problem of assigning prior probabilities to meaningful hypotheses since by the time one has evolved meaningful hypotheses through the success and failure in of language in use one has a rich set of rational expectations. Another paper ("THE EVOLUTION, APPROPRIATION, AND COMPOSITION OF RULES" Forthcoming in Synthese) shows how rule-following behavior, like addition or transitive inference, might evolve, then those rules might evolve to be used in new contexts or be used to evolve more complex rules by composition with other evolved rules.

### **William Batchelder**

The main goal of my Cognitive Psychometrics Lab has been to further position Cultural Consensus Theory (CCT) as a main Psychometric measurement tool at the same level as Item Response Theory (IRT). IRT gives questionnaires to respondents where the research supposedly knows the correct answers apriori. The main goal of IRT is to estimate the ability of each respondent, and a secondary goal is to estimate the difficulty of each item. CCT gives questionnaires to respondents where it is assumed that there are 'shared culturally correct answers' but that they are unknown apriori to the researcher. The main goal of CCT is to estimate the consensus correct answers, and a secondary goal is to estimate the ability and response biases of each respondent and the difficulty of each item. The main extension this year has been to extend the models so that they can estimate multiple subcultures, each of which has a different set of culturally shared correct answers.

### **Michael Burton**

I presented one paper at a conference this year. This was the annual meeting of the Association for the Social Anthropology of Oceania, held in Kona in February. The paper was titled "Breadfruit and Chicken: Two Contrasting Circulations of Food in Kosrae." This is a new paper from an NSF-funded project from some years ago. It is actually more than a paper - it is the beginning of a book manuscript. My co-author is Karen Nero, of the University of Otago, New Zealand. The data set is from one of the four states of a nation that is governed under the Federal System of the US. The topic is something that few people were interested in 25 years ago when we began the project, and has since become almost a national obsession - the contrast between healthy local foods and less healthy global foods. In the paper we use breadfruit as the exemplar of a healthy and environmentally-sustainable local food (breadfruit trees produce more food for less effort than pretty much anything) and chicken (shipped frozen from the US, often from Tyson's chicken) is the exemplar of the less healthy global food. Now that there is so much interest in this subject matter, it is nice for me to know that we have one of the best possible data sets on this topic. We collected comparable data in 4 societies (3 nations). Just our data on food consumption in Kosrae has more than 100,000 records of one person eating one food, linked to other relevant data about

that individual. This paper just uses baby statistics, such as 3-variable cross-tabulations, but the larger project will use fancier models.

### **Jean-Paul Falmagne**

In August 2013, the Falmagne Family provided the funds for the creation of three endowed chairs in mathematical psychology at the University of California at Irvine. At the same time, the Falmagne Family also created a charitable remainder trust. It is their intention that, at the end of the life of the last living of Dina and Jean-Claude Falmagne, the funds remaining in the trust should be distributed to the University of California at Irvine, to be used equally by the Department of Cognitive Sciences and the Institute of Mathematical Behavioral Sciences.

Falmagne gave a talk in three symposia. The first symposium took place on the occasion of a visit from Iranian educational scientists. The last two symposia were organized to celebrate Falmagne's 80th birthday and described later in this report. For health reasons, he could not be physically present at the third symposium in Tuebingen and his talk was in the form of slides displayed with vocal comments of Falmagne accompanying each slide.

### **Vladimir A. Lefevre**

Preparation for publication my book "What Are Consciousness, Animacy, Mental Activity and the Like?"

Another project involved finding a theoretical explanation for a figure in this book manuscript; the importance of doing so is that this figure appears in numerous experiments devoted to the quantification of human emotion. This work is being done in collaboration with Dr. Robert Schwartz from the University of Pittsburgh Medical Center.

Worked on construction of theoretical model of antiterrorism using the reflexive game theory.

### **Louis Narens**

During the last year I spent most of my research effort on finishing my book, Probabilistic Lattices with Applications to Decision Theory. This book will be published during the summer, 2014 by World Scientific. Its research has been supported by a three-year grant from AFOSR. It provides new foundations for theories of probability intended for scientific application that generalize traditional probability theory and applies them to behavioral decision theory.

Such generalizations are needed behavioral science for the following four reasons: (1) The current justifications for the rationality of traditional probability theory are too narrow, that is, they assume more than is need for a general rational theory of probability. (2) For human decision making, the traditional theory lacks the means to formulate adequate definitions of ambiguity and vagueness concepts that are natural and crucial for understanding human decisions. (3) In scientific and engineering applications the data is often incomplete, vague, and ambiguous, and rationally based probability theories are needed for such situations. (4) The logical structure



inherent in traditional probability theory is inadequate for the kind of contextuality that routinely appears in psychological experimental paradigms. Quantum physics has developed a probability theory that deals with contextuality in its experimental paradigms. Recently, some psychologists have applied this probability theory to psychological experimental paradigms. However, there has been little foundational rationale for the appropriateness for the use of the methods of quantum probability theory in the behavioral sciences. I develop a new approach in my book that shows that by using only considerations about the structure of psychological experiments, a probability theory can be developed that has the same abstract logical event structure as quantum probability theory. Besides my book, I have published two articles about the new probability theories developed in the book, one for cognitive scientists, and one (with Donald Saari as co-author) for economists. Also during this year I have given 5 symposia and 2 conference presentations about the new probability theories at international conferences.

A second area of my research during this last year concerns the role invariance in formulating mathematical models of behavioral situations, and for drawing empirical conclusions from mathematical models. I have given 3 invited talks or symposia at international psychology meetings concerning this invariance research. A third area of my research during last year involves using evolutionary game theory to explain the evolution of systems that categorize objects from a continuous domain. For reasons described below, color is used as the paradigmatic case for investigating this. Preliminary research on this project by me and others led to a \$980,000 award from NSF to pursue the research more fully. Kimberly Jameson (IMBS) is the project PI, and Natalia Komarova (Mathematics, IMBS), Domink Wodarz (Ecology and Evolutionary Biology), and I (Cognitive Sciences, IMBS) are the Co-PIs. The grant begins in September 2014. The following quote from the grant describes the proposed research. The formation and communication of concepts permeate human activities. Psychologists, linguists, anthropologists, computer scientists, and others have studied this by focusing on a special case: How color terms evolve and their meanings are understood and shared by members of an ethnolinguistic society. This becomes an interesting problem, because individuals in a society vary in their understanding of color terms, and different societies often have lexicons that categorize colors in manners that differ. The challenge that evolution presents in this case is (1) only a small slice of the evolutionary history of a given lexicon is available for empirical investigation because scientists were not around during a sufficiently distant past collecting relevant data, and (2) analysis of written text alone is insufficient, because one cannot conclude with reasonable accuracy which portions of color space written color terms were previously intended to denote. Because of this, only conclusions can be drawn from current languages whose color lexicons are at various stages of evolution. The proposed research develops new mathematical models that apply to this type of situation. Its models describe a geometry for characterizing the meaning of color terms, their evolution as a system within the geometry, and methods for how color terms and their meanings can be transmitted to neighboring ethnolinguistic communities to affect the evolution of its color naming system. Further, the models will be tested using the Mesoamerican Color Survey (MCS), a database of categorization behavior of 900 individuals from 116 endangered or developing languages that are at various stages of color lexicon evolution. The MCS is currently in hand-written form, and part of this proposal is to digitalize it and make it available for the first time to the scientific community. The proposed mathematical models are formulated in a manner so that they apply beyond color to any set of concepts about a domain whose objects have a

mathematically characterizable similarity structure. During this year, I have been engaged in a number of IMBS activities. I serve as Graduate Director of a small graduate program associated with IMBS, organized or co-organized three IMBS conferences, taught a two quarter core IMBS graduate course (Social Dynamics I & II with Donald Saari and Brian Skyrms) and participated in an ongoing, IMBS seminar organized by Kimberly Jameson on color vision.

### ***Statistical Modeling***

#### **David Eppstein**

This year marks the publication of the book Knowledge Spaces: Applications in Education, which I co-edited with cognitive science emeritus professor Jean-Claude Falmagne and several others, concerning Falmagne's theory of learning spaces and its application to computerized education systems. I also published two chapters in the book concerning the underlying algorithms needed to implement learning space theory efficiently.

#### **Michael Lee**

My work continues to focus on modeling higher-order cognition (decision-making, memory, learning), especially through the application of hierarchical Bayesian methods. My course-book on this topic, written in collaboration with E.-J. Wagenmakers, University of Amsterdam, was published this year. Research highlights have included a paper studying individual differences in categorization with colleagues from the University of Leuven, several research efforts applying cognitive models to "wisdom of the crowd" problems (including probability estimation and ranking data), and applied collaborations with Ranker.com (wisdom of the crowd in social media) and the Medical Care Corporation (Alzheimer's disease and related disorders).

#### **Lisa Pearl**

One of my findings concerns how the cognitively immature minds of infants solve the initial tasks involved in native language learning. One of these tasks is word segmentation, which is identifying individual words in fluent speech. As anyone who has ever listened to a foreign language knows, there are rarely any overt markers of word boundaries - it often sounds like one long stream of sounds. Instead, listeners who know the language impose word boundaries to identify the words being spoken. We find in Phillips & Pearl (2014, in press) that a Bayesian learning strategy does quite well at this task across a variety of languages, even when it begins with no knowledge of where the words are. Importantly, we evaluate segmentation performance in a more empirically grounded way: Instead of assuming infants segment a stream of fluent speech exactly the way adults do, we draw from existing psychological literature to identify the way infants are likely to segment an utterance. Notably, this can be rather different from the way adults would do it — for example, “It’s a penguin!” might be segmented by a young child as “*Itsa penguin*”. Interestingly, the success of the Bayesian learning strategy cross-linguistically also appears (currently) to be unique — no other proposed segmentation strategy we investigated can succeed just as well on languages like Japanese and Farsi as it does on English. This suggests

Bayesian word segmentation is a robust strategy that is viable for learning to segment the words in any language.

Another finding concerns the automatic identification of mental states of text, using linguistic cues within the text (rather than non-verbal cues such as voice pitch or facial expression). For example, “Don’t you just love this idea?” is expressing a persuasive intention (and possibly sarcasm), and some distinctive linguistic cues include the use of “don’t” to begin the question and the use of a second person pronoun (“you”) preceding a verb with a positive connotation (“love”). Since humans routinely transmit and interpret this kind of subtle information via linguistic cues, we suggest in Pearl & Enverga (2014), building on work in Pearl & Steyvers (2013), that humans can utilize the linguistic signature of a mental state (its “*mindprint*”) to accomplish this. We focus on the mindprints of eight mental states resulting from intentions, attitudes, and emotions, and present a mindprint-based machine learning technique to automatically identify these mental states in realistic language data. By using linguistic features that leverage deeper linguistic information, our approach achieves near-human performance on average and even exceeds human performance on occasion. Interestingly, we find that our technique makes similar errors to humans in some cases, suggesting that the mindprints used are similar to the mindprints human use. Given the promising results we have found, we suggest that linguistically-sophisticated mindprints are likely to be a viable and important component of any intelligent system interacting linguistically with humans.

A third finding concerns how humans mentally represent knowledge about their language, and in particular how we as scientists evaluate competing theories of linguistic knowledge representation (KR). KR theories are typically developed with the goal of explaining in an economical way the variety of linguistic structures observed in all the world’s languages. It is often a tacit assumption that if humans represent language in this economical way, it should be remarkably simple to learn their specific language’s representation from the language input they’re exposed to. The core intuition behind this is that the KR already highlights what variables of a child’s experience matter for representing language — so, if children have the correct KR, they know what to focus their attention on to learn their language. In Pearl, Ho, & Detrano (In press), we explicitly evaluate this claim for a set of KR theories that each are meant to represent human knowledge of the stress patterns of their language (i.e., what SYLLable you put the EMphasis on in a word). We evaluate each KR theory on its ability to learn the English stress system from realistic English data. Surprisingly, we find that all KR theories struggle to learn the correct stress system from English data. However, rather than concluding that all the KR theories are completely wrong, we look for ways to alter them. Notably, we find that small changes to the definition of the English stress system in each KR theory can lead to learning success under various learning assumptions. More generally, this learnability-based approach allows us to suggest useful alterations to the theories about how stress knowledge is represented.

## *Sociological/Anthropological*

### **John Boyd**

I've developed a faster way of measure the statistical significance of network measures. For example, comparing a social network of dolphins with that of boys in a karate class, I've found that dolphins have no significant inclination to interact with the high ranking dolphins, while boys of low degree want to associate with those of higher degree. On the other hand, friendship among dolphins tends to be transitive, where a friend of a friend is a friend; while the boys have no significant tendency toward transitive.

## *Individual Decision-Making*

### **L. Robin Keller**

Simon, Kirkwood and Keller (2014) present a decision analysis methodology for decisions based on data from geographic information systems. The consequences of a decision alternative are modeled as distributions of outcomes across a map of a geographic region. We discuss conditions that may conform with the decision maker's preferences over a specified set of alternatives; then we present specific forms for value or utility functions that are implied by these conditions. Decisions in which there is certainty about the consequences resulting from each alternative are considered first; then probabilistic uncertainty about the consequences is included as an extension. The methodology is applied to two hypothetical urban planning decisions involving water use and temperature reduction in regional urban development, and fire coverage across a city. These examples illustrate the applicability of the approach and the insights that can be gained from using it.

From: Jay Simon (Merage doctoral alumnus, Assistant Professor, Defense Resources Management Institute, Naval Postgraduate School), Craig W. Kirkwood (W. P. Carey School of Business, Arizona State University), L. Robin Keller, "Decision Analysis with Geographically Varying Outcomes: Preference Models and Illustrative Applications", *Operations Research*, 62(1), Jan.-Feb. 2014, 182-194. Online in *Articles in Advance* on Dec. 16, 2013

Supplement *Simon et al. 2014 supplement*:

[http://pubsonline.informs.org/doi/suppl/10.1287/opre.2013.1217/suppl\\_file/opre.2013.1217-sm.pdf](http://pubsonline.informs.org/doi/suppl/10.1287/opre.2013.1217/suppl_file/opre.2013.1217-sm.pdf) Abstract, and link to paper pdf:

<http://pubsonline.informs.org/doi/abs/10.1287/opre.2013.1217>

### **Mark Machina**

I continue to work in the area of ambiguity and ambiguity aversion. I am currently exploring a notion of a smooth conversion from purely subjective to purely objective events based on sensitivity to shifts in a Bayesian prior over a linear state space. I am also beginning work on a notion of intertemporal substitution which is distinct from the standard intertemporal elasticity of

substitution concept in that it is a form of nonseparability in which the degree of interaction of preferences between consumption in two time periods depends upon their distance apart in time as well as their distance from nearby consumption levels

### **Jennifer Trueblood**

My research focuses on two main areas. The first is using quantum probability theory to develop formal models for social and behavioral sciences. This approach was the focus of a full-day tutorial “Quantum Models of Cognition and Decision” held in conjunction with the 36<sup>th</sup> Annual Conference of the Cognitive Science Society in July 2014. In work supported by NSF, I have been investigating how quantum probability theory can be used to model causal reasoning. This work has been presented in three invited talks and three conference presentations.

My second area of research is on modeling multi-alternative choice behavior. In collaboration with Scott Brown and Andrew Heathcote at the University of Newcastle, Australia, I have been studying context effects in multi-alternative choice behavior. A decision context effect occurs when the introduction of a third option (which doesn’t get chosen) causes a change in preference between two original options. In a recent paper published in *Psychological Review*, we describe a new theory of these effects, the MLBA model.

### **Perception and Psychophysics**

### **Charlie Chubb**

Using a new class of auditory stimuli called “tone-scrambles” Chubb et al. (2013) listed below showed that auditory sensitivity to the difference between music in the major vs minor mode is far from universal across listeners. Our stimuli consisted of rapid, random sequences of 32 tones (which took roughly 2 sec to display). All tone-scrambles comprised 8 each of the notes G5 (on the piano), D6 and G6; in addition, MAJOR (MINOR) tone-scrambles comprised 8 B5’s (B5-flats). Listeners were asked to try to classify stimuli (with trial-by-trial feedback) as MAJOR vs MINOR. We discovered that approximately 70% of listeners perform very near chance at this task. The other 30% of listeners perform near perfectly. Implication: when music is stripped of all but tonal cues, the “happiness” vs. “sadness” that characterize music in the major vs minor musical modes is vividly available to 30% of listeners; all other listeners seem to be deaf to this difference. We conjecture that, like colorblindness, this difference in sensitivity may have a genetic basis.

### **Mike D’Zmura**

We have used electroencephalography (EEG) to show that the "cocktail party" effect depends on both the entrainment of cortical processing to the volume envelope of an attended speech stream and the suppression of neural responses to unattended streams. EEG signals which follow the volume envelope of an attended speech stream can be used to determine which speaker one is paying attention to.

## **Kimberly Jameson**

In 2013-2014 Jameson's research continued on topics in the empirical testing and mathematical modeling of color perception and cognition. Moreover, the 2013-2014 academic year was marked by both new research ventures and novel extensions of longstanding research directions. For example, new opportunities arose to carry out exciting applied color perception research with a participant who is a professional artist who happens to also have the genetic potential for human tetrachromacy. Intense ongoing empirical study begun in October 2013, in collaboration with Dr. Ali Winkler, on this topic and has yielded some very important advances that have been presented in recent conference talks, and are reported in manuscripts in-progress. A second novel project envisioned by Jameson was initiated with medical school colleagues at the Gavin Herbert Eye Institute, UCI, and a grant was submitted to fund new studies on color perception assessment methods for Early Adult-onset Macular Degeneration (grant pending). A third novel project -- which is an extension of Jameson's ongoing UC PacRim Research Program project -- was envisioned and proposed by Jameson (PI) and her IMBS colleagues Komarova, Narens and Wodarz to the National Science Foundation (titled "New methods for investigating the formation of individual and shared concepts and their dynamic dispersion across related societies") and was one of 3 grants successively classified as "Highly Competitive" and was granted a fully funded award. Funds for this project are scheduled to soon arrive on campus in September 2014, and work has already begun on this new research effort. This latter project will greatly extend and expand on Jameson's ongoing work on the Mesoamerican Color Survey database, which in addition to basic research results in the area, will make available to the public for the first time one of the most extensive public archives on color categorization data across ethnolinguistic groups.

Funded Research: Jameson continues as PI funded by the UC Pacific Rim Research Program grant (through June 2015) to develop a new color categorization database with colleagues at UC Berkeley's International Computer Science Institute. Work to date on this project helped seed a successful 2014 National Science Foundation Award (described below).

Jameson describes the central question of the project as the following: Perceptual color experience is universally appealing – without it our visual lives would consist of monochrome shades of gray. But despite many similarities, a number of linguistic societies categorize and apply meaning to perceived color in ways that differ from the familiar associations learned by English language speakers. This raises the question: What are the cognitive factors that influence the assignment of linguistic categories to conceptual domains such as everyday color experience? Jameson explains, the ways individuals classify color depends on, among other things, the uses and importance of color in our everyday visual processing environments and the ways different societies of people develop meaning systems on the rather uniform domain of color perception can tell us a lot about cognition, communication, perceptual processing and environmental color salience and utility.

During the 2013-14 academic year, Jameson's UCPRRP funds have supported Alissa D. Winkler (IMBS Assistant Specialist) and Daniel Wolf (IMBS graduate student) and Ayden Parish (UC Berkeley, Linguistics undergraduate) with whom she is exploring aspects of (1) rapid database

transcription using the power of the internet and procedures involving crowd-sourcing and the quantitative modeling of shared information, (2) development of coding and syntax for large scale numerically-addressable database metadata, and (3) the timely transcription of the color content of the raw data from the survey. Additional work has been done on digitizing the components of the MCS archive that provide valuable replications of the existing World Color Survey database.

### **Jack Xin**

I worked on flame speeds in ordered and disordered fluid flows arising in turbulent combustion, and sparse representation of data in over-complete dictionary based on optimization methods.

My other research deals with presbyopia—the eye’s gradual loss of its ability to change focus, which typically becomes a serious problem in middle age. Reading glasses can usually provide an effective prosthetic solution to this problem, but glasses are not always immediately available when critical information needs to be read—printed medicine labels, for example, or urgent text messages on mobile phone screens. A longstanding question for printers is how to mitigate the effects of uncorrected presbyopia by typographical methods—i.e., changing the size and shape of printed characters. Here magnification is always the first step, but even after characters are made much larger than normal, presbyopic defocus can still cause their retinal images to be distorted beyond recognition. In principle, modern printing technology should allow this shape distortion to be prevented typographically by spatial phase filtering that anticipates and precompensates for the phase shifts (“phase reversals”) created by defocus. I have been studying the costs and benefits of this kind of prosthetic typography, which can easily be implemented on smart phones and similar display devices. Last fall I gave an invited talk on this work at the annual vision meeting of the Optical Society of America. One significant finding is that a geometrical optics model of the eye provides a very accurate account of presbyopic phase reversal and its correction by pre-filtering, so the computational complexities of diffraction theory can largely be avoided.

### **Jack Yellott**

In the past year I worked on two applied problems in physiological optics. One is a classical problem in pupillometry--the science of measuring and predicting the behavior of pupil of the human eye. Here I helped A.B. Watson from NASA Ames develop a formula that predicts pupil size from experimental parameters such as visual field luminance and size, observer age, and monocular versus binocular viewing. Our “unified formula for light-adapted pupil size” is based on earlier proposals and data from research over the past 100 years. The article reporting it (cited below) includes a built-in program that readers can run on-line to calculate expected pupil size for a wide range of experimental conditions.

### **Hongkai Zhao**

My current research has been focused on developing novel models and computational algorithms for (1) data analysis, such as understanding geometric structure from high dimensional data; (2) medical imaging, such as cone beam CT reconstruction using low-rank matrix factorization; (3) numerical simulation of physical and biological systems.

## *Social and Economic Phenomena*

### *Economics and Game Theory*

#### **Bill Branch**

The financial crisis of 2007-2009, and the resulting Great Recession, highlighted the important role that financial markets play in the macroeconomy. In particular, a housing and stock market bubble during the early 2000's, followed by a financial crisis, led to boom-bust cycle in key macroeconomic variables such as unemployment, output growth, consumption, and asset prices. A recent literature incorporates realistic financing and collateral constraints into macro and asset pricing models. However, these models fail to deliver realistic paths for macroeconomic variables. My research incorporates bounded rationality, learning, and heterogeneous expectations into macroeconomic models with financial frictions and shows how learning interacts with the financial sector in such a way as to replicate key empirical facts about the business cycle.

#### **Jan K. Brueckner**

Product unbundling has been the focus of a long theoretical literature in industrial organization, but few consumers had experienced the phenomenon prior to the unbundling revolution in the airline industry. Airlines have unbundled baggage and food service, and they earn more \$3 billion per year from bag fees. A study of mine with three coauthors explores the economics of airline bag fees, focusing on the question of whether fares fell when the fees were imposed. A theoretical model predicts that fares would indeed fall, but that, depending on behavior of the price elasticity of demand, the full price of a trip (fare plus bag fee) could be higher or lower than the pre-bag-fee fare, which included baggage service. Empirical analysis shows that fares fell about 3 percent when bag fees were imposed, an amount that is too small to offset the bag fee itself. Therefore, the full trip price rose by about  $\frac{1}{2}$  to  $\frac{2}{3}$  the amount of the bag fee.

#### **Natalia Komarova**

The fascinating ability of humans to modify the linguistic input and "create" a language has been widely discussed. In the work of Elissa Newport and colleagues, it has been demonstrated that both children and adults have some ability to process inconsistent linguistic input and "improve" it by making it more consistent. One example is the fascinating study of the performance of a 7-year deaf boy Simon, who mastered the American Sign Language (ASL) by learning it from his parents, both of whom were imperfect speakers of ASL. In a number of papers, Newport and colleagues studied artificial miniature language acquisition from an inconsistent source. It was shown that (i) children are better at language regularization than adults, and that (ii) adults can also regularize, depending on the structure of the input. Together with students Yelena Mandelshtam and Jacquelyn Rische we created a number of learning algorithms of the reinforcement-learning type, which exhibits patterns and suggest a way to explain them. It turns out that in order to capture the differences between children and adults' learning patterns, we need



to introduce a certain asymmetry in the learning algorithm. Namely, we have to assume that the reaction of the learners differs depending on whether or not the source's input coincides with the learner's internal hypothesis. We interpret this result in the context of a different reaction of children and adults to positive and negative evidence. We propose that a possible mechanism that contributes to the children's ability to regularize an inconsistent input is related to their heightened sensitivity to positive evidence rather than the (implicit) negative evidence. In our model, regularization comes naturally as a consequence of a stronger reaction of the children to evidence supporting their preferred hypothesis. In adults, their ability to adequately process implicit negative evidence prevents them from regularizing the inconsistent input, resulting in a weaker degree of regularization.

Over the last year I have also worked on several topics of mathematical biology. This includes stochastic dynamics of stem cells; applying methods of evolutionary biology to optimizing treatment of the blood cancer CLL (chronic lymphocytic leukemia); and investigating the role of spatial constraints in crossing fitness valleys in evolutionary dynamics.

### **Simon Levin**

My research program continues to be centered on understanding the dynamics of biological diversity at all levels, from the molecular diversity of diseases to the diversity of global ecological and cultural systems; the importance of that diversity for humans; and the interactions of that diversity with human social and ecological systems. Some accomplishments in the past year have been:

#### **The Dynamics of Biodiversity and Biocomplexity**

- (1) With postdoctoral fellow Juan Bonachela, published a paper on viral lysis rates.
- (2) With former student Eili Klein, published a paper on the interactions among different strains of malaria.
- (3) With Qing Nie and J. Lei, published a paper in PNAS viewing stem cell regeneration through the lens of ecological life history theory and economic dynasty theory
- (4) With former graduate student Liliana Salvador and others, published a paper analyzing the foraging behavior of *C. elegans*.
- (5) With former postdoc Emanuel Schertzer and former student Carla Staver, published a paper using percolation theory to develop and analyze a fire spread model as a component in broader models of critical transitions in grassland ecosystems.
- (6) With former postdoc Sally Thompson and colleague Ignacio Rodriguez-Iturbe, published a paper extending previous work on *Phytophthora* to relate the risk of the spread of this pathogen to climate change.
- (7) With former students Josephine Walker and Eili Klein, published a paper on effectiveness of measures to control tick transmission.
- (8) With graduate student Andrew Berdahl and others, published a paper on collective navigation in salmon populations; this has appeared online and will appear soon in print.
- (9) With postdoc Malin Pinsky and others, published a paper in *Science* on range shifts in fish populations, and relation to climate change.

- (10) With former graduate student Caroline Fariior and others, published two papers on the ecological and evolutionary dynamics of plant communities, including one that one the President's Award for best paper in the American Naturalist.
- (11) With Adam Martiny and others, published a paper in Nature Geoscience on latitudinal patterns in the oceans regarding C:N:P ratios in plankton and organic matter.

### **The Interactions Between Ecological Systems and Socioeconomic Systems, and the Management of Natural Resources**

- (1) With Kenneth Arrow and Paul Ehrlich, published a paper on managing linked ecosystems and socioeconomic systems.
- (2) With Vitor Vasconceles, Jorge Pacheco and FCSantos, published a paper in PNAS on achieving climate change agreements when there is wealth inequality.
- (3) With postdoc Thom Van Boeckel and others, published a paper on global patterns of antibiotic use.
- (4) Wrote a paper (to appear, PNAS) on public goods, comparing ecological and economic perspectives.
- (5) With Ilan Fischer and others, published a paper in PNAS on complex strategies in game-theoretic situations.
- (6) With several collaborators, published a paper showing how critical transitions can occur in common-pool resource situations.
- (7) Published a paper on the mathematics of sustainability in the Notices of the American Mathematical Society.
- (8) First author with others on a paper published in Environment and Development Economics on socioeconomic systems as complex adaptive systems.

### **Michael McBride**

It is believed that dark (illegal and covert) networks take decentralized structures to maximize concealment rather than efficiency. However, testing this theory with field data is difficult for ethical and practical reasons. We conduct a laboratory experiment that exogenously varies the network's visibility. In the first stage, a network designer chooses the dark network's structure to maximize network production; in the second stage, the interventionist removes a single node to minimize network production. We find that networks become more decentralized, as the dark network is more visible and that the decentralization may persist even after visibility lessens

### **Don Saari**

For a couple of centuries, mathematicians and social scientists have been puzzled about cycles and why they can occur in voting, statistics, data from lab experiments, and in a variety of other settings. The foundations as to why all of this occurs were developed in my Math of Operations Research paper that is "online" and scheduled to be published shortly. So, some of my research has been to show how all of huge literature in this area now can be easily understood and

significantly extended: some of this is reported in my Math of Social Sciences paper that appeared in January.

A second theme is my continuing work on the underpinnings for the dark matter mystery from astronomy.

### ***Public Choice***

#### **Jean-Paul Carvalho**

*Coordination and Culture*-Culture constrains individual choice, rendering certain actions impermissible or taboo. When individuals from different cultural groups interact, we find that social coordination can permanently break down despite strong incentives to coordinate behavior. In fact, mis-coordination between groups is the most likely outcome for an open set of parameters. In an application to identity-based conflict exclusive ethnic and religious identities are shown to persist in poorer and more unequal societies. Factors that may favor social coordination are also explored, including assimilations, deviance and cultural choice.

#### **Anthony McGann**

I have developed an algorithm to estimate the position of the median voter or the “policy mood” (how far public opinion has moved “to the left” or “to the right”) from aggregate data. We have many opinion poll questions asking people their views. The problem is the same questions are not asked every year, although (crucially) there is some overlap. I develop a technique from psychometrics (item response theory) to produce a single measure of public opinion for this array of questions. I have applied this to public opinion in the United Kingdom. The algorithm will be of use in many contexts and countries. I am currently working on a grant proposal to collect data from countries with coalition governments. I have also applied the algorithm to historical data on public opinion in Scotland.

Social Choice and Political Gerrymandering. In the case *Vieth v. Jubelirer* (2004) the Supreme Court decided that courts could not prohibit the gerrymandering of Congressional districts to benefit one party over the other. This finding was based on the argument that the US Constitution does not grant rights to equal representation to groups, but only gives rights to individuals. However, using social choice theory, I have proven that any districting scheme that does not allocate a majority of seats to a party that wins a majority of the votes necessarily fails to treat all voters equally. Therefore political gerrymandering does violate individual, as opposed to group, rights.

I have completed a book manuscript on Political Gerrymandering (“*The End of Equality: Gerrymandering, The Supreme Court and the Constitutional Revolution of 2014*”). This is currently under review. This provides measures of partisan bias for all states, demonstrating that the level of bias is even greater than currently believed, and that the origin of this is political. It also shows that many common explanations, such as the urban concentration of democrats, cannot explain the recent increase in bias.

## **Rein Taagepera**

“Tamed quasi-hyperbolic function”,  $P=A/[\ln(B+e^{(D-t)/\tau})]^M$ , fits world population growth over 1600 years and projects to population explosion coming to a screeching halt by 2100, at a ceiling of 10.2 billion. Population, Earth’s carrying capacity and technological skills interact to produce the millennial acceleration and the present slowdown, according to a set of 3 differential equations, of which the function above is an approximate solution. (Taagepera, 2014)

### ***Social Networks***

## **Katherine Faust**

I have been investigating the triadic structure in social networks using a collection of close to 300 networks of different types of social relations measured on populations of various species. Results show that, unlike physical, biological, and technical networks, social networks are not well characterized by discrete “structural signatures”.

I have also been collaborating with Zita Oravecz and Bill Batchelder on applying cultural consensus theory models to several substantive examples, including knowledge about science and environment, facts about aging, and features of the concept of “behavior”.

## **Andrew Noymer**

I work on epidemiology, the area where two complex systems interface (pathogens and human society). While the spread of diseases is now a well-elaborated sub-field of mathematical biology, the complex social system also affects who gets diseases, when, and with what severity. As a sociologist/demographer, I work mostly on the empirics of social and historical epidemiology, though some of my work straddles this area and methodology/modeling. I continue to do much work on influenza pandemics, the subject of my PhD dissertation (2006). I am also branching out to the seasonality of all-cause mortality and other topics in medical demography.

### ***Social Dynamics and Evolution***

## **Carter Butts**

Inferring the mechanisms that drive changes in networks - and predicting how network structure will change over time - is an important scientific goal with practical applications in fields ranging from emergency management and organizational design to systems engineering and gene expression analysis. In work with (now former) student Zack Almquist, I have developed a scalable approach to modeling network dynamics from observational data that can be used for systems in which both the entities in the network and the ties among those entities change endogenously with time. In ongoing work with collaborator Anima Anandkumar, I have extended this approach to incorporate latent dependence in the appearance of entities within the network while still maintaining dependence. In related work with collaborator Padhraic Smyth (and former UCI student Chris Dubois), I have developed new techniques for finding hidden role structures in relational dynamics, and in modeling dynamics within large sets of groups (e.g.,

school classrooms, organizations, etc.). These new techniques are giving us a window into phenomena ranging from online communication and inter-organizational collaboration to gang violence, and we believe that they will ultimately have applications across a wide range of fields.

## **Doug White**

The past few years have led to unprecedented breakthroughs in the mathematics of data analysis with open source modifiable software that allowed research, publication, and grant proposals on improvements in Bayesian and inferential statistics to support testing of networks of causal variables from data on human societies and historical sequence data that have major policy implications (White 2012a). White's SFI Working Group on Robust Causality in the Social Sciences reports another year of massive progress, solving the 130-year conundrum of non independence of cases in survey research, which has plagued anthropology and the social sciences and is known as **Galton's problem**. Our working group has implemented a solution, along with new approaches to complex networks, and with installation of the first general-purpose **Complex Social Science (CoSSci) Supercomputer Gateway** at the San Diego Supercomputer Center (SDSC). The SFI renewed White's external professorship for 2013-2016. The working group will meet again at SFI in August 2014. The CoSSci Gateway at <http://socscigate.oit.uci.edu/uci/root> now allows not only a "big data" approach to worldwide sociocultural, political-economic and ecoenvironmental modeling but networked modeling of observational-variable path analyses that incorporate time-series panel data, Bayesian estimation and causal effects of cohesive interaction networks at multiple levels of analysis. A Virtual Machine at UCI, hosted at [socscicompute.ss.uci.edu](http://socscicompute.ss.uci.edu) by Irvine's OIT and Social Science allows open access to modelers (researchers and students in online courses) to complete each iterative stage in model improvement in less than two minutes, whereas (1) analysis of results may require a half hour, (2) a dozen iterations may be required for completion of a given model and (3) models linked by sharing of independent and/or dependent variables for a path analysis may require weeks. In contrast, a "big data" analysis of many linked models may require several days of supercomputer time at the Trestles Supercomputer at UCSD.

The CoSSci project has four major databases that cover the gamut of human societies from a foragers sample (N=339 societies V=850 variables), to the EthnoAtlas world sample (N=1287 V=92), Standard Cross-Cultural Sample (N=186, V=2800+) and Western North American Indian sample (N=172, V=289), and will encompass more world databases in the future, each equipped for missing data imputation. The working group has included MBS graduate students Tolga Oztan, Giorgio Gosti, Elliott Wagner, and Steve Doubleday, SFI postdocs Marcus Hamilton and Laura Fortunato, SFI external faculty Henry Wright and Peter Turchin, and invitees Chris Boehm and Amber Johnson. The SDSC contingent (Gosti, Oztan and Doubleday), working with White and SDSC scientist Robert Sinkovits, distinguished themselves as one of three outstanding supercomputer projects in the 2013 NSF report on Gordon Research Highlights for solution and computation for vertex-connectivity structures, measuring large-network subgroup cohesiveness according to the Menger Theorem and as initially developed by White, Frank Harary, James Moody and Mark Newman. Tolga Oztan gave the group's presentation at the International Network for Social Network Analysis (INSNA) in Hamburg, 2013. These accomplishments of a Social Science Initiatives Project round out White's Working Group on Robust Causality

assembly and analysis of major comparative and historical databases on human societies and in the assembly, theory development for societal processes and network analysis, and robust causal modeling and model testing using social science and environmental databases, codebooks, and primary source bibliographies for the N individual cases and V variables in societal samples such as:

- Ethnographic Atlas (N=1287 Murdock 1967)
- Standard Cross-Cultural Sample (N=186 Murdock and White 1969,2006)
- Forager Database (N=339 Binford 2001)
- Western North American Indians (N=172 Jorgensen 1980,1987)
- Kinsources Network Sample (N=85), with marriage node networks in a larger social unit (ANR-Kinsources 2012)
- Chiefdoms and Early Empires Data (N=ca.25 Wright 2009)
- Longitudinal Empires Database (N=ca.35, with many time-steps) (Turchin 2005)

#### **E. Research Seminars and Activities**

The research activities of the Institute often result in graduate research seminars. Among those this year:

- Mathematical Models of Cognitive Processes (Batchelder)
- Graduate Research Methods (Burton)
- Theory, History and Development Seminar (Carvalho)
- UC Irvine-Chapman Economics of Religion Discussion Group (Carvalho)
- Evolutionary Biology (Frank)
- Introduction to Game Theory Introduction to Voting Theory (Kaminski)
- Experiential Learning (Keller)
- Management Science (Keller)
- Decision Analysis (Keller)
- Microeconomics (Kopylov)
- Topics in Decision Theory (Kopylov)
- Mathematics for Economists (Kopylov)
- Skepticism (Maddy)
- Computational Models of Language (Pearl)
- Social Dynamics (Skyrms, Narens, and Saari)
- Graduate Research Seminar (Saari)
- Colloquium in Transportation Science (Small)
- Bayesian inference (Vandekerckhove)
- Algorithmic statistics (Vandekerckhove)
- Foundations of Classical Field Theories I & II (Weatherall)

1. *New This Year*

**Economics of Religion**

Organized by faculty member Jean-Paul Carvalho, Economics of Religion Discussion Group is a joint venture between the Institute for Mathematical Behavioral Sciences at UC Irvine and the Institute for the Study of Religion, Economics and Society (IRES) at Chapman University. The group convened for the first time this year over four sessions held between January and May. The four core members of the group are Larry Iannaccone (Chapman), Mike McBride (UC Irvine), Jared Rubin (Chapman) and Jean-Paul Carvalho (UC Irvine). There was also vigorous participation by Stergios Skaperdas (UC Irvine), Andrea Molle (Chapman) and others. The group takes advantage of the extraordinary concentration of scholars working on religion in southern California. All four core members have published on the economics of religion, and Larry Iannaccone is regarded as the founder of the discipline.

Discussion began with foundational issues in the economics of religion: What is religion? How are religious groups different? What is the role of supernatural beliefs? Are developed societies secularizing and on what dimensions? There was intense debate about these issues. While the role of supernatural beliefs is conceptually important in distinguishing religious organizations, we found that they played no substantive role in existing theoretical models. Rather, religious beliefs were mathematically indistinguishable from other credence goods or cultural traits. Every model that included supernatural beliefs was equivalent to a model that did not include such beliefs.

Frontier research topics of general interest were then explored by the group, including the roots of religious extremism, the interaction between political and religious authority and the relationship between religion, identity and meaning. The consensus was that further work is needed on these issues. Outstanding questions include the following: Why are religious groups able to impose stricter prohibitions and enjoy greater stability than non-religious groups? How do political institutions affect the likelihood of religious extremism and conflict? What factors lead individuals to emphasize or deemphasize their religious identity vis-à-vis national, ethnic, linguistic or other forms of identity? How can the meaning and purpose imparted by religion be modeled? Several research projects were proposed during the meetings.

*Continuing Activities*

**Computational Models of Language (CoLa) Reading Group**

Lisa Pearl is the faculty organizer and leader of the interdisciplinary discussion group CoLa. Topics of interest include: computational models of language/acquisition, computational learning theory, principals underlying models of language learning and change, and modeling information extraction from language by humans. Below is the group-reading schedule for 2013-14.

October 23    Universal grammar  
November 6    Bayesian models  
November 20    Word Learning  
December 4    Word Learning  
January 24    Productivity and categorization

February 14	Development of parsing
February 28	Recursion
March 15	Scalar implicatures
April 14	Learning in the absence of input
May 5	Pronouns
May 19	Evaluating early acquisition models
June 2	Recovering from overregularization

Further information can be found at the CoLa homepage:

<http://www.socsci.uci.edu/~lpearl/colareadinggroup/>

### **UCI Social Network Research Group**

The *UCI Social Network Research Group (SNRG)* is a weekly meeting of researchers in the social network area organized by Carter Butts and Katherine Faust. The SNRG welcomes discussions and/or presentations of current theoretical, methodological, and/or empirical work on or of relevance to the study of social structure. Discussion of “early phase” research and preliminary findings are especially welcomed, as are presentations by students and newcomers to the field.

[http://lakshmi.calit2.uci.edu/cnra/?page\\_id=205](http://lakshmi.calit2.uci.edu/cnra/?page_id=205)

### **Social Dynamics and Complexity Research Group**

The focused research group in Social Dynamics and Complexity, initiated by Professor Douglas White, hosts two on-line peer-reviewed eScholarship journals, the Structure and Dynamics eJournal of Anthropological and Related Sciences and the World Cultures eJournal of Cross-Cultural Research, and has a mediawiki InterSciWiki web site for complexity, dynamics, network sciences, and causal modeling. The InterSciWiki hosts the UCI Complex Social Science Gateway, served by two UCI virtual computers that provide a Galaxy-based online access to a research and instructional system and to the Trestles High Performance Computing (HPC) at the San Diego Supercomputer (SDSC) at UC San Diego. This year White’s Santa Fe Institute Robust Causality Working Group, which includes MBS PhD student Tolga Oztan and has included others who completed MBS PhDs in the past (Giorgio Gosti, Elliot Wagner), completed the installation of Social Science databases and R software that contributes solutions to autocorrelation and missing data imputation to multiple regression, logit, Bayesian learning for networks of variables, NeighborNet phylogenetics and will provide HPC solutions to the estimation of structural cohesion in large social networks to causal analysis with Peer effects. This year the group’s Societal Study Initiative and Working Group on Robust Causality in the Social Sciences projects have been funded by SFI and NSF support for Argonne Labs and U Chicago programming for the XSEDE projects that support our Science Gateway. [http://escholarship.org/uc/imbs\\_socdyn](http://escholarship.org/uc/imbs_socdyn)



### III. GRADUATE TRAINING

#### A. Ph.D. Students

Louis Narens is the Director of the MBS graduate program. Others on the graduate committee who assist Professor Narens are Professors Marek Kaminski and Michael McBride. Working with the faculty of the Institute are 13 Ph.D. students, of whom 5 graduated this academic year.

The following is our current roster of students enrolled in the Ph.D. program in Mathematical Behavioral Sciences during the current academic year. They are listed in Appendix F.

\*Kalin Agrawal  
Steven Doubleday  
\*Robert Forbes  
\*Giorgio Gosti  
Nancy Gonzalez  
Santiago Guisasola  
Lisa Guo  
\*Rolf Johnson  
William Leibzon  
Tom McIntee  
Bahattin (Tolga) Oztan  
\*Heidi Tucholski  
Dan Wolf

\*graduated in 2013-2014

#### B. Graduate Activities

This past year the IMBS graduate students organized student meetings with weekly colloquia speakers. This gives students an opportunity to interact and network with professors. One of the goals is to gain insight into how students perceive IMBS and how to facilitate more involvement of the social science student body.

#### C. Weekly Research Presentations

This IMBS activity was coordinated by Stergios Skaperdas and Jean-Paul Carvalho and directed by graduate student and IMBS participant Michael Sacks. Weekly research meetings give space for graduate students and faculty to gather on Fridays from Noon- 1:00 p.m. in the Luce Conference Room to introduce research they are working on. The presentations are followed by discussion periods afterwards. Below is the list of the presentations for the year:

October 1	Michael Sacks, Economics	“The Economics of Open Source and Proprietary Software: A Dynamic Approach”
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October 25	Blake Allison, joint work with Mike McBride, Jenny Swift, and George Tita, Political Science	“gang formation within a social network”
November 8	Jerod Anderson, joint work Blake Allison and Michael Sacks, Economics	“Evolutionary Markets”
November 15	Steve Doubleday, MBS	“Simulating the Market for Protection”
November 22	Justin Bruner, LPS	“Evolution, Emotion and Strong Negative Reciprocity”
December 6	Lisa Guo, MBS	“Modeling Riskless Choice in Dual Process Decision-making”
January 17	Kimberly Jameson and Louis Narens, IMBS	“Game Theory and the Social-Psychological Evolution of Categorization”
January 31	Michael Sacks, Economics	“The Plural of Linux: Forks and Offshoots in Open Source Software”
February 7	Justin Bruner, LPS	“The problem of instantaneously biased agents”
February 14	Seungkyu K. Lee, Economics	“A cunning strategy to blunt competition: Specialty credit cards (in progress)”
March 7	Si-Yuan Kong and Amine Mahmassani, Economics	“Drive Responses to Variable Message Signs After a Traffic Incident”
April 4	Michael Sacks, Economics	“In the Club: Strategic Admission, Membership, Loss, and Splitting”
April 11	Steve Doubleday, MBS	“Problem-solving as simulation”
April 25	William Liebzon, MBS	“Modeling Competitive Beliefs on a Social Network”
May 9	Mark Bloxson, Economics	“A Game Theoretic Analysis of Absolute and Relative Grading Schemes”
May 16	Dan Wolf, MBS	“Ringlemann Effects in Language: Propagation Speed and Size”
May 30	Mike Caldara, Economics	“Time as Money: Contribution Based Assignment Auctions”

## **D. IMBS Graduate Student Conference**

IMBS sponsors a yearly graduate student conference where students in the MBS program, as well as other students whose research interests are related to MBS, present their research. The graduate organizers were Santiago Guisasola, Tomas McIntee, and Michael Sacks. The 12<sup>th</sup> Annual Graduate Student Conference was named this year in honor and memory of IMBS Founding Director Duncan Luce. This year's presentations are listed below:

### **2014 IMBS Luce Graduate Student Conference**

9:00 *Opening remarks*

#### **Session I: From Ecology to Economy**

*Session Chair: Tomas McIntee*

9:20 Jen Briner, Ecology & Evolutionary Biology

"The more, the merrier: the presence and amount of concolonial brood affect collective choice in Temnothorax colonies"

9:50 Hannah Rubin, Logic & Philosophy of Science

"Hardy-Weinberg Dynamics and the Evolution of Altruism"

10:20 *Mid-session break*

10:30 Tyler Boston, Economics

"A Common Pool Resource Dilemma with Private Technology Adoption"

11:00 Patrick Button, Economics

"Can Motion Picture Production Incentives Create a Local Film Industry?"

11:30-12:30 *Lunch*

#### **Session II: Political Models**

*Session Chair: Santiago Guisasola*

12:40 Michael Sacks, Economics

"In the Club: Strategic Admission, Membership, and the Endogenous Splitting of Clubs"

1:10 Andrew Colopy, Political Science

"Survival of Regimes in the Modern Era"

1:40 Tomas McIntee, IMBS

"On the Likelihood of Unusual Election Results"

2:10 *Inter-session break*

#### **Session III: Simulation, from Languages to Individuals**

*Session Chair: Michael Sacks*

2:20 Dan Wolf, IMBS

"Ringelmann Effects in Language: Propagation Speed and Size"

2:50 Steve Doubleday, IMBS

"Simulation in Problem-Solving (Languages)"

3:20 *Mid-session break*

3:30 Lisa Guo, IMBS

"An investigation of time pressure on framing effects in risky choice"

4:00 Michael Nunez, Cognitive Sciences

"Integrating EEG with Cognitive Modeling to Explain Individual Differences in Perceptual Decision Making"

4:30 William Leibzon, IMBS

"Competitive Information Transmission on Abstract Social Networks"

5:00 *Closing remarks*

### **E. Jean-Claude Falmagne Dissertation Award**

Each year, the IMBS offers the "Jean-Claude Falmagne dissertation award" to a graduate student for the best dissertation that uses mathematics to develop conceptual advances for issues coming from the social and behavioral sciences. Going beyond the use of mathematics for computational purposes, the intent is to award a dissertation that uses concepts from mathematics to reach new conclusions. The prize is \$1,500. Last year the committee presented co-awards to Daniel Jessie, MBS, for his dissertation "Applied Algebraic Systems: New Tools for the Social Sciences" and Ryan Kendall, Economics, for his dissertation, "Behavioral Models of Competition: A Theoretical, Empirical, and Experimental Analysis".

This year Heidi Tucholski, a 2014 graduate of MBS, received the award for her dissertation, "Incentivized Decisions in the U.S. Air Force: Stepping Back to look at the Big Picture".

**CONGRATULATIONS!**



#### IV. COMMUNICATION

##### A. IMBS Conferences

The director's statement expanded on the areas of interest for this year's research conferences. We are providing the following conference agendas to give a more in-depth look at the scope of our presentations.

**UCI Institute for Mathematical Behavioral Sciences**  
***Conference on New Mathematical Approaches***  
***In the Behavioral Sciences***  
**December 2 & 3, 2013**  
**Social Science Plaza A, Duncan Luce Room 2112**

#### **Monday, December 2**

10:00–10:15 a.m.	Opening Remarks– Don Saari Director, IMBS
10:15–11:15 a.m.	Ehtibar Dzhafarov, Purdue University <a href="#"><i>“Contextuality-by-Default, from Psychology to Quantum Physics”</i></a>
11:15–11:30 a.m.	Break
11:30–12:30 p.m.	Jennifer Trueblood, UC Irvine <a href="#"><i>“A Quantum Probability Approach to Causal Reasoning”</i></a>
12:30–2:30 p.m.	Break for lunch
2:30–3:30 p.m.	Bill Batchelder, UC Irvine <a href="#"><i>“Evolving Dominance Hierarchies and Naming Conventions”</i></a>
3:30–3:45 p.m.	Break
3:45–4:45 p.m.	Brian Skyrms, UC Irvine <a href="#"><i>“Some Dynamics of Signaling Games”</i></a>
4:45–5:00 p.m.	Remarks
5:00 p.m.	Adjourn for the day

#### **Tuesday, December 3**

10:00–10:15 a.m.	Morning Remarks
10:15–11:15 a.m.	Jay Myung, Ohio State <a href="#"><i>“Optimal Decision Stimuli for Risky Choice Experiments: An Adaptive Approach”</i></a>
11:15–11:30 a.m.	Break
11:30–12:30 p.m.	Hans Colonius, Universitaet Oldenburg <a href="#"><i>“Universal Fechnerian Scaling: Theory and Applications”</i></a>
12:30–2:00 p.m.	Break for lunch
2:00–3:00 p.m.	Natalia Komarova and Kimberly Jameson, UC Irvine <a href="#"><i>“New formal methods for analyzing conceptual representation of continuous domains”</i></a>
3:00–3:15 p.m.	Break
3:15–4:15 p.m.	Don Saari, UC Irvine <a href="#"><i>“From topology to faces”</i></a>
4:15–5:15 p.m.	Louis Narens, UC Irvine <a href="#"><i>“New event spaces for psychological experimentation”</i></a>
5:15–5:30 p.m.	Ending Remarks

1. *Of special interest to our readers*

This particular conference is an unusual one; it was funded by the US State Department, partly coordinated by NAS, and involved a delegation of distinguished Iranian mathematicians.

**Mathematics Education Program**  
**Monday, January 27 – Wednesday, January 29, 2014**  
**University of California, Irvine, Beckman Center**

**Day One: Monday, January 27**

8:45 – 8:50 a.m.	Donald G. Saari Distinguished Professor: Mathematics and Economics, University of California, Irvine, NAS member	Opening and Introductions
8:50 – 9:15 a.m.	Michael V. Drake, M.D. Chancellor, University of California, Irvine  Megerdich Toomanian Delegation Head; Iranian Academy of Sciences	Welcome
9:15 – 9:45 a.m.	Professor Megerdich Toomanian Professor of Mathematics Azad University- Karaj Branch	Continuity creates topology
9:45 – 10:15 a.m.	Donald G. Saari Distinguished Professor: Mathematics and Economics, University of California, Irvine, NAS member	Using continuity and topology to model human behavior
10:15 – 10:30 a.m.	Break	
10:30 – 11:00 a.m.	Professor Madjid Mirzavaziri Professor of Mathematics, Ferdowsi University of Mashad	A mathematical style in fictions
11:00 – 11:30 p.m.	Professor Ebrahim Reyhani Assistant Professor of Mathematics Shahid Rajaee Teacher Training University	Problem solving and problem posing in mathematics education
11:30 – 12:00 p.m.	Dr. Nasim Asghary Assistant Professor of Mathematics Education, Azad University- Central Tehran Branch	Early algebraic thinking
12:00 – 1:30 p.m.	Lunch	
1:30 – 2:00 p.m.	Dr. Ghorbanali Haghghatdoost Bonab President, University of Bonab	Teaching of mathematics in high schools- position of mathematics, goals, programs, methods and teacher training
2:00 – 2:30 p.m.	Diane Briars President-Elect, National Council of Teachers of Mathematics	Creating and selecting mathematics textbooks that support effective teaching and student learning
2:30 - 3:00 p.m.	Greg Duncan School of Education, University of California, Irvine, NAS member	Good in math, good in life
3:00 – 3:10 p.m.	Discussion	
3:10 – 3:25 p.m.	Break	
3:30 – 4:00 p.m.	Dr. Reza Heidari Ghezaljah Ministry of Education	Dynamic mathematics software and mathematical modeling in high school level
4:00 – 5:00 p.m.	Robert Devaney President, Math Association of America Professor of Mathematics and Statistics, Boston University	The Fractal Geometry of the Mandelbrot Set

**Mathematics Education Program**  
**Monday, January 27 – Wednesday, January 29, 2014**  
**University of California, Irvine, Beckman Center**

**Day Two: Tuesday, January 28**

8:45 – 9:00 a.m.	Deborah Vandell Dean, School of Education University of California, Irvine	Welcome
9:00– 9:30 a.m.	Dr. Rashid Zaare Nahandi Associate Professor, Institute for Advanced Studies in Basic Sciences	Mathematics competitions for university students in Iran
9:30 – 10:00 a.m.	Michael Jones Editor Mathematics Magazine Assoc. Editor, Math Reviews	Opportunities for Pre-College Students: Circles, Competitions, Fairs, and Longer Programs
10:00 – 10:30 a.m.	Dr. Arash Rastegar Assistant Professor of Mathematical Sciences, Sharif University of Technology	Mathematics education and cognition types
10:30 – 10:45 a.m.	Break	
10:45 – 11:15 a.m.	Deanna Haunsperger Chair, Math Dept., Carleton College Past MAA Vice President	Building supportive communities in mathematics
11:15 – 11:45 a.m.	Dr. Amir Hossein Asghari Assistant Professor of Mathematics Education, Shahid Beheshti University	The use of historical comic strips to engage students in mathematics and to help them to appreciate mathematics as a human endeavor
11:45 – 12:15 p.m.	Dr. Abolfazl Rafiepour Assistant Professor of Mathematics Education, Shahid Bahonar University of Kerman	Modeling and application in Iranian mathematics education community: research and practice
12:15 – 1:30 p.m.	Lunch	
1:30 – 2:00 p.m.	Simon Levin George M. Moffett Professor of Biology Princeton University, NAS member	Modeling of infectious diseases
2:00 – 2:30 p.m.	Dr. Abdolaziz Abdollahi Professor of Mathematics, Shiraz University	How to teach matrices in information technology era
2:30 – 3:00 p.m.	Sarah Eichhorn Associate Dean of Distance Learning, Department of Mathematics, University of California, Irvine	Preparing students for STEM Gateway course success: Low-cost, scalable, online solutions for remediating students
3:00 – 3:15 p.m.	Break	
3:15 – 3:45 p.m.	Dr. Masoud Ariannejad Associate Professor of Mathematics University of Zanjan	The necessity of philosophical approaches in teaching advanced pure mathematics
3:45 – 4:15 p.m.	Dr. Soheila Gholamazad Assistant Professor, Department of Mathematics, Science and Technology Research Institution for Education, Ministry of Education	Exploring mathematical proof through self-dialogue
4:15 – 4:45 p.m.	Dr. Kasra Alishahy Assistant Professor of Mathematics Shiraz University of Technology	Using the Element of Surprise in Teaching Probability
4:45 – 5:00 p.m.	Discussion	

**Mathematics Education Program**  
**Monday, January 27 – Wednesday, January 29, 2014**  
**University of California, Irvine, Beckman Center**

**Day Three: Wednesday, January 29**

8:45 – 9:00 a.m.	Kenneth Janda Dean of Physical Sciences, University of California, Irvine	Welcome
9:00 – 9:30 a.m.	Dr. Mani Rezaie Assistant Professor of Mathematics Education Shahid Beheshti University	The nature of combinatorial thinking
9:30 – 10:00 a.m.	Jean-Claude Falmagne Research Professor of Cognitive Sciences University of California, Irvine	Learning Spaces: the mathematical foundation of the ALEKS system
10:00 – 10:15 a.m.	Break	
10:15 – 10:45 a.m.	Dr. Harold Baker, Director, Customer Support, ALEKS	Demonstration of ALEKS
10:45 – 11:00 a.m.	Discussion	
11:00 – 12:30 p.m.	Representative: International Visitor Leadership Program	Final Administrative Details; Evaluation of Mathematics Education Program
12:30 – 1:30 p.m.	Lunch and Adjournment	



*Mini-Conference:*  
**Reliable Signaling!**  
Thursday, January 30, 2014  
2:00 p.m. – 6:00 p.m.  
SSPA 2112

*Jointly sponsored by IMBS, LPS and the School of  
Social Sciences Dean's Office*

2:00 p.m. Introduction by Don Saari and Brian Skyrms

2:05 p.m. Andreas Blume, Department of Economics,  
University of Arizona  
*"High-Order Uncertainty About Language"*

3:15 p.m. Break

3:30 p.m. Jorge Pacheco, Department of Mathematics,  
University of Minho (Portugal), & ATP-Group,  
CMAF & CBMA, Institute for Interdisciplinary  
Investigation (Portugal)  
*"The Evolution of Quorum Signaling"*

5:00 p.m. Reception, SSPA 2142

IMBS Conference on Meaningfulness and Learning Spaces  
 A Tribute to the Work of Jean-Claude Falmagne  
 February 27 & 28, 2014  
 Social Science Plaza A, Duncan Luce Conference Room

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**Thursday, February 27**

<b>Time</b>	<b>Speaker Name</b>	<b>Title</b>
9:30 – 9:45 a.m.	Don Saari, UC Irvine	Opening Remarks and Welcome
9:45 – 10:45 a.m.	Louis Narens, UC Irvine	"Meaningfulness and the Possible Psychophysical Laws Revisited"
10:45 – 11:00 a.m.	Break	
11:00 – 12 noon	Fred Roberts, Rutgers University	"Meaningless Statements in Epidemiology"
12:00 – 1:30 p.m.	Speaker Lunch	
1:30 – 1:45 p.m.	Biff Baker, ALEKS Corporation	"J.-Cl. Falmagne and ALEKS"
1:45 – 2:45 p.m.	Jean-Claude Falmagne, UC Irvine	"Deriving meaningful scientific laws from abstract, "gedanken" type, axioms: three examples"
2:45 – 3:45 p.m.	David Eppstein, UC Irvine	"Structures in solution spaces: three lessons from Jean-Claude"
3:45 – 4:00 p.m.	Break	
4:00 – 5:00 p.m.	Ragnar Steingrimsson, UC Irvine	"Theoretical and practical application of measurement theory: Relating some of J.-Cl. Falmagne's contributions to challenges in contemporary psychology"
5:00 p.m.	Adjourn for the day	

**Friday, February 28**

9:30 a.m.	Morning Remarks	
9:45 – 10:45 a.m.	Geoff Iverson, UC Irvine	"Jean-Claude Falmagne's Remarkable Career: The Psychophysics Years, 1972-1982"
10:45 – 11:00 a.m.	Break	
11:00 – 12 noon	Virginia Richards, UC Irvine	"Auditory Psychophysics"
12:00 – 1:30p.m.	Speaker Lunch	
1:30 – 2:30 p.m.	Jean-Paul Doignon, Universite Libre de Bruxelles	"Polytopes in mathematical psychology"
2:30 – 3:30 p.m.	Michel Regenwetter, University of Illinois At Urbana-Champaign	"Random Utility and Probabilistic Choice"
3:30 – 3:45 p.m.	Break	
3:45 – 4:45 p.m.	George Sperling, UC Irvine	"Formally defining and describing the mechanisms of attention"
4:45- 5:00 p.m.	Discussion	
5:00 p.m.	Conference Ends	

INSTITUTE FOR MATHEMATICAL AND BEHAVIORAL SCIENCES  
*“WORKSHOP ON SOCIAL CHOICE AND LAW”*  
 SSPA 2112, DUNCAN LUCE CONFERENCE ROOM  
 March 14, 1:00 – 5:00 p.m. & March 15, 9:30 a.m. – 5:00 p.m.

**Friday, March 14, 2014**

11:30 am to 1:00 pm	Speaker's Lunch
1:00 pm to 1:15 pm	Welcome, Don Saari, UC Irvine
1:15 pm to 1:45 pm	Linda Cohen, UC Irvine, "Initial Thoughts About Connecting Social Choice and Law"
1:45 pm to 2:45 pm	Max Stearns, University of Maryland, "A Gentle Madness: Social Choice and Public Law"
2:45 pm to 3:05 pm	Discussion
3:05 pm to 3:20 pm	Break
3:20 pm to 4:20 pm	Charlie Plott, Caltech, "Committee Karate: Designing Procedures to Influence Decisions"
4:20 pm to 5:00pm	Discussion
5:00 pm	Adjourn for the day

**Saturday, March 15, 2014**

9:30 am to 9:45 am	Morning remarks
9:45 am to 10:45 am	Leo Katz, Penn Law, "Why Law Breeds Cycles"
10:45 am to 11:05 am	Discussion
11:05 am to 12:05 pm	Don Saari, UC Irvine, "The Source of all those Problems & Paradoxes in Social Choices"
12:05 pm to 12:25 pm	Discussion
12:25 pm to 1:45 pm	Lunch
1:45 pm to 2:45 pm	Bruce Chapman, University of Toronto, "Making an Issue of It: Rational Social Choice and Deliberative Exchange"
2:45 pm to 3:05 pm	Discussion
3:05 pm to 3:20 pm	Break
3:20 pm to 4:20 pm	Chris Chambers, UC San Diego "Gerrymandering"
4:20 pm to 4:40 pm	Discussion
4:40 pm to 5:00 pm	Workshop Conclusions and Adjournment

The XVI Southwest Economic Theory Conference  
UC Irvine, March 21-22, 2014  
SSPA 2112 Luce Conference Room

FRIDAY, March 21

- i) Session I: 9-10:30am
  - [“Bargaining under Strategic Uncertainty”](#) by A. Friedenber (Arizona State University)
  - [“Do Players Prefer to Bargain Noncooperatively in the Shadow of Conflict?”](#) By Blake Allison (UCI)
  - [“A Unification of Solutions To the Bargaining Problem”](#) by C. J. Haake and Cheng-Zhong Qin (UC Santa Barbara)
- ii) Session II: 10:45am-12:15pm
  - [“First-Price Auctions with Speculative Resale: Equilibrium and Optimal Revenue:”](#) by H. Cheng and G. Tan (USC)
  - [“Pay-As-Bid: Selling Divisible Goods to Informed Bidders”](#) by M. Pycia and Kyle Woodward (UCLA)
  - [“Efficient Bilateral Trade”](#) by R. Garratt (UCSB) and M. Pycia
- iii) Lunch: 12:15 -1:30pm
- iv) Session III: 1:30-3:00pm
  - [“Self-Enforcing Coalitions with Power Accumulation”](#), Karl Jandoc and Ruben Juarez (U of Hawaii)
  - [“Persuading Voters”](#) by R. Alonso and O. Camara (USC)
  - [“One-to-One Matching with Continuum Agreements: The Effects of Effort on Dating and Marriage”](#) by James Fisher (U of Arizona)
- v) Session IV: 3:15-4:45pm
  - [“Revenue Neutral Assignment Auctions: An Experiment”](#) by M. Caldara (UCI) and D. Porter (Chapman University)
  - [“Belief in Mean Reversion and the Disposition Effect”](#) by P. Jiao (Claremont Graduate University)
  - [“Large Capitalization ETF Style Rotation Using Entropy Measures of the VIX Bubbles”](#) by L. Efremidze (Pepperdine University), G. Sarraf, K. Miotto, and P. Zak
  -
- vi) Dinner: 5:30pm -8pm, UCI University Club

SATURDAY, March 22

- i) Session I: 9:00am-10:30pm
  - [“Partition-Dependent Ambiguity and Risk”](#) by I. Kopylov (UCI)
  - [“Value Computation and Value Modulation: A Dual-Process Theory of Self-Control”](#), by **Isabelle Brocas** and J.D. Carrillo (USC)
  - [“The Perception Adjusted Luce Model”](#) by F. Echenique, K. Saito, and **Gerelt Tserenjigmid** (Caltech)
- ii) Session II: 10:45am-12:15pm
  - [“Recognition for Sale”](#) by Nageeb Ali (UCSD)
  - [“Dynamic Network Formation with Incomplete Information”](#) by **Y. Song** (UCLA) and M. van der Schaar
  - [“Mechanism Design for an Ignorant Planner: Universal anking Experts by an Ignorant Planner: Universal Mechanisms, Logarithmic Payoffs and Implementation”](#) by **J. Cvitanic** (Caltech), D. Prelec, S. Radas, and H. Sikic
- iii) Lunch: 12:15 -1:30pm
- iv) Plenary Talk: “Sticky Prices” by Bill Zame(UCLA) 1:30-2:30pm
- v) Session III: 2:45pm-4:15pm
  - [“A Reputation Theory of Firm Dynamics”](#) by **Simon Board** (UCLA) and Moritz Meyer-ter-Vern
  - [“Education as Unemployment Insurance: A Model with Endogenous Educational Requirement for Job Application and Its Policy Implications”](#) by D. Liu (UCR)
  - [“Competition for Imperfectly Informed Customers”](#), James Fisher and **Asaf Plan** (U of Arizona)

## **B. Conferences/Seminars organized by IMBS Members**

### **Pierre Baldi**

Co-Chair, “5th ACM Conference on Bioinformatics,” Computational Biology and Health Informatics (ACM BCB) ACM BCB, Newport Beach, CA, September 2014.

Organizer, Bioinformatics Summer School, Heidelberg, Germany, 2013

### **Carter Butts**

Co-organizer and instructor, “2014 Statnet Workshops,” held in conjunction with Sunbelt 2014, St. Pete's Beach, FL. February 2014.

I ran a four-day lab rotation workshop for students in the Chemistry and Materials Physics (ChaMP) program. This entailed hands-on training in the use of Ising models, exponential family random graph models (ERGMs), and Markov chain Monte Carlo methods. Exercises included simulating the impact of alternative material structures on the properties of ferromagnets, fitting

and simulating ERGMs for social and other networks, and using ERGMs to model hydrogen bond networks in liquid water, UCI, September 2013.

### **Amihai Glazer**

I organized the tenth Irvine/Japan Conference in public economics. Papers from that conference are forthcoming in a book: Toshihiro Ichori and Kimiko Terai, eds., *The Political Economy of Fiscal Consolidation in Japan*. Tokyo: Springer. The web site for the book is <http://www.springer.com/economics/public+finance/book/978-4-431-55126-3>

### **L. Robin Keller**

Appointed Session Chair for Research Incubator session, and steering committee member at the “Advances in Decision Analysis Conference,” sponsored by the Decision Analysis Society of INFORMS, Georgetown University, June 2014.

### **Igor Kopylov**

Session Chair, “Foundations of Utility and Risk Conference,” University of Rotterdam, 2014.

Organizer, “Southwest Economic Theory Conference,” UCI, March 2014.

### **Simon Levin**

Co-organizer, “Workshop on Discounting and Evaluation of Environmental Policies,” Istituto Veneto di Scienze, Lettere ed Arti, Venice, Italy, June 2014.

Co-organizer, Chairperson of Session 2, “Workshop on Climate Change and Public Goods,” Fondazione Eni Enrico Mattei, Venice, Italy, June 2014.

Co-organizer, “Social-Ecological Complexity and Adaptation in Marine Systems (NSF: Coupled Natural-Human Systems Grant) Meeting/Workshop,” Princeton University, April 2014.

Co-organizer, “MASpread Workshop,” Princeton University, March 2014.

Organizer, “Coordination and Collective Decision Making,” (Army Research Office) Grant Project Review Meeting/Workshop, Princeton University, November 2013.

Co-organizer, “Gateways to Emergent Behavior in Science and Society: An ICAM/SFI Workshop,” Sante Fe, NM, September 2013.

### **Penelope Maddy**

Co-organizer, “Mathematical Depth,” with J. Weatherall, S. Walsh, and J. Heis, Department of Logic and Philosophy of Science, UCI, April 2014.

**Dale Poirier**

Co-organizer with Ivan Jeliazkov, "Advances in Econometrics," Volume on Bayesian model comparison, UCI, February 22-23, 2014.

**Don Saari**

Co-organizer with V. Roychowdhury, "Mathematics of Politics," Institute for Pure and Applied Mathematics, UCLA, April 2014.

Organizer, "Social Choice and Law," IMBS, March 2014.

With suggestions from several, "Meaningfulness and Learning Spaces," IMBS, February 2014.

Organizer, "Mathematics Education Program" in Iran and in the United States. Sponsored by US State Department and NAS, Beckman Center, UCI, January 2014.

With L. Narens and W. Batchelder, "New Mathematical Approaches in the Behavioral Sciences," IMBS, December 2013.

Co-organizer with D. Pines, UCD, J. Holland, U. Mich., and S. Levin, Princeton, "Gateways to Emergent Behavior in Science & Society," Santa Fe Institute, September 2013.

**Ken Small**

Annual conference organized by the International Transportation Economics Association, of which K. Small is president: Kuhmo Nectar conference on Transportation Economics: Northwestern University, July 2013.

**Joachim Vanderkerckhove**

Organizer, "Recent Advances in Bayesian Inference Workshop," UCI, March 2014.

With J. Krichmar and R. Srinivasan, "First Irvine Workshop on Cognitive Neuromodeling: Interfacing Models with Brain Signals to Investigate Cognition," UCI, November 2013.

**James Weatherall**

"Category Theoretic Foundations of Mathematics," with P. Maddy and S. Walsh, Department of Logic and Philosophy of Science, UCI, May 2013.

"Irvine-Pittsburgh-Princeton Conference on Mathematical and Conceptual Foundations of Physics," with H. Halvorson, M. Miller, and G. Valente, University of Pittsburgh, April 2013.

“Relativistic Causality between Quantum Field Theory and General Relativity,” with J. Earman and G. Valente, Center for Philosophy of Science, University of Pittsburgh, April 2013.

“Mathematical Depth,” with P. Maddy, S. Walsh, and J. Heis, Department of Logic and Philosophy of Science, UCI, April 2014.

“Gauge Theory,” with J. Barrett, H. Halvorson, and G. Valente, Department of Logic and Philosophy of Science, UCI, March 2014.

“Second Annual Irvine-Pittsburgh-Princeton Conference on the Mathematical and Conceptual Foundations of Physics,” with J. Barrett, H. Halvorson, and G. Valente, UCI, Irvine, March 2013.

### **Jennifer Trueblood**

Co-organizer, full-day tutorial, “Quantum Models of Cognition and Decision” The 36th Annual Conference of the Cognitive Science Society, Quebec City, Canada, July 2014.

### **Hongkai Zhao**

Organizer, “International Workshop on Multiscale Modeling and Simulation,” in honor of 60th birthday of Russell Caflisch, IPAM, UCLA, April 2014.

## **C. Visitors**

IMBS hosted Princeton Professor Simon Levin, Moffett Professor of Biology, Princeton University during the academic year. His activities letter can be found in Appendix G.

Next year the Institute will again sponsor the visit of Professor Levin. In addition, researcher Tim Satalich will continue work with Professor Kim Romney, Alissa Winkler will continue work with Project Scientist Kimberly Jameson, and Robert Forbes will continue work with Professor Louis Narens.

## **D. IMBS Colloquia Series**

During the academic year the Institute conducts a weekly colloquia series with speakers from both inside as well as outside the Institute. For speakers outside California, we attempt, insofar as possible, to coordinate their visit with other travel to California and to co-sponsor joint talks with other research units. We distribute a relevant paper, when available, prior to each colloquium. Most papers are also downloadable from the IMBS web site at [http://www.imbs.uci.edu/imbs\\_colloquia](http://www.imbs.uci.edu/imbs_colloquia).

The following talks were presented in the IMBS Luce Conference Room during the 2013-2014 academic year:



**OCTOBER 10**

**JAMES MONTGOMERY**

**Department of Sociology  
University of Wisconsin-Madison**

**“An Age-Structured Two-Sex Population Model with Endogenous Forces of Attraction”**

**OCTOBER 17**

**CHARLIE CHUBB, PENG SUN, TED WRIGHT, GEORGE SPERLING**

**Department of Cognitive Sciences  
University of California, Irvine**

**“Filter Processes in Human Visual Attention: Methods, Measurements, Theory”**

**OCTOBER 31**

**JAN BRUECKNER**

**Department of Economics  
University of California, Irvine**

**“Negative Campaigning in a Probabilistic Voting Model”**

**NOVEMBER 4 (Joint with Econometrics)**

**NOBEL LAUREATE IN ECONOMICS: DANIEL MCFADDEN**

**E. Morris Cox Professor of Economics  
University of California, Berkeley**

**“The New Science of Pleasure: Consumer Choice Behavior and the Measurement of Well-Being”**

**NOVEMBER 7**

**MARK MACHINA**

**Department of Economics  
University of California, San Diego**

**“Ambiguity Aversion with Three or More Outcomes”**

**NOVEMBER 14**

**HONGKAI ZHAO**

**Department of Mathematics  
University of California, Irvine**

**“See through point clouds in 3D and higher”**

**NOVEMBER 21**

**LISA PEARL**

**Department of Cognitive Sciences  
University of California, Irvine**

**“More learnable than thou? Empirically testing linguistic knowledge representations”**

**DECEMBER 5**  
**JEAN-PAUL CARVALHO**  
Department of Economics  
University of California, Irvine  
“Coordination and Culture”

**JANUARY 16**  
**ERIC-JAN WAGENMAKERS**  
Department of Psychology  
University of Amsterdam  
“A Bayesian perspective on the “crisis of confidence” in psychological science”

**JANUARY 23**  
**SIMON LEVIN**  
Department of Ecology & Evolutionary Biology  
Princeton University  
“Exploration as investment in the future”

**JANUARY 30**  
**ANDREAS BLUME**  
Department of Economics  
University of Arizona  
“High-Order Uncertainty About Language”

**FEBRUARY 6**  
**ERIK SNOWBERG**  
Division of the Humanities and Social Sciences  
California Institute of Technology  
“Overconfidence in Political Behavior”

**FEBRUARY 13**  
**MARTY GOLUBITSKY**  
Mathematical Biosciences Institute  
Ohio State University  
“Patterns of Synchrony: From Animal Gaits to Binocular Rivalry”

**FEBRUARY 20**  
**MICHAEL MCBRIDE**  
Department of Economics  
University of California, Irvine  
“An Experimental Study of Network Formation with Limited Observation”

**APRIL 3**  
**MARTIN EVERETT**  
University of Manchester  
“Social Networks Containing Negative Ties”

**APRIL 10**  
**LINDA COHEN**  
UC Irvine  
“Forward Markets to Spur Innovations”

**APRIL 17**  
**PATRICIA CHENG**  
UCLA  
“Nature’s Wisdom: Why Causal Discovery in Preschoolers can Inform Scientific Causal Inference”

**MAY 1**  
**TOM BEVER**  
University of Arizona  
“Fibonacci, The Golden Mean, and Natural Law in Vision (and Language)”  
Co-sponsored by the Dept. of Cognitive Sciences and Center for Language

**MAY 8**  
**ROJA BANDARI**  
UCLA  
“Political Dynamics in Large Scale Web Data Sets: A Study of Content-Oriented Behavior”

**MAY 22**  
**STEPHANE HESS**  
University of Leeds  
“A mixed random utility – random regret model linking the choice of decision rule to latent character traits”  
Co-sponsored with Econometrics

**MAY 29**  
**JERRY FELDMAN**  
UC Berkeley  
“Unified Cognitive Science and ICSI/UCB Neural Theory of Language Project”  
Co-sponsored with Center for Language Science

V. BUDGET

A. Appropriations and Expenditures

**Appropriations:**

IMBS 2013-14 Budget allocation	\$ 83,282.00
IMBS 2012 Carry Forward	\$ 22,226.00
Visitor Allocation	\$ 17,000.00
<b>Total budget for 2013-14:</b>	<b><u>\$122,508.00</u></b>

**Expenditures:**

Salaries (Director, Staff, Visitor)	\$ 60,885.00
School Administrative Support	\$ 7,500.00
Conference/Colloquia	\$ 26,904.00
Equipment	\$ 2,572.00
Supplies & Expenses	\$ 3,740.00
Graduate Student Support	\$ 16,484.00
<b><u>Total Expenditures:</u></b>	<b><u>\$118,085.00</u></b>

***Carry Forward:***      \$4,423.00

**2014-15 Encumbrances:**      **\$11,250.00 Graduate Student Support**

**B. Extramural Funding Activity**

**GRANTS AWARDED AND ACTIVE:**

IMBS faculty research was supported by research grants totaling \$48,631,458 with pending grants totaling \$2,070,443. The following is a detailed breakdown of the extramural funding:

**Pierre Baldi**

Source of Support: NIH  
Amount: \$15,401.00  
Award Period: 2012-2014  
Role: Investigator

Source of Support: NIH  
Amount: \$10,000.00  
Award Period: 2012-2017  
Role: Investigator

Source of Support: CHOC  
Amount: \$169,858.00  
Award Period: 2013-2014  
Role: PI

Source of Support: NIH  
Amount: \$251,949.00  
Award Period: 2013-2014  
Role: Investigator

Source of Support: NIH  
Amount: \$17,448.00  
Award Period: 2013-2018  
Role: Investigator

Source of Support: NIH  
Amount: \$15,350.00  
Award Period: 2013-2014  
Role: Investigator

**William H. Batchelder**

Source of Support: Oak Ridge Institute for Science and Education (ORISE)  
Amount: \$75,000.00  
Award Period: 7/13-8/14

Title: Fellowship Award

Source of Support: Army Research Office

Amount: \$355,000.00

Award Period: 7/10 – 8/13

Title: Statistical Inference for Cultural Consensus Theory

### **Carter Butts**

Source of Support: NSF

Amount: \$15,140.00

Award Period: 2013-2014

Title: Dynamic Network Models for Scalable Analysis of Networks with Missing Sampled Joint Edge/Vertex Evolution

Role: PI

Source of Support: NSF

Amount: \$746,783.00

Award Period: 9/1/2013-8/30/2016

Title: BIGDATA: Small DA DCM: Measurement and Learning in Large-Scaled Social Networks

Role: Co-PI

Source of Support: NIH NIDA

Amount: \$402,820.00

Award Period: 6/2012-5/2015

Title: Cascades of Network Structure and Function: Pathways to Adolescent Substance Use

Role: Co-Investigator

Source of Support: NIH NICHD

Amount: \$3,092,315.00

Award Period: 5/2011-4/2016

Title: Statistical Methods for Network Epidemiology

Role: Co- Investigator

Source of Support: NSF CMMI

Amount: \$404,948.00

Award Period: 10/2010-9/2014

Title: Collaborative Research: Informal Online Communication in Extreme Events

Role: PI

Source of Support: NSF

Amount: \$2,152,181.00

Award Period: 10/2010-9/2014

Title: CDI-Type II: Topology and Function in Computer, Social and Biological Networks

Role: Co-PI

Source of Support: NSF BCS Human Social Dynamics  
Amount: \$749,245.00  
Award Period: 10/2008-3/2014  
Title: DHB: Large-scale Spatially Embedded Interpersonal Networks: Measurement, Modeling, and Dynamics  
Role: PI

Source of Support: ONR  
Amount: \$5,381,300.00  
Award Period: 5/2008-5/2015  
Title: Scalable Methods for the Analysis of Network-based Data  
Role: Co-PI

### **Mike D’Zmura**

Source: Army Research Office  
Amount: \$4,100,000.00  
Award Period: 7/08-9/13  
Title: Silent Spatialized Communication among Dispersed Forces  
Role: PI

### **David Eppstein**

Source: NSF  
Amount: \$388,861.00  
Award Period: 2012-2015  
Title: Geometric Graph Algorithms  
Role: PI

### **Steve Frank**

Source: NSF  
Award Amount: \$270,000.00  
Award Period: 2013 – 2016  
Title: Models of Natural Selection, Development, and Life History

### **Simon Huttegger**

Source: NSF  
UC Irvine Award Amount: \$275,000.00  
Award Period: 2010 – 2014  
Title: Collaborative Research: Dynamic Perspectives on Costs and Conflict in Signaling Interactions.  
Role: Co-PI with Kevin Zollman (Carnegie Mellon) and Carl Bergstrom (U. Washington).

### **Kimberly Jameson**

Source: NSF

Award Amount: \$980,923.00

Award Period: 2014-2017

Title: IBSS: New methods for investigating the formation of individual and shared concepts and their dynamic dispersion across related societies

Role: K. A. Jameson (PI), N. Komarova (Co-PI), D. Wodarz (Co-PI), L. Narens (Co-PI)

### **Marek Kaminski**

Source: CSD

Award Amount: \$2,500.00

Award Period: Spring 2014

Title: Games and Institutions

Role: PI

Source: CSD

Award Amount: \$2,500.00

Award Period: Summer 2013

Title: How Strong Are Soccer Teams?

Role: PI

### **Natalia Komarova**

Source: NSF

Award Amount: \$980,923.00 (calculated with Jameson's award)

Award Period: 2014-2017

Title: IBSS: New methods for investigating the formation of individual and shared concepts and their dynamic dispersion across related societies

Role: K. A. Jameson (PI), N. Komarova (Co-PI), D. Wodarz (Co-PI), L. Narens (Co-PI)

### **Michael Lee**

Source: NSF

Award Amount: \$182,000.00

Award Period: 2013-2015

Title: Classifying categorization using state trace analysis and hierarchical Bayesian modeling

Role: Co-PI subcontract

### **Simon Levin**

Source: The Andrew W. Mellon Foundation

Total Award Amount: \$295,867.00



Total Award Period: 10/01/2008 – 09/30/2014  
Location of Project: Princeton University  
Title: Dynamics of South African Vegetation  
Role: PI

Source: NSF  
Total Award Amount: \$497,366.00  
Total Award Period: 01/01/11 – 12/31/2015  
Location of Project: Princeton University  
Title: Dimensions: Collaborative Research: Biological Controls on the Ocean C:N:P Ratios  
Title: Coordination and Collective Decision-Making  
Role: Co-PI with Adam Martiny (University of California, Irvine)

Source: Army Research Office  
Total Award Amount: \$360,000.00  
Total Award Period: 08/17/11 – 5/15/15  
Location of Project: Princeton University  
Role: Co-PI with Iain D. Couzin (Princeton University) and Naomi E. Leonard (Princeton University)

Source: NSF  
Total Award Amount: \$733,625.00  
Total Award Period: 09/01/2011 – 08/31/2015  
Location of Project: Princeton University  
Title: The Evolution of Incentives and Social Structure under Imperfect Information  
Role: PI (Postdoctoral researcher: Erol Akçay)

Source: Society for Conservation Biology/David H. Smith Conservation Research Fellowship Program  
Total Award Amount: \$185,678.00  
Total Award Period: 09/01/2011 – 08/31/2014  
Location of Project: Princeton University  
Title: Conservation in a Changing Climate: Predicting Range Shifts for Marine Spatial Planning  
Role: PI (Postdoctoral researcher: Malin Pinsky)

Source: Arizona State University/National Institutes of Health  
Total Award Amount: \$44,369.00  
Total Award Period: 09/15/2011 – 06/30/2015  
Location of Project: Princeton University  
Title: Modeling Anthropogenic Effects in the Spread of Infectious Diseases  
Role: Co-PI with Charles Perrings (Arizona State University)

Source: NSF  
Total Award Amount: \$1,498,902.00  
Total Award Period: 09/01/2012 – 08/31/2016

Location of Project: Princeton University  
Title: CNH: Social-Ecological Complexity and Adaptation in Marine Systems  
Role: PI (Postdoctoral researcher: James Watson)

Source: U.S. Department of Homeland Security  
Total Award Amount: \$675,553.00  
Total Award Period: 09/24/2012 – 09/23/2014  
Location of Project: Princeton University  
Title: Disease in Motion Integrating Epidemic and Social Dynamics in the Control of Infectious Agents  
Role: Co-PI with Bryan Grenfell (Princeton University)

Source: The John Templeton Foundation  
Total Award Amount: \$179,970.00  
Total Award Period: 10/01/2012 – 09/30/2014  
Title: Evolutionary Construction and Complexity  
Location of Project: Princeton University  
Role: PI

Source: NordForsk/ University of Oslo  
Total Award Amount: \$314,855.00  
Total Award Period: 01/01/2014 – 12/31/2016  
Title: Resource-Based Green Growth Under Climate Change: Ecological and Socio-Economic Constraints (ResGreen)  
Location of Project: Princeton University  
Role: PI of the subaward from University of Oslo

### **Michael McBride**

Source: Center for the Study of Democracy Seed Grant  
Award Amount: \$2,400.00  
Award Period: 2013  
Title: Property Rights and Litigation Conflict  
Role: PI, Skaperdas (Co-PI)

Source: Center for the Study of Democracy Small Grant  
Award Amount: \$1,075.00  
Award Period: 2014  
Title: Corruption: A Comparison of American and German Students  
Role: Principal Investigator, I. Kubbe (Co-Principal Investigator)

### **Louis Narens**

Source: NSF  
Award Amount: \$980,923.00 (calculated with Jameson's award)

Award Period: 2014-2017  
Title: IBSS: New methods for investigating the formation of individual and shared concepts and their dynamic dispersion across related societies  
Role: Co- PI, K. A. Jameson (PI), N. Komarova (Co-PI), D. Wodarz (Co-PI)

Source: AFOSR  
Award Amount: \$388,187.00  
Award Period: 12/12– 12/15  
Title: Modeling Behavioral and Decision Behavior through Systems of Observers  
Role: PI

### **Lisa Pearl**

Source: NSF  
UCI Award Amount: \$145,000.00  
Award Period: 2014-2016  
Title: Collaborative Research: An Integrated Theory of Syntactic Acquisition  
Role: Principal Investigator

Source: NIAAA  
Total Award Amount: \$3.1 million UC Irvine Amount: \$963,871  
Award Period: 2010-2015  
Title: Automating Behavioral Coding via Text-Mining and Speech Signal Processing  
Role: Co-Investigator

### **Padhraic Smyth**

Source: National Institute of Health  
Award Amount: \$953,952.00  
Award Period: 10/10 – 9/15  
Title: Automated behavioral coding via text mining and speech signal processing

Source: IARPA  
Award Amount: \$1,334,537.00  
Award Period: 4/11– 2/14  
Title: Statistical learning algorithms for text and network analysis

### **Hal Stern**

Source: NSF (ATM)  
Award Amount: \$626,243.00  
Award Period: 9/10-8/13  
Title: Representations and Time-varying Statistical Models for Climate Patterns  
Role: Co-PI with G. Magnusdottir and Y.Yu

Source: NIMH Conte Center  
Award Amount: \$10,000,000.00  
Award Period: 6/13-5/18  
Title: Fragmented Early Life Environment and Cognitive and Emotional Vulnerabilities  
Role: Co-PI and Head of Biostatistics Computation and Data Management Core, T Baram, PI)

### **Jennifer Trueblood**

Source: Levehulme Trust  
Award Amount: £98 ,962  
Award Period: 2013-2015  
Title: Quantum similarity: harnessing the flexibility of human similarity judgments  
Role: Co-PI with Emmanuel Pothos

### **Joachim Vandekerckhove**

Source: John Templeton Foundation  
Award Amount: \$540,018.00  
Award Period: 2014-2017  
Title: A formal modeling framework for the dynamics of subjective well-being  
Role: PI

Source: NSF Graduate Research Fellowship (Awarded to advisee Maime Guan)  
Award Amount: \$121,500.00  
Award Period: 2014-2017  
Title: Graduate Research Fellowship (Awarded to advisee Maime Guan)  
Role: Advisor

Source: NSF  
Award Amount: \$250,000.00  
Award Period: 2012-2015  
Title: Cognitive structural equation models  
Role: PI

### **James Weatherall**

Source: National Endowment for the Humanities, Big Questions Course Development Grant  
Award Amount: \$21,991.00  
Award Period: 2014-2017  
Title: What is Time? Perspectives from Physics, Philosophy, Fiction, and Film  
Role: Principal Investigator

Source: National Science Foundation Science and Technology Research Grant  
Award Amount: \$221,590.00  
Award Period: 2013-2016

Title: A Theoretical Study of the Conceptual, Mathematical, and Explanatory Interconnections at the Foundations of Classical Field Theories  
Role: Principal Investigator

Source: National Science Foundation Interdisciplinary Behavioral and Social Science Research Team Exploratory Grant  
Award Amount: \$249,928.00  
Award Period: 2013-2015  
Title: Comprehending and Regulating Financial Crises  
Role: Co-PI w/ Nina Bandelj (Sociology), Julia Elyachar (Anthropology), and Gary Richardson (Economics)

Source: National Science Foundation  
Award Amount: \$11,699.00  
Award Period: 2013-2014  
Title: Using Topology to Answer Philosophical Questions about General Relativity  
Role: Principal Investigator

### **Jack Xin**

Source: NSF  
Award Amount: \$400,000.00  
Award Period: July 2012-June 2015  
Title: Reaction-Diffusion Front Speeds in Chaotic and Stochastic Flows  
Role: PI

Source: NSF  
Award Amount: \$400,000.00  
Award Period: September 2012-August 2015  
Title: Blind and Template Assisted Source Separation Algorithms with Applications to Spectroscopic Data  
Role: PI

Source: NSF-PRISM  
Award Amount: \$1,950,568.00  
Award Period: September 2009-August 2014  
Title: UCI Interdisciplinary Computational and Applied Mathematics Program  
Role: PI, (Co-PIs: H-K Zhao, S. Eichhorn, A. Ihler, M. Welling)

### **Hongkai Zhao**

Source: NSF PRISM  
Award Amount: \$2,000,000.00  
Award Period: 2009-2014  
Title: UCI Interdisciplinary Computational and Applied Mathematics Program

Role: Co-PI

Source: ONR

Award Amount: \$452,914.00

Award Period: 2011-2014

Title: Image Fusion via Batch Registration from Linear Measurements

Role: PI

Source: NSF

Award Amount: \$298,511.00

Award Period: 2011-2015

Title: A new approximation for effective Hamiltonians

Role: PI

Source: NSF

Award Amount: \$330,000.00

Award Period: 2014-2017

Title: Shape and data analysis using computational differential geometry

Role: PI

## **PROPOSALS PENDING**

### **Kimberly Jameson:**

Source: UCI Medical School Dean's Tiumvirate Grant Application

Award Amount: Pending

Award Period: 2014-2015

Title: Clinical and Behavioral Investigations of Human Photopigment Opsin Gene Variations and Age-related Macular Degeneration.

Role: PI, K. A. Jameson (Co-PI), N. L. Komarova (Co-PI).

### **Carter Butts**

Source of Support: DOD ARO

Amount: \$375,000.00

Award Period: 10/2014-9/2017

Title: Advancing Statistical Methods for Analysis of Multiple Networks

Role: PI

Source of Support: NSF DMMS

Award Amount: \$1,200,000.00

Award Period: 10/2014-9/2018

Title: Bayesian Methods for Protein Fibrillization: Model Integration and Network Dynamics

Role: PI

**Simon Levin**

Source: NSF

Award Amount: \$135,443.00

Award Period: 2014-2018

Title: Coastal SEES Collaborative Research: Adaptations of Fish and Fishing Communities to Rapid Climate

Location of Project: Princeton University

Role: Co-PI

Source Army Research Office

Award Amount: \$360,000.00

Award Period: 2014-2017

**Title:** Coordination and Collective Decision Making (Recommended for funding)

Location of Project: Princeton University

Role: PI

**Michael McBride**

Source: National Institute for Justice

Award Amount: Pending

Award Period: Pending

Title: Understanding the Mechanisms of Street Intervention: A Mixed-methods Analysis of Gang Workers in Los Angeles

Role: Co-Investigator with K. Reiter, N. Sugui, and G. Titi

**Jennifer Trueblood**

Source: NSF

Award Amount: (Pending)

Award Period: 2013 –2016

Title: Applications of Quantum Probability Theory to Human Causal

Role: PI

## VI. APPENDICES

### A. CURRENT FACULTY MEMBERS

<b>APPENDIX A IMBS FACULTY, 2013-2014</b>
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Pierre F. Baldi, (Ph.D. Mathematics, California Institute of Technology). Distinguished Professor of Computer Science; Director, Institute for Genomics & Bioinformatics, University of California, Irvine. Research areas: Bioinformatics, computational biology, probabilistic modeling, machine learning.

Jeffrey Barrett, (Ph.D. Philosophy, Columbia University). Chancellor's Fellow and Professor of Logic and Philosophy of Science, University of California, Irvine. Research areas: Philosophy of science; theory of knowledge; philosophy of physics.

William H. Batchelder, (Ph.D. Psychology, Stanford University). Professor of Cognitive Sciences, University of California, Irvine. Research areas: Mathematical modeling and measurement methodology in the social sciences.

Michael Birnbaum, (Ph.D. Psychology, University of California, Los Angeles). Professor of Psychology, Cal State University, Fullerton. Research areas: Human judgment, decision-making, and utility measurement.

John P. Boyd, (Ph.D. Communication Sciences, University of Michigan). Professor Emeritus of Anthropology, University of California, Irvine. Research areas: Algebraic models of social relations, quantitative methods, and sociobiology.

William A. Branch, (Ph.D. Economics, University of Oregon). Chancellor's Fellow and Professor of Economics, University of California, Irvine. Research areas: Macroeconomic dynamics.

Myron (Mike) Braunstein, (Ph.D. Psychology, University of Michigan). Professor Emeritus of Psychology, University of California, Irvine. Research areas: Visual perception, especially depth and motion perception.

David Brownstone, (Ph.D. Econometrics and Applied Microeconomics, University of California, Berkeley) Professor of Economics, University of California, Irvine. Research areas: Computer-intensive analysis of statistical estimation strategies and applied econometrics.

Jan K. Brueckner, (Ph.D. Economics, Stanford University). Professor of Economics and Department Chair, University of California, Irvine. Research areas: Urban economics, public economics, industrial organization, housing finance.



Michael Burton, (Ph.D. Anthropology, Stanford University). Professor Emeritus of Anthropology, University of California, Irvine. Research areas: Economic and social anthropology.

Carter Butts, (Ph.D. Sociology, Carnegie Mellon University). Professor of Sociology, University of California, Irvine. Research areas: Social networks, Bayesian methods, informant accuracy and strategic behavior.

Jean-Paul Carvalho, (Ph.D. Economics, University of Oxford). Assistant Professor of Economics, University of California, Irvine. Research areas: Applied game theory; culture, identity and institutions.

Charles Chubb, (Ph.D. Experimental Psychology, New York University). Professor of Cognitive Sciences, University of California, Irvine. Research areas: Vision, perception, and information processing.

Linda Cohen, (Ph.D. Social Sciences, California Institute of Technology). Professor of Economics, University of California, Irvine. Research areas: Political economy, public choice, and government regulation of business.

Art De Vany, (Ph.D. Economics, University of California, Los Angeles). Professor Emeritus of Economics, University of California, Irvine. Research areas: Models of industry organization, health, analysis and policy of extreme events, information processing and market institutions.

Barbara A. Doshier, (Ph.D. Experimental Psychology, University of Oregon). NAS Member, Distinguished Professor of Cognitive Sciences, School of Social Sciences, University of California, Irvine. Research areas: Memory, visual perception, depth from visual motion.

Michael D'Zmura (Ph.D. Psychology, University of Rochester). Professor of Cognitive Sciences, University of California, Irvine. Research areas: Vision, color, attention, image understanding, virtual reality.

David A. Eppstein, (Ph.D. Computer Sciences, Columbia University). Professor of Computer Science, University of California, Irvine. Research areas: Computational geometry and graph algorithms, including finite element meshing, minimum spanning trees, shortest paths, dynamic graph data structures, graph coloring, graph drawing, geometric optimization, computational robust statistics, and geometric optimization.

Jean-Claude Falmagne, (Ph.D. Psychological Sciences, University of Brussels). Professor Emeritus of Cognitive Sciences, University of California, Irvine. Research areas: Assessment of knowledge, measurement theory, psychophysics, mathematical psychology.

Katherine Faust, (Ph.D. Social Science, University of California, Irvine). Professor of Sociology, University of California, Irvine. Research areas: Mathematical, computational, and conceptual models to study complex phenotypes.

Steven A. Frank, (Ph.D. Biology, University of Michigan). Professor of Ecology and Evolutionary Biology, University of California, Irvine. Research areas: Evolution of social behavior; design of reliability.

Linton C. Freeman, (Ph.D. Sociology, Northwestern University). Professor Emeritus of Sociology, University of California, Irvine. Research areas: Cognition of social structure, social networks.

Michelle Garfinkel, (Ph.D. Economics, Brown University). Professor of Economics, University of California, Irvine. Research areas: Strategic aspects of monetary and fiscal policies.

Amihai Glazer, (Ph.D. Economics, Yale University). Professor of Economics, University of California, Irvine. Research Areas: Public choice, especially concerning commitment problems.

Bernard Grofman, (Ph.D. Political Science, University of Chicago). Jack W. Peltason Endowed Chair, Professor of Political Science; Past Director, Center for the Study of Democracy, University of California, Irvine. Research areas: Models of group decision making, models of individual choice, electoral competition.

Donald Hoffman, (Ph.D. Computational Psychology, Massachusetts Institute of Technology). Professor of Cognitive Sciences and Information and Computer Science, University of California, Irvine. Research areas: Formal theories of perception, human and machine vision, recovery of depth from images.

Simon Huttegger, (Ph.D. Universität Salzburg). Chancellor's Fellow and Associate Professor of Logic and Philosophy of Science, University of California, Irvine. Research areas: Probability theory; philosophy of probability, induction, decision theory, social philosophy, dynamical Systems.

Geoffrey Iverson, (Ph.D. Theoretical Physics, University of Adelaide, Australia, Ph.D. Experimental Psychology, New York University). Professor of Cognitive Sciences, University of California, Irvine. Research areas: Psychophysics, vision, statistical estimation and testing of ordinal models.

Kent Johnson, (Ph.D. Philosophy, Rutgers University). Professor of Philosophy, University of California, Irvine. Research areas: Lexical semantics, metaphysical/epistemological relation between current linguistic theories and broader psychological processes, Methodological issues bearing on linguistic theorizing.

Marek Kaminski, (Ph.D. Government and Politics, University of Maryland). Associate Professor of Political Science, University of California, Irvine. Research areas: Political systems and economics in transition, formal models of voting, political consequences of electoral laws, models of allocation and social choice.

L. Robin Keller, (Ph.D. Management Sciences, University of California, Los Angeles). Professor of Management, Paul Merage School of Business, University of California, Irvine. Research areas: Individual decision making, risk analysis, fairness, probability judgements, decision problem structuring.

Igor Kopylov, (Ph.D. University of Rochester). Associate Professor of Economics, University of California, Irvine. Research areas: Microeconomic theory, decision theory, and game theory.

Natalia Komarova, (Ph.D. Applied Mathematics, University of Arizona). Professor of Mathematics, and Ecology & Evolutionary Biology, University of California, Irvine. Research areas: Mathematical modeling and biology, virus dynamics, cancer modeling.

Michael D. Lee, (Ph.D. Psychology, University of Adelaide). Professor of Cognitive Sciences, University of California, Irvine. Research Areas: Mathematical and computational models of stimulus representation, categorization, memory, decision-making and problem-solving.

Simon Asher Levin, (Ph.D. Mathematics, University of Maryland). NAS Member, Director, Center for BioComplexity, George M. Moffett Professor of Biology, Princeton University. Research Areas: Dynamics of populations and communities; spatial heterogeneity and problems of scale; evolutionary ecology; theoretical and mathematical ecology; biodiversity and ecosystem processes.

Mark Machina, (Ph.D. Economics, Massachusetts Institute of Technology). Professor of Economics, University of California, San Diego. Research areas: Utility, decision making, risk behavior.

Penelope Maddy, (Ph.D. Philosophy, Princeton). Distinguished Professor of Logic and Philosophy of Science and Mathematics, University of California, Irvine. Research areas: Philosophy of mathematics, especially the philosophy of set theory.

Michael McBride, (Ph.D. Economics, Yale University). Associate Professor of Economics, University of California, Irvine. Research areas: Microeconomics, game theory, and political economy.

Anthony McGann, (Ph.D. Political Science, Duke University). Professor in the School of Government and Public Policy, University of Strathclyde, Glasgow, Scotland. Research Areas: Party systems, democratic theory, formal models of political systems, European government

Louis Narens, (Ph.D. Mathematics, University of California, Los Angeles). Professor of Cognitive Sciences, and Psychiatry and Human Behavior, Graduate Advisor for IMBS, University of California, Irvine. Research areas: Measurement theory, foundations of science, decision theory.

Andrew Noymer, (Ph.D. Sociology, University of California, Berkeley). Associate Professor of Sociology and Public Health, University of California, Irvine. Research Areas: Medical demography, mathematical sociology, quantitative methodology.

Richard S. Palais, (Ph.D. Mathematics, Harvard University). Adjunct Professor of Mathematics, University of California, Irvine. Research Areas: Mathematical Visualization and more specifically to continue the development of Macintosh program 3D-Filmstrip (now called 3D-XplorMath).

Lisa Pearl, (Ph.D. Linguistics, University of Maryland at College Park). Associate Professor of Cognitive Sciences, University of California, Irvine. Research areas: Language acquisition, language change, natural language processing.

Dale Poirier, (Ph.D. Economics, University of Wisconsin). Professor of Economics, University of California, Irvine. Research areas: Econometrics, both theoretical and empirical, specializing in Bayesian econometrics

David M. Riefer, (Ph.D. Psychology, University of California, Irvine). Professor of Psychology, California State University at San Bernardino. Research areas: Memory, cognitive science, and mathematical Psychology.

A. Kimball Romney, (Ph.D. Social Anthropology, Harvard University). NAS Member, Emeritus Professor of Anthropology, University of California, Irvine. Research areas: Cognitive anthropology, cultural consensus, informant accuracy, quantitative methods.

Donald G. Saari, (Ph.D. Mathematics, Purdue University). NAS Member, Distinguished Professor of Mathematics and Economics, and Director of the Institute for Mathematical Behavioral Sciences, University of California, Irvine. Research areas: Mathematics and application of dynamical systems to social sciences; decision theory.

Stergios Skaperdas, (Ph.D. Economics, Johns Hopkins University). Professor of Economics., University of California, Irvine. Research areas: Economic theory and political economy.

Brian Skyrms, (Ph.D. Philosophy, University of Pittsburgh). NAS Member, Distinguished Professor of Social Sciences, Professor of Logic and Philosophy of Science, and Professor of Economics, University of California, Irvine. Research areas: Probability, induction, causation, rational choice.

Kenneth A. Small, (Ph.D. Economics, University of California, Berkeley). Professor Emeritus of Economics, University of California, Irvine. Research areas: Urban, energy and transportation economics, econometrics.

Padhraic Smyth, (Ph.D. Computer Engineering, California Institute of Technology). Professor of Computer Science, University of California, Irvine. Research areas: Statistical pattern

recognition, probabilistic learning, information theory, artificial intelligence, image and time-series modeling.

George Sperling, (Ph.D. Psychology, Harvard University). NAS Member, Distinguished Professor of Cognitive Sciences, University of California, Irvine. Research areas: Human information processing, vision and visual perception, computer vision and image processing.

Ramesh Srinivasan, (Ph.D. Biomedical Engineering, Tulane University). Professor of Cognitive Sciences, University of California, Irvine. Research areas: Perception, development and cortical dynamics.

Hal Stern, (Ph.D. Statistics, University of California, Irvine). Dean, Donald Bren School of Information and Computer Science, Professor of Statistics, University of California, Irvine. Research areas: Bayesian methods, model diagnostics, statistical computing.

Mark Steyvers, (Ph.D. Psychology, Indiana University). Professor of Cognitive Sciences, University of California, Irvine. Research areas: Computational models of memory, reasoning and perceptions.

Rein Taagepera, (Ph.D. Physics, University of Delaware). Professor Emeritus of Political Science, University of California, Irvine. Research areas: Quantitatively predictive models; electoral and party systems; Finno-Ugric area studies.

Jennifer Trueblood, (Ph.D. Cognitive Science, Indiana University, Bloomington). Assistant Professor of Cognitive Sciences, University of California, Irvine. Research areas: Judgment and decision making and cognitive modeling.

Carole Uhlaner, (Ph.D. Political Science, Harvard University). Associate Professor of Political Science, University of California, Irvine. Research areas: Rational actor models and statistical analyses of political behavior, especially participation and voting; decision theory; comparative politics.

Joachim Vandekerckhove, (Ph.D. Psychology, University of Leuven, Belgium) Assistant Professor of Cognitive Sciences, University of California, Irvine. Research areas: Response time modeling – Psychometrics- Computational methods – Bayesian statistics.

James Weatherall, (Ph.D. Philosophy, University of California, Irvine). Associate Professor of Logic and Philosophy of Science, University of California, Irvine. Research areas: Philosophy of physics. Philosophy of space and time, philosophy of science, atomic, molecular, and optical physics (theory), mathematical physics.

Douglas White, (Ph.D. Anthropology, Social Theory, University of Minnesota). Professor Emeritus of Anthropology, University of California, Irvine. Research areas: social networks, longitudinal social demography, cross cultural, quantitative methods.

Charles E. (Ted) Wright, (Ph.D. Psychology, University of Michigan). Associate Professor of Cognitive Sciences, University of California, Irvine. Research areas: Motor processing and control, visual search, handwriting.

Jack Xin, (Ph.D. Courant Institute, New York University). Professor of Mathematics, University of California, Irvine. Research areas: Partial Differential Equations (PDE), Asymptotic Analysis, Scientific Computation, and their Applications in Fluid Dynamics, Voice Signal Processing, Biology, Nonlinear Optics and Geoscience.

John I. Yellott, (Ph.D. Psychology, Stanford University). Professor Emeritus of Cognitive Sciences, University of California, Irvine. Research areas: Vision, probabilistic choice models.

Hongkai Zhao, (Ph.D. Mathematics, University of California, Los Angeles). Professor of Mathematics, University of California, Irvine. Research areas: Applied and computational mathematics with applications in physics, engineering, imaging science and computer vision.

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Robert Forbes, (Ph.D. Mathematical Behavioral Sciences, University of California, Irvine). Project Scientist, University of California, Irvine. Research areas: Applied studies of decision-making under uncertainty. Development of mathematical modeling and methodologies for risk assessment and group decision-making in large corporations.

Kimberly Jameson, (Ph.D. Psychology, University of California, Irvine). Associate Project Scientist, University of California, Irvine. Research areas: categorization behaviors; modeling concept formation for perceptual stimuli (e.g., the cognitive organization of color sensations and its relationship to linguistic classifiers); the development and breakdown of these cognitive functions; and optimum performance in tasks involving color codings.

Vladimir A. Lefebvre, (Ph.D. Psychology, Lomonosov Moscow State University). Researcher for Cognitive Sciences, University of California, Irvine. Research areas: Human reflexion, mathematical modeling of human inner world, military psychology.

Tim Satalich, (Ph.D. Mathematical Psychology, John Hopkins University). Associate Researcher, University of California, Irvine. Research areas: Mathematical modeling of human color vision processing. Development of statistical analysis methods for representing perceptual color space data.

Alissa Winkler, (Ph.D. Psychology, University of California, Irvine). Assistant Specialist, University of California, Irvine. Research areas: Psychophysical investigations of color vision phenotype variations correlated with common photopigment opsin gene polymorphisms. Empirical investigations of applied color perception and an artist's use of color in representational painting.

## B. SCIENTIFIC PUBLICATIONS

### APPENDIX B SCIENTIFIC PUBLICATIONS OF IMBS MEMBERS, 2013-14

#### Pierre Baldi

M. Zeller, C. Magnan, V. R. Patel, P. Rigor, L. Sender, and P. Baldi. A Genomic Analysis Pipeline and Its Application to Pediatric Cancers. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, in press, (2014)

P. Baldi, P. Sadowski, and D. Whiteson. Deep Learning in High-Energy Physics: Improving the Search for Exotic Particles. *Nature Communicaitons*, in press, (2014).

S. Masri, P. Rigor, M. Cervantes, N. Ceglia, C. Sebastian, C. Xiao, M. Roqueta-Rivera, C. Deng, T. F. Osborne, R. Mostoslavsky, P. Baldi, and P. Sassone-Corsi. SIRT6 defines circadian transcription leading to control of lipid metabolism. *Cell*, in press, (2014)

C. Magnan and P. Baldi. Sspro/ACCpro 5.0: Almost Perfect Prediction of Protein Secondary Structure and Relative Solvent Accessibility. Problem Solved? *Bioinformatics*, in press, (2014)

V. R. Patel, K. Eckel-Mahan, P. Sassone-Corsi, and P. Baldi. How Pervasive Are Circadian Oscillations? *Trends in Cell Biology*, 24, 329-331, (2014).

K. Nagata, A. Randall, and P. Baldi. Incorporating Post-Translational Modifications and Unnatural Amino Acids into High-Throughput Modeling of Protein Structures. *Bioinformatics*, in press, (2014).

S. Sahar, S. Masubuchi, K. Eckel-Mahan, S. Vollmer, L. Galla, N. Ceglia, S. Selma Masri, T. K. Barth, B. Grimaldi, O. Oluyemi, G. Astarita, W. C. Hallows, D. Piomelli, A. Imhof, P. Baldi, J. M. Denu, and P. Sassone-Corsi. Circadian Control of Fatty Acid Elongation by SIRT1-mediated Deacetylation of Acetyl-CoA Synthetase 1. *Journal of Biological Chemistry*, in press, (2014).

P. Baldi and P. Sadowski. The Dropout Learning Algorithm. *Artificial Intelligence*, 210C, 78-122, (2014).

K. A. Dyar, S. Ciciliot, L. E. Wright, R. S. Biensø, G. Malagoli Tagliazucchi, V. R. Patel, M. Forcato, M. I. Peña Paz, A. Gudiksen, F. Solagna, M. Albiero, I. Moretti, K. L. Eckel-Mahan, P. Baldi, P. Sassone-Corsi, R. Rizzuto, S. Bicciato, H. Pilegaard, B. Blaauw, and S. Schiaffino. Muscle Insulin Sensitivity and Glucose Metabolism are Controlled by the Intrinsic Muscle Clock. *Molecular Metabolism*, 3, 1, 29-41, (2014).

P. Sadowski and P. Baldi. Small-molecule 3D Structure Prediction Using Open Crystallography Data. *Journal of Chemical Information and Modeling*, 53, 12, 3127-3130, (2013).

K. L. Eckel-Mahan, V. R. Patel, S. de Mateo, N. J. Ceglia, S. Sahar, S. Dilag, K. A. Dyar, R. Orozco-Solis, P. Baldi, and Paolo Sassone-Corsi. Reprogramming of the Circadian Clock by Nutritional Challenge. *Cell*, 155, 7, 1464-1478, (2013).

D. Fooshee, A. Andronico, and P. Baldi. ReactionMap: An Efficient Atom-Mapping Algorithm for Chemical Reactions. *Journal of Chemical Information and Modeling*, 53 (11), 2812–2819, (2013). PMID:24160861.

Refereed Conference Proceedings

G. Urban, J. Yarkony, C. Kao, S. Zamani, F. Hamprecht, P. Baldi, P. Sen. Multiencoders A New Type of Autoencoder for Learning with Limited Labeled Data. Submitted to NIPS 2014.

P. Baldi, N. Ceglia, P. Sadowski, and J. Yarkony. Towards A Systematic Framework for Local Learning Rules. Submitted to NIPS 2014.

P. Sadowski, D. Whiteson, and P. Baldi. Searching for Higgs Boson Decay Modes with Deep Learning. Submitted to NIPS 2014.

C74. J. Yarkony, T. Beyer, B. Andres, B.S. Manjunath, P. Baldi, and F. Hamprecht. Massively Parallel Multicut Segmentation via Dual Decomposition. ICML, submitted, (2014).

### **William Batchelder**

France, S., Vaghefi, M., and Batchelder, W. H. Flex:CCT: Software for maximum likelihood Cultural Consensus Theory. In S. K. D’Mello, R. A. Calvo, and A. Olney (Eds.). Proceedings of the 6<sup>th</sup> International Conference on Educational Data Mining (EDM 2013). 394-395.

Matzke, D., Dolan, C., Batchelder, W. H., and Wagenmakers, E. J. Bayesian estimation of multinomial processing tree models with heterogeneity in participants and items. *Psychometrika*, On Line First, 2013, 31pp

Oravecz, Z., Anders, R., and Batchelder, W. H. Hierarchical Bayesian modeling for test theory without and answer key. *Psychometrika*, On Line First, 2013, 24pp.

Anders, R., and Batchelder, W. H. Cultural Consensus Theory for the ordinal data case. *Psychometrika*, On Line First, 2013. 31pp.

Batchelder, W. H., and Alexander, G. E. Discrete-state models: Comment on Pazzaglia, Dube, and Rotello. *Psychological Bulletin*, 2013, 139, 1204-1212.

Batchelder, W. H. Discrete state models of information processing. In J. D. Wright (Ed.) *Encyclopedia of the Social and Behavioral Sciences*, Second Edition, In Press.



Batchelder, W.H. Mathematical Psychology: History. In J.D. Wright (Ed.). Encyclopedia of Social and Behavioral Sciences, Second Edition. (In Press).

Oravecz, Z., Vandekerckhove, J., and Batchelder, W. H. Bayesian Cultural Consensus Theory. Field Methods, 2014, 207-222. .

Oravecz, Z., Vandekerckhove, J., and Batchelder, W. H. User's Guide to Bayesian Cultural Consensus Theory Toolbox. Field Methods, supplementary material , 2014 .

Oravecz, Z., Faust, K., and Batchelder, W. H. An extended Cultural Consensus Theory model to account for cognitive processes in decision making in social surveys. Sociological Methodology, In Press.

France, S., and Batchelder, W. H. Maximum likelihood item easiness models for test theory without an answer key. Educational and Psychological Measurement, In Press

Oravecz, Z., Faust, K., Levitis, D. A., and Batchelder, W. H. Studying the existence and attributes of consensus on psychological concepts by a cognitive psychological model. American Journal of Psychology, In Press.

France, S. L., and Batchelder, W. H. Unsupervised consensus analysis for on-line review and questionnaire data. Information Sciences (In Press).

Anders, R., Oravecz, Z., and Batchelder, W. H. Cultural consensus theory for continuous responses: A latent appraisal model for information pooling. Journal of Mathematical Psychology (In Press).

Batchelder, W. H. A Tribute to William Kaye Estes (1919-2011). Journal of Mathematical Psychology (In Press)

### **Michael Birnbaum**

Birnbaum, M. H. (2013). True-and-error models violate independence and yet they are testable. Judgment and Decision Making, 8, 717-737.  
Download paper as .pdf file

### **Jan Brueckner**

“Airline Alliances, Carve-Outs and Collusion” (with Pierre Picard), Review of Network Economics 12, 211-227 (June 2013).

“City-Pairs versus Airport-Pairs: A Market Definition Methodology for the Airline Industry” (with Darin Lee and Ethan Singer), Review of Industrial Organization 44, 1-25 (February 2014).

“Measuring Firm Strategic Interaction in Product-Quality Choices: The Case of Airline Flight

Frequency” (with Dan Luo), *Economics of Transportation* 3, 102-115 (March 2014).

“Partial Fiscal Decentralization and Demand Responsiveness of the Local Public Sector: Theory and Evidence from Norway” (with Lars-Erik Borge and Jorn Rattso), *Journal of Urban Economics* 80, 153-163 (March 2014).

“Beaches, Sunshine, and Public-Sector Pay: Theory and Evidence on Amenities and Rent Extraction by Government Workers” (with David Neumark), *American Economic Journal: Economic Policy* 6, 198-230 (May 2014).

“Product Unbundling in the Travel Industry: The Economics of Airline Bag Fees” (with Darin Lee, Pierre Picard and Ethan Singer), *Journal of Economics and Management Strategy*, forthcoming.

### **Carter Butts**

Adam Boessen; John R. Hipp; Smith, Emily J.; Butts, Carter T.; Nagle, Nicholas N.; and Almquist, Zack W. (2014). “Networks, Space, and Residents' Perception of Cohesion” *American Journal of Community Psychology*, forthcoming.

Almquist, Zack W. and Butts, Carter T. (2014). “Logistic Network Regression for Scalable Analysis of Networks with Joint Edge/Vertex Dynamics.” *Sociological Methodology*, forthcoming.

Almquist, Zack W. and Butts, Carter T. (2014). “Bayesian Analysis of Dynamic Network Regression with Joint Edge/Vertex Dynamics.” In Ivan Jaliaskov and Xin-She Yang (Eds.), *Bayesian Inference in the Social and Natural Sciences*, forthcoming. John Wiley and Sons.

Almquist, Zack W. and Butts, Carter T. (2014). “Predicting Regional Self-Identification from Spatial Network Models.” *Geographical Analysis*, forthcoming.

Gjoka, Minas; Smith, Emily J.; and Butts, Carter T. (2014). “Estimating Clique Composition and Size Distributions from Sampled Network Data.” *Proceedings of the Sixth IEEE Workshop on Network Science for Communication Networks*. (NetSciCom 2014).

Marcum, Christopher S. and Butts, Carter T. (2014). “Constructing and Modifying Sequence Statistics for `relevent` using `informR` in R.” *Journal of Statistical Software*, forthcoming.

Sutton, Jeannette; Spiro, Emma S.; Johnson, Britta; Fitzhugh, Sean; Gibson, Ben; and Butts, Carter T. (2014). “Warning Tweets: Serial Transmission of Warning Messages During a Disaster Event.” *Information, Communication, and Society*, forthcoming.

Almquist, Zack W. and Butts, Carter T. (2013). “Dynamic Network Logistic Regression: A Logistic Choice Analysis of Inter and Intra-group Blog Citation Dynamics in the 2004 US Presidential Election.” *Political Analysis*, 21(4), 430-448.

DuBois, Christopher; Butts, Carter T.; and Smyth, Padhraic. (2013). "Stochastic Blockmodeling of Relational Event Dynamics." *Proceedings of the 16th International Conference on Artificial Intelligence and Statistics*. (AISTATS).

DuBois, Christopher; Butts, Carter T.; McFarland, Daniel; and Smyth, Padhraic. (2013). "Hierarchical Models for Relational Event Sequences." *Journal of Mathematical Psychology*, 57(6), 297--309.

Hipp, John R. and Butts, Carter T. and Acton, Ryan and Nagle, Nicholas N. and Boessen, Adam. (2013). "Extrapolative Simulation of Neighborhood Networks Based on Population Spatial Distribution: Do They Predict Crime?" *Social Networks*, 35, 614--625.

Spiro, Emma S.; Acton, Ryan M.; and Butts, Carter T. (2013). "Extended Structures of Mediation: Re-examining Brokerage in Dynamic Networks." *Social Networks*, 35, 130--143.

Sutton, Jeannette; Spiro, Emma S.; Greczek, Matt; Johnson, Britta; Fitzhugh, Sean; and Butts, Carter T. (2013). "Tweeting the Spill: Online Informal Communications, Social Networks, and Conversational Microstructures during the Deepwater Horizon Oil Spill." *International Journal of Information Systems for Crisis Response and Management*, 5(1), 58--76.

### **Charles Chubb**

Richards V, Shen Y, Chubb C (2013) Level dominance for the detection of changes in level distribution in sound streams, *Journal of the Acoustical Society of America*, **134**, EL237; <http://dx.doi.org/10.1121/1.4813591>

Chubb C, Dickson C, Dean T, Fagan C, Mann DS, Wright CE, Silva A, Guan H, Gregersen P,

Kowalsky E (2013) Bimodal distribution of performance in discriminating major/minor modes, *J. Acoust. Soc. Am.* **134** (4), 3067–3078 [<http://dx.doi.org/10.1121/1.4816546>]

Sun, P, Chubb C, Sperling G (2014) A moving barber pole illusion. *Journal of Vision*, 14(5):1; doi:10.1167/14.5.1

Silva AE, Chubb C (2014) The 3-dimensional, 4-channel model of human visual sensitivity to grayscale scrambles. *Vision Research*, 101, 94-107.

### **Mike D'Zmura**

Horton, C., D'Zmura, M. & Srinivasan, R. (2013). Suppression of competing speech through entrainment of cortical oscillations. *Journal of Neurophysiology* **109**, 3082-3093.

Horton, C., Srinivasan, R. & D'Zmura, M. (2014). Envelope responses in single-trial EEG indicate attended speaker in a "cocktail party". *Journal of Neural Engineering* **11**, 046015, 1-2.

## David Eppstein

D. Eppstein and M. Löffler. (2013) Bounds on the complexity of halfspace intersections when the bounded faces have small dimension. *Discrete Comput. Geom.* 50 (1): 1-21, 2013

D. Eppstein and J. Simons, (2013). Confluent Hasse diagrams. *Journal of Graph Algorithms and Applications* 17(7): 689-710, 2013.

D. Eppstein, M. T. Goodrich, M. Löffler, D. Strash, and L. Trott. (2013). Category-based routing in social networks: membership dimension and the small-world phenomenon. *Theor. Comput. Sci.* 514:96-104, 2013.

D. Eppstein. (2014). Antimatroids and balanced pairs. *Order* 31(1):81-99.

D. Eppstein. (2014). Diamond-kite meshes: adaptive quadrilateral meshing and orthogonal circle packing. *Engineering with Computers* 30(2):223-235, 2014.

J.-C. Falmagne, D. Albert, C. Doble, D. Eppstein, and X. Hu, eds. Springer, (2013). *Knowledge Spaces: Applications in Education*. Springer.

D. Eppstein. (2013). Learning sequences: an efficient data structure for learning spaces. *Knowledge Spaces: Applications in Education*, J.-C. Falmagne, D. Albert, C. Doble, D. Eppstein, and X. Hu, eds. Springer, pp. 287-304.

D. Eppstein. Projection, decomposition, and adaption of learning spaces. (2013). *Knowledge Spaces: Applications in Education*, J.-C. Falmagne, D. Albert, C. Doble, D. Eppstein, and X. Hu, eds. Springer, pp. 305-322.

D. Eppstein, M. T. Goodrich, and J. Simons. (2013). Set-difference range queries. *25th Canadian Conference on Computational Geometry*, Waterloo, Canada.

P. Angelini, D. Eppstein, F. Frati, M. Kaufmann, S. Lazard, T. Mchedlidze, M. Teillaud, and A. Wolff. (2013). Universal point sets for planar graph drawings with circular arcs. *25th Canadian Conference on Computational Geometry*, Waterloo, Canada.

D. Eppstein, M. T. Goodrich, and D. S. Hirschberg. (2013). Combinatorial pair testing: distinguishing workers from slackers. *13th Int. Symp. Algorithms and Data Structures*, London, Ontario.

M. J. Bannister, S. Cabello, and D. Eppstein. (2013). Parameterized complexity of 1-planarity. *13th Int. Symp. Algorithms and Data Structures*, London, Ontario

M. J. Bannister, D. Eppstein, and J. Simons. (2013). 21st Int. Symp. Graph Drawing, Bordeaux, France, 2013. *Lecture Notes in Comp. Sci.* 8242, pp. 340-351.

M. J. Bannister, Z. Cheng, W. E. Devanny, and D. Eppstein. (2013). Superpatterns and universal point sets. 21st Int. Symp. Graph Drawing, Bordeaux, France. *Lecture Notes in Comp. Sci.* 8242, 2013, pp. 208-219.

D. Eppstein. (2013). Drawing arrangement graphs in small grids, or how to play planarity. 21st Int. Symp. Graph Drawing, Bordeaux, France, *Lecture Notes in Comp. Sci.* 8242, 2013, pp. 436-447.

D. Eppstein, D. Holten, M. Löffler, M. Nöllenburg, and B. Speckmann, and K. Verbeek. (2013) Strict confluent drawing. 21st Int. Symp. Graph Drawing, Bordeaux, France. *Lecture Notes in Comp. Sci.* 8242, 2013, pp. 352-363.

D. Eppstein, M. van Garderen, B. Speckmann, and T. Ueckerdt. (2013). Convex-arc drawings of pseudolines. 21st Int. Symp. Graph Drawing (poster), Bordeaux, France. *Lecture Notes in Comp. Sci.* 8242, 2013, pp. 522-523.

M. J. Bannister, W. E. Devanny, and D. Eppstein. (2014). Small superpatterns for dominance drawing. *Analytic Algorithmics and Combinatorics* (ANALCO14), Portland, Oregon, pp. 92-103.

B. Aronov, M. De Berg, D. Eppstein, M. Roeloffzen, and B. Speckmann. (2014). Distance-sensitive point location made easy. 30th European Workshop on Computational Geometry (EuroCG 2014), Dead Sea, Israel.

### **Jean-Claude Falmagne**

J.-Cl. Falmagne and C.W. Doble. Overview. Chapter 1 in *Knowledge Spaces: Application in Education*. Eds. J.-Cl. Falmagne, D. Albert, C.W. Doble, D. Eppstein, and X. Hu. *Knowledge Spaces: Application in Education*. Springer-Verlag, Berlin. 2013..

E. Cosyn, C.W. Doble, J.-Cl. Falmagne, A. Lenoble, N. Thiéry, and H. Uzun. Assessing Mathematical Knowledge in a Learning Space. Chapter 2 in *Knowledge Spaces: Application in Education*. Eds. J.-Cl. Falmagne, D. Albert, C.W. Doble, D. Eppstein, and X. Hu. *Knowledge Spaces: Application in Education*. Springer-Verlag, Berlin. 2013.

J.-P. Doignon, J.-Cl. Falmagne, and E. Cosyn. Learning Spaces: A Mathematical Compendium. Chapter 9 in *Knowledge Spaces: Application in Education*. Eds. J.-Cl. Falmagne, D. Albert, C.W. Doble, D. Eppstein, and X. Hu. *Knowledge Spaces: Application in Education*. Springer-Verlag, Berlin. 2013

J.-Cl. Falmagne. Deriving meaningful scientific laws from abstract, “gedanken” type, axioms: five examples. Submitted for publication in the special issue *Symmetry: Theory and Applications in Vision* of the journal “*Symmetry*.” Guest Editors: Christopher W. Tyler, Zygmunt Pizlo, and Manish Singh.

### **Katie Faust**

Oravecz, Zita, Katherine Faust, Daniel A. Levitis, and William H. Batchelder, forthcoming, "Studying the Existence and Attributes of Consensus on Psychological Concepts by a Cognitive Psychological Model." *American Journal of Psychology*.

Oravecz, Zita, Katherine Faust, and William H. Batchelder, 2014. "An Extended Cultural Consensus Theory Model to Account for Cognitive Processes in Decision Making in Social Surveys." *Sociological Methodology*.

### **Steve Frank**

Frank, S. A., (2014). The big questions in somatic mosaicism and disease. *Current Biology* (in press).

Frank, S. A., (2014). Generative models versus underlying symmetries to explain biological pattern. *Journal of Evolutionary Biology* (in press).

Frank, S. A., (2014). Microbial metabolism: optimal control of uptake versus synthesis. *PeerJ* 2:e267.

Frank, S. A., (2013). Input-output relations in biological systems: measurement, information and the Hill equation. *Biology Direct* 8:31.

Frank, S. A., (2013). Microbial evolution: regulatory design prevents cancer-like overgrowths. *Current Biology* 23:R343-R346.

Frank, S. A., (2013). A new theory of cooperation. Pages 40–47 in *Human Social Evolution: The Foundational Works of Richard D. Alexander, K. Summers and B. Crespi*, eds. *Oxford University Press*.

Frank, S. A., (2013). Natural selection. VI. Partitioning the information in fitness and characters by path analysis. *Journal of Evolutionary Biology* 26:457-471.

### **Amihai Glazer**

Terai, K., Glazer, A., (forthcoming). Budgets under delegation. Toshihiro Ihori and Kimiko Terai, eds., *The Political Economy of Fiscal Consolidation in Japan*. Tokyo: Springer.

Glazer, A., Kondo, J., (forthcoming). Governmental transfers and altruistic private transfers. Forthcoming, *Journal of Population Economics*.

Uppal, Y., Glazer, A., (forthcoming). Legislative turnover, fiscal policy, and economic growth: Evidence from U.S. state legislatures." *Economic Inquiry*.

Bucovetsky, S., Glazer, A., (forthcoming). Inefficiencies in excluding the poor from rich communities. Forthcoming, *Journal of Urban Economics*.

### **Bernard Grofman**

Merrill, S., Grofman, B. and Brunell, P., Forthcoming. Dynamics of Party Differentiation: Replacement Effects. *Party Politics*.

Winer, S., Kenny, L, and Grofman, B. Forthcoming. Explaining Variation in the Degree of Electoral Competition in a Mature Democracy: U.S. Senate Elections 1922-2004. *Public Choice*.

Fraenkel, J. and Grofman, B., Forthcoming. The Borda Count and its Real World Alternatives: Comparing Scoring Rules in Nauru and Slovenia. *Australian Journal of Political Science*.

Grofman, B. and Garcia, J. Forthcoming. Using Spanish Surname to Estimate Hispanic Voting Population in Voting Rights Litigation: A Model of Context Effects Using Bayes Theorem. *Election Law Journal*.

### **Simon Huttegger**

Simon M. Huttegger, Brian Skyrms, and Kevin J. S. Zollman (2014). Probe and Adjust in Information Transfer Games. *Erkenntnis*, forthcoming.

Simon M. Huttegger (2013). How Much Rationality do we need to Explain Conventions? *Philosophy Compass* 9:11–21.

Simon M. Huttegger, Brian Skyrms, Pierre Tarrès, and Elliott E. Wagner (2014). Some Dynamics of Signaling Games. Forthcoming in the *Proceedings of the National Academy of Sciences USA*.

Simon M. Huttegger (2014). Learning Experiences and the Value of Knowledge. Accepted for publication in *Philosophical Studies*.

Simon M. Huttegger and Kevin J. S. Zollman (2013). Methodology in Biological Game Theory. *The British Journal for the Philosophy of Science*.

Simon M. Huttegger (2013). In Defense of Reflection. *Philosophy of Science* 80: 413-433.

Kevin J. S. Zollman, Carl T. Bergstrom, and Simon M. Huttegger (2013). Between Cheap and Costly Signals: The Evolution of Partially Honest Communication. *Proceedings of the Royal Society London B* 280: 20121878.

Simon M. Huttegger (2013). Probe and Adjust. *Biological Theory*, 10.1007/s13752-013-0114-2.

### **Kimberly Jameson**

Jameson, K. A. & Winkler, A. D., (2014). New results on color appearance space and the potential for human tetrachromacy. Conference presentation at the Annual Cognitive Sciences Association for Interdisciplinary Learning (CSAIL). Hood River Valley, Oregon. August 2014. Published abstract: *Program for CSAIL*, July 31, 2014.

Jameson, K. A. & Winkler, A. D., (2014). Investigating differences in observers' cone photopigment classes using variations on a minimal motion isoluminance task: A preliminary report.

Jameson, K. A., Winkler, A. D., Herrera, C. & Chubb, C.F., (manuscript in-progress). The Veridicality of Color: A case study of human tetrachromacy. Invited Article. (to appear in 2015). *GlimpseJournal: The Art + Science of Seeing*, Issue on Truth.

### **Kent Johnson**

2014a, "Realism and Uncertainty of Unobservable Common Causes in Factor Analysis," *Nous*.

2014b, "Notational Variants and Invariance in Linguistics", *Mind and Language*, 2014a

2014c, "Maps, Languages, and Manguages: Rival Cognitive Architectures?", *Philosophical Psychology*

2014d, "Methodology in Generative Linguistics: Scratching Below the Surface", *Language Sciences* 44, 47 – 59.

### **Marek Kaminski**

Kaminiski, M., Swistak, P., and Lissowski, G., (2014) "Formal Theory and Value Judgments," *Polish Sociological Review*.

Kaminski, M., (2014). "Prisoner's Dilemma," in Oxford Bibliographies, forthcoming, 2014.

Kaminski, M. and Nalepa, M., (forthcoming). "Suffer a Scratch to Avoid a Blow. Why Do Postcommunists Introduce Self-Hurting Legislation?" *Decisions*.

### **L. Robin Keller**

Yitong Wang, Tianjun Feng, L. Robin Keller, "A Further Exploration of the Uncertainty Effect", *Journal of Risk and Uncertainty*, accepted 1-25-2013, Published 'Online First' on SpringerLink on 11-24-13; December 2013 47(3) 291-310. <http://link.springer.com/article/10.1007%2Fs11166-013-9180-x>



Tianjun Feng, L. Robin Keller, Ping Wu, Yifan Xu, “An Empirical Study of the Toxic Capsule Crisis in China: Risk Perceptions and Behavioral Responses”, accepted 6-18-2013, online in early view on 7-16-13, doi: 10.1111/risa.12099, Vol. 34, No. 4, 2014, pp. 698-710, [Risk Analysis](http://onlinelibrary.wiley.com/doi/10.1111/risa.12099/abstract). <http://onlinelibrary.wiley.com/doi/10.1111/risa.12099/abstract>.

## **Chapters in Books**

Candice H. Huynh, Jay Simon, L. Robin Keller, “Decision Technologies”, Invited chapter submitted to section V. Old and new issues in judgment and decision making, in Wiley-Blackwell Handbook of Judgment and Decision Making: An Interdisciplinary Perspective, eds. Gideon Keren and George Wu. Slated for 2014 publication. Malden (MA): Blackwell. Submitted 1/2013, refereed, revised Jan. 2014. (Accepted; contact authors for a copy of the working paper.)

## **Working papers**

James M. Leonhardt (New Mexico State University, Merage doctoral alumnus) and L. Robin Keller, “Probability Format and Vaccine Risk Perception”

Partially funded by a fellowship (Leonhardt) from the Newkirk Center for Science and Society and conducted under UCI Institutional Review Board’s approved research protocol HS# 2009-7037.

Shijian Wang, Liangyan Wang, L. Robin Keller, “Exploring the Effects of Consumers’ Thinking Styles on Their Reactions to Corporate Strategic Response to a Brand Crisis”

This research was funded by the National Natural Science Foundation of China Grant (71072059) and Shanghai Shuguang Program Grant (13SG16) to Liangyan Wang.

Liangyan, Baozhou Lu, Zhang Tao, and L. Robin Keller, “Trust Antecedents, Trust and Online Microsourcing Adoption: An Empirical Study from the Resource Perspective”

## **Natalia Komarova**

Komarova, N. L., (2014). Spatial interactions and cooperation can change the speed of evolution of complex phenotypes. *Proceedings of the National Academy of Sciences*, 201400828.

Mandelstam, Y. and Komarova, N.L., (2013). When learners surpass their models: mathematical modeling of learning from an inconsistent source. *Bulletin of Math Bio*.

Jackson, T.L., Komarova, N.L. and Swanson, K.R., (2014 to appear). Mathematical Oncology: Using Mathematics to Enable Cancer Discoveries. *American Mathematical Monthly*.

Wodarz, D., Garg, N., Komarova, N. L., Benjamini, O., Keating, M. J., Wierda, W. G., Kantarjian, H., James, D., O'Brien, S. and Burger, J. A., (2014). Kinetics of chronic lymphocytic

leukemia (CLL) cells in tissues and blood during therapy with the BTK inhibitor ibrutinib. *Blood, blood*.

Manem, V.S.K., M. Kohandel, M., Komarova, N.L., Sivaloganathan, S., (2014). Spatial invasion dynamics on random and unstructured meshes: Implications for heterogeneous tumor populations. *Journal of Theor. Biol.* 349, 66--73.

Wodarz, D., Sorace, R., and Komarova, N.L., (2014). Dynamics of cellular responses to radiation. (2014) *PLoS Computational Biology*, 10(4), e1003513.

Komarova, N.L., Shahriyari, L. and Wodarz, D., (2014). Complex role of space in the crossing of fitness valleys by asexual populations. *Jour of the Roy Soc Interface*, 11(95), 20140014.

Rodrigues-Brenes, I. A., Komarova, N.L., Wodarz, D., (2014). Cancer-associated mutations in healthy individuals: assessing the risk of carcinogenesis. *Cancer Research*, 74(6), 1661-1669.

Shahriyari, L. and Komarova, N.L., (2013). Symmetric vs asymmetric stem cell divisions: an adaptation against cancer? *PLoS One*, 8: e76195.

Komarova, N.L. and Boland, C.R., (2013). Cancer: Calculated treatment. *Nature* 499, 291-292 (News and Views article).

Komarova, N.L. (2013) Principles of regulation of self-renewing cell lineages. *PLoS One* 8(9), e72847.

## **Igor Kopylov**

### **Submitted Papers**

Commitment Devices and Self-Deception (joint with J. Noor) - RR at Theoretical Economics

Comparative Ignorance and Context-Dependent Beliefs

### **Working Papers**

Forgetting, Ignorance, and Ambiguity Attitudes (joint with J. Miller)

Subjective Probability and Confidence

Procedural Rationality in the Multiple Priors and Variational Models

Subjective Model Uncertainty and Second-Order Beliefs

## **Michael Lee**

Bartlema, A., Lee, M.D., Wetzels, R., & Vanpaemel, W. (in press). A Bayesian hierarchical mixture approach to individual differences: Case studies in selective attention and representation in category learning. *Journal of Mathematical Psychology*.

Guan, H., Lee, M.D., & Silva, A. (in press). Threshold models of human decision making on optimal stopping problems in different environments. In P. Bello, M. Guarini, M. McShane, & B. Scassellati (Eds.), *Proceedings of the 36th Annual Conference of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.

Lee, M.D., & Danileiko, I. (2014). Using cognitive models to combine probability estimates. *Judgment and Decision Making*, 9, 259-273.

Lee, M.D., Lodewyckx, T., & Wagenmakers, E.-J. (in press). Three Bayesian analyses of memory deficits in patients with dissociative identity disorder. In J. R. Raaijmakers, A. Criss, R. Goldstone, R. Nosofsky, & M. Steyvers (Eds.), *Cognitive modeling in perception and memory: A festschrift for Richard M. Shiffrin*. Psychology Press.

Lee, M.D., Steyvers, M., & Miller, B.J. (2014). A cognitive model for aggregating people's rankings. *PLoS ONE*, 9.

Lee, M.D., & Wagenmakers, E.-J. (2013). Bayesian cognitive modeling: A practical course. *Cambridge University Press*.

### **Vladimir A. Lefebvre**

Lefebvre, V.A., (2014). *What Are Consciousness, Animacy, Mental Activity and the Like?* Los Angeles: Leaf & Oaks Publishers.

Lefebvre, V.A., (in press). The Quantification of Emotion: An Empirical Ratio in Search of a Theory (with Robert M. Schwartz), *American Psychologist*.

Lefebvre, V.A. with Nyamekye, K., (2014 in press). Construction of Theoretical Model for Antiterrorism: From Reflexive Game Theory Viewpoint. *Conference Proceeding, 19<sup>th</sup> ICCRTS "C2 Agility: Lessons Learned From Research and Operations..*

### **Simon Levin**

Arrow, K., Ehrlich, P., and S.A. Levin. 2014. Some perspectives on linked ecosystems and socio economic systems. Pp.95-116 In *Environment and Development Economics: Essays in Honor of Sir Partha Dasgupta*, ed. S. Barrett et al. Springer-Verlag.

Bonachela, J.A. and S.A. Levin. 2014. Evolutionary comparison between viral lysis rate and latent period. *Journal of Theoretical Biology* 345(21): 32-42.

- Klein, E. et al. (including S.A. Levin). 2014. Cross-reactive immune responses as primary drivers of malaria chronicity. *Infection and Immunity* 82(1): 140.
- Lei, J., Levin, S.A., and Nie, Q. 2014. Mathematical model of adult stem cell regeneration with cross-talk between genetic and epigenetic regulations. *PNAS*: DOI/10.1073/pnas.1324267111.
- Salvador, L. et al. (including S.A. Levin). 2014. Mechanistic analysis of the search behavior of *Caenorhabditis elegans*. *Journal of the Royal Society Interface* 11(92): 20131092.
- Badiou, P. et al. (including S.A. Levin). 2013. *International Boreal Conservation Science Panel: Conserving the World's Last Great Forest Is Possible: Here's How*. (Science/Policy Briefing, International Boreal Conservation Science Panel and Associates, November 2011).
- Bonachela, J.A., Allison, S.D., Martiny, A.C., and S.A. Levin. 2013. A model for variable phytoplankton stoichiometry based on cell protein regulation. *BioGeoSciences* 10: 3241-3279.
- Case, M.F., Halpern, C.B., and S.A. Levin. 2013. Contributions of gopher mound and casting disturbances to plant community structure in a Cascade Range meadow complex. *Botany* 91: 555-561.
- Farrior, C.E., R. Dybzinski, S. Levin, and S. Pacala. 2013. Competition for water and light in closed-canopy forests: A tractable model carbon of allocation with implications for carbon sinks. *American Naturalist* 181(3): 314-330.
- Farrior, C.E. et al. (including S.A. Levin). 2013. Resource limitation in a competitive context determines complex plant responses to experimental resource additions. *Ecology* 94(11): 2505-2517.
- Fischer, I. et al. (including S.A. Levin). 2013. Fusing enacted and expected mimicry generates a winning strategy that promotes the evolution of cooperation. *PNAS* 110(25): 10229-10233.
- Giuggioli, L. et al. (including S.A. Levin). 2013. Stigmergy, collective actions, and animal social spacing. *PNAS* 110(42): 16904-16909.
- Kinzig, A.P. et al. (including S.A. Levin). 2013. Social norms and global environmental challenges: The complex interaction of behaviors, values, and policy. *BioScience* 63(3): 164-175.
- Lade, S.J., Tavoni, A., Levin, S.A., and M. Schlüter. 2013. Regime shifts in a social-ecological system. *Theoretical Ecology (Special Issue on Regime Shifts and Tipping Points)* 6: 359-372.
- Levin, S.A. 2013. Comment on "Voluntary Pledges and Green Growth in the Post-Copenhagen Economy" by Thomas Sterner and "World Economic Crises: Commodity Prices and Environmental Scarcity as Missing Links" by Ramón López. In *Development Challenges in a Postcrisis World*, ed. C. Sepúlveda, A. Harrison, and J.Y. Lin, 195-199. ABDCE Conference on

Development Economics – Global 2011, Stockholm, Sweden (May 31-June 2, 2010).  
Washington, D.C.: World Bank.

Levin S.A. 2013. Cooperation and sustainability. In *Practicing Sustainability*, ed. G. Madhavan et al., 39-43. New York; Heidelberg; Dordrecht; London: Springer.

Levin, S.A. Dedication and foreword. 2013. *Mathematical Biosciences (Special Issue in honor of Professor Luigi M. Ricciardi)*. BIOCOMP 2012: Mathematical Modeling and Computational Topics in Biosciences, Vietri sul Mare (Italy), June 4-9, 2012.

Levin, S.A. 2013. Ecological resilience and robustness. *Encyclopedia Britannica*. Available from: <http://www.britannica.com/EBchecked/topic/1919092/ecological-resilience>.

Levin, Simon A., ed. 2013. *Encyclopedia of Biodiversity* (2<sup>nd</sup> edition).

Levin, S.A. 2013. Foreword. *Dispersal, Individual Movement and Spatial Ecology: Mathematical Perspective*, ed. M.A. Lewis et al., v-vii. *Lecture Notes in Mathematics 2071*. Berlin; Heidelberg: Springer-Verlag.

Levin, S.A. 2013. Mathematics of sustainability. *AMS Notices* 60(4): 392-393.

Levin, Simon A., ed. 2013. Preface to the *Encyclopedia of Biodiversity* (2<sup>nd</sup> edition).

Levin, S.A. 2013. Preface to Special Issue in Honor of Carlos Castillo-Chavez. *Mathematical Biosciences and Engineering* 10 (5-6): xxv-xxvii.

Levin, S.A. 2013. Resolution of Respect: Dick Root 1936-2013. *Bulletin of the ESA* (July): 210-215.

Levin, S.A. et al. 2013. Social-economic systems as complex adaptive systems: Modeling and policy implications. *Environment and Development Economics* 18(2): 111-132.

Martiny, A. et al. (including S.A. Levin). 2013. Strong latitudinal patterns in the elemental ratios of marine plankton and organic matter. *Nature Geoscience* 6: 279-283.

Nadell, C.D. et al. (including S.A. Levin). 2013. Cutting through the complexity of cell collectives. *Proceedings of the Royal Society B* 280(1755): 20122770.

Pinsky, M.L. et al. (including S.A. Levin). 2013. Marine taxa track local climate velocities. *Science* 341(6151): 1239-1243.

Standberg-Peshkin, A. et al. (including S.A. Levin). 2013. Visual sensory networks and effective information transfer in animal groups. *Current Biology* 23(17): R709-R711.

Thompson, S., Levin, S., and Rodriguez-Iturbe, I. 2013. Linking plant disease risk and precipitation drivers: A dynamical systems framework. *The American Naturalist* 181(1): 1-38.

Torney, C.J., Levin, S.A., and Couzin, I.D. 2013. Decision accuracy and the role of spatial interaction in opinion dynamics. *Journal of Statistical Physics* 151(1-2): 203-217.

Schertzer, E., Staver, A.C., and S.A. Levin. 2014. Implications of the spatial dynamics of fire spread for the bistability of savanna and forest. *Journal of Mathematical Biology*: DOI: 10.1007/s00285-014-0757-z.

Thompson, S., Levin, S., and I. Rodríguez-Iturbe. 2014. Rainfall temperatures changes have confounding impacts on *Phytophthora cinnamomi* occurrence risk in the south western USA under climate change scenarios. *Global Change Biology* 20: 1299-1312.

Vasconcelos, V.V. et al. (including S.A. Levin). 2014. Climate policies under wealth inequality. *PNAS*: DOI/10.1073/pnas.1323479111.

Walker, F.J.G., Klein, E.Y., and S.A. Levin. 2014. Disease at the wildlife-livestock interface: Acaricide use on domestic cattle does not prevent transmission of a tick-borne pathogen with multiple hosts. *Veterinary Parasitology* 199(3-4): 206-214.

### **Forthcoming**

Berdahl, A. et al. (including S.A. Levin). 2014. A collective navigation hypothesis for homeward migration in anadromous salmonids. *Fish and Fisheries*.

Herlands, W., Der, R., Greenberg, Y., and S. Levin. 2014. A machine learning approach to musically meaningful homogenous style classification. *Proceedings of the Advancement of Artificial Intelligence Conference, July 27-31 2014, Québec City, Québec, Canada*.

Levin, S.A. 2014. Foreword: A personal perspective on landscape ecology in the United States. *History of Landscape Ecology in America*.

Levin, S.A. 2014. Public goods: Competition, cooperation and spite. *PNAS*.

Van Boeckel, T. et al. (including S.A. Levin). 2014. Global trends in antibiotic consumption 2000-2010. *Lancet Infectious Diseases*.

### **Penelope Maddy**

Maddy, P. (2014). A second philosophy of arithmetic. *Review of Symbolic Logic* 7 pp. 222-249.

Maddy, P. (to appear). The Logical Must: Wittgenstein on Logic. *Oxford University Press* (to appear).

## **Mark Machina**

Machina, M. (accepted for publication). Ambiguity Aversion with Three or More Outcomes. *American Economic Review*.

## **Handbook**

Machina, M., Viscusi, K. (in print) Handbook of the Economics of Risk and Uncertainty, *North-Holland Handbooks in Economics*.

## **Handbook Chapter**

Machina, M., Siniscalchi, M. (in print) Ambiguity and Ambiguity Aversion, Handbook of Economics, *North Holland Handbooks in Economics*.

## **Michael McBride**

M. McBride, D. Hewitt. (2013). The Enemy You Can't See: An Investigation of the Disruption of Dark Networks. *Journal of Economic Behavior and Organization* 93: 32-50, 2013.

M. McBride, S. Skaperdas, (2014). Conflict, Settlement, and the Shadow of the Future. *Journal of Economic Behavior and Organization* 105: 75-89, 2014.

M. McBride. Authority in Mormonism: A Rational Choice Analysis. in P. Mason, ed., *Mormon Studies in the 21st Century*, University of Utah Press, forthcoming.

## **Anthony McGann**

Anthony McGann. (2014). Estimating the Political Center from Aggregate Data: An Item Response Theory Alternative to the Stimson Dyad Ratios Algorithm. *Political Analysis* 22:115-129.

Anthony McGann and Michael Latner. (2014). The Calculus of Consensual Democracy: Rethinking *Patterns of Democracy* without Veto Players. *Comparative Political Studies* 46.7 2013.

Fairness and Bias in Electoral Systems, in Jack Nagel and Rogers Smith, ed. *Representation: Elections and Beyond*. University of Pennsylvania. Press 2013.

## **Louis Narens**

Narens, L. (2014 in publication). Probabilistic Lattices with Applications to Decision Theory. *World Scientific*.

Saari, D., Narens L. (to appear). Modeling Decisions Involving Ambiguous, Vague, or Rare Events. *The Economics of Global Environment*.

## **Andrew Noymer**

Andrew Noymer and Ann M. Nguyen. Influenza as a proportion of pneumonia and influenza mortality: United States, 1959–2007. *Biodemography and Social Biology* 2013 59(2):178-190, 2013.

## **Lisa Pearl**

Pearl, L. & Enverga, I. In press. “Can you read my mindprint? Automatically identifying mental states from language text.” *Interaction Studies*.

Pearl, L. In press. “Evaluating learning strategy components: Being fair.” *Language*. Also archived at lingbuzz: <http://ling.auf.net/lingbuzz/001940> (downloaded 568 times as of 6/26/14).

Phillips, L. & Pearl, L. In press. “Bayesian inference as a viable cross-linguistic word segmentation strategy: It’s all about what’s useful.” *Proceedings of the 36<sup>th</sup> Annual Meeting of the Cognitive Science Society*.

Pearl, L., Ho, T., & Detrano, Z. In press. “More learnable than thou? Testing knowledge representations which child-directed speech.” *Proceedings of the Berkeley Linguistics Society*.

Phillips, L. & Pearl, L. 2014. “Bayesian inference as a cross-linguistic word segmentation strategy: Always learning useful things.” *Proceedings of the Computational and Cognitive Models of Language Acquisition and Language Processing Workshop*, EACL, Gothenberg, Sweden.

## **Dale Poirier**

Poirer, D. (2013) Reacting to Surprising Seemingly Inappropriate Results. in I. Jeliaskov and X.-S. Yang, eds., *Bayesian Inference in the Social Sciences* (Wiley), 291-298.

Poirer, D. (2014) Identification in Multivariate Partial Observability Probit. *International Journal of Mathematical Modelling and Numerical Optimisation*, Vol. 5, No1/2, 45-63.

## **Donald Saari**

Saari, D. (2014). Unifying voting theory from Nakamura's to Greenberg's Theorems. *Mathematical Social Sciences*, 69, 1-11.

Saari, D. (online January 11, 2014). A new way to analyze paired comparison rules. *Mathematics of Operation Research*.

Saari, D., McIntee, T. (2013). Connecting pairwise and positional election outcomes. *Mathematical Social Sciences*, 66, 140-151.



Saari, D., Ratliff, T. (October 2013). Complexities of electing diverse committees. *Social Choice & Welfare*, Online First.

Saari, D., Narens L. (to appear). Modeling Decisions Involving Ambiguous, Vague, or Rare Events. *The Economics of Global Environment*.

Saari, D., Jessie, D. (to appear). Cooperation in n-player repeated games. *The Mathematics of Decisions, Elections, and Games*, ed. M. Jones. AMS Contemporary Mathematics series.

Saari, D. (to appear). Voting mysteries: A picture is worth a thousand words. *Handbook for Social Choice and Voting*, ed., N. Miller and J. Heckelman.

### **Stergios Skaperdas**

Jia, Hao, Skaperdas, Stergios, and Vaidya, Samarth, "[Contest Functions: Theoretical Foundations and Issues in Estimation](#)," *International Journal of Industrial Organization*, 2013, 31, 211–222.

Skaperdas, Stergios, "Proprietary Public Finance: Its Emergence and Evolution out of Anarchy," in Dominguez-Vazquez J. and Winer S. (eds), *Coercion and Social Welfare in Public Finance: Economic and Political Dimensions*, 2014, New York: Cambridge University Press.

Evia, Jose Luis, Roberto Laserna and Stergios Skaperdas, "[Sociopolitical Conflict and Economic Performance in Bolivia](#)," in Warneryd, K (ed.), *The Economics of Conflict: Theory and Empirical Evidence*, 2014, Cambridge, MA: MIT Press.

McBride, Michael and Skaperdas, Stergios, "Conflict, Settlement, and the Shadow of the Future," *Journal of Economic Behavior and Organization*, 2014.

### **Brian Skyrms**

With Simon Huttegger and Kevin Zollman (2014). Probe and Adjust in Information Transfer Games. *Erkenntnis* 79(4):835-853, 2014.

Skyrms, B. Grades of Inductive Skepticism. Forthcoming in *Philosophy of Science*.

Skyrms, B. Learning to Signal with Two Kinds of Trial and Error. Forthcoming in *Foundations and Methods from Mathematics to Neuroscience: Essays Inspired by Patrick Suppes*. Ed. Colleen E. Crangle, Adolfo Garcia de la Sienra, and Helen E. Longino. CSLI Publications.

With Simon Huttegger, Pierre Tarrès and Elliott Wagner. Some Dynamics of Signaling Games. Forthcoming in *Proceedings of the National Academy of Sciences of the USA*.

## Ken Small

Fosgerau, Mogens, and Kenneth A. Small (2013), “Hypercongestion in Downtown Metropolis,” *Journal of Urban Economics*, 76: 122–134.

Small, Kenneth A., and Chen Feng Ng (2014), “Optimizing Road Capacity and Type,” *Economics of Transportation*, <http://dx.doi.org/10.1016/j.ecotra.2014.02.001> Previous version: working paper 12-13-09, Univ. of California at Irvine.

### Journal articles, other

Small, Kenneth A., and Kurt Van Dender, “If Cars Were More Efficient, Would We Use Less Fuel?” *Access*, Publication of University of California Transportation Center, No. 31 (Fall 2007), pp. 8-13.

Parry, Ian W.H., and Kenneth A. Small, “Response to Nye,” *Regulation*, 31, 2 (Summer 2008), pp. 38-39.

Small, Kenneth A., and Chen Feng Ng (2012), “When Do Slower Roads Provide Faster Travel?,” *Access*, Publication of University of California Transportation Center, No. 41 (Fall).

Chinese translation published in: *Urban Transport of China*, 11(2), March 2013.

Fosgerau, Mogens, and Kenneth A. Small, “[Endogenous Scheduling Preferences and Congestion](#),” working paper, Transport Studies Unit, Danish Technical University, and U.C. Irvine (revised July 2011).

Small, Kenneth A., and Chen Feng Ng, “Optimizing Road Capacity and Type,” working paper 12-13-09, Univ. of California at Irvine (June 2013). Presented to Kuhmo Nectar Conference on Transportation Economics, Evanston, Illinois, July 2013.

## Hal Stern

Wang, Y-H, Magnusdottir, G, Stern, H, Tian, X, and Yu, Y (2014) “Uncertainty Estimates of the EOF-Derived North Atlantic Oscillation,” *Journal of Climate*, 27, 1290–1301.  
<http://dx.doi.org/10.1175/JCLI-D-13-00230.1>

Heins, KA and Stern, HS (2014) “A Statistical Model for Event Sequence Data,” Proceedings of the Seventeenth international conference on Artificial Intelligence and Statistics (AISTATS 2014).

Stern, H. (2014) Comment on “The Need for More Emphasis on Prediction: A “Nondenominational” Model-Based Approach” by D. A. Harville, *The American Statistician*, Vol. 68, No. 2, pp 83-84.

## Rein Taagepera

Taagepera, Rein. (2014). A world population growth model: Interaction with Earth’s carrying capacity and technology in limited space, *Technol. Forecast. Soc. Change* 82 34-41.

Gaines, Brian, and Rein Taagepera (2013). How to operationalize two-partyness, *Journal of Elections, Public Opinion and Parties*, 23, 387-404.

Taagepera, Rein, Peter Selb, Bernard Grofman. (2013). How turnout depends on the number of parties: A logical model, *Journal of Elections, Public Opinion and Parties*. Forthcoming.

### **Jennifer Trueblood**

Trueblood, J. S. (in press). Reference point effects in riskless choice without loss aversion. *Decision*.

Hughes, M. A., Dolan, M. C., Trueblood, J. S., & Stout, J. C. (2014). Psychopathic Personality Traits and Iowa Gambling Task Performance in Incarcerated Offenders. *Psychiatry, Psychology and Law*. doi: 10.1080/13218719.2014.919689

Lorains, F. K., Dowling, N. A., Enticott, P. G., Bradshaw, J. L., Trueblood, J. S., & Stout, J. C. (2014). Strategic and non-strategic problem gamblers differ on decision making under risk and ambiguity. *Addiction*, 109(7): 1128-37. doi: 10.1111/add.12494.

Lorains, F. K., Dowling, N. A., Enticott, P. G., Bradshaw, J. L., Trueblood, J. S., & Stout, J. C. (2014). Response to Turner. *Addiction*. 109: 1139–1140. doi: 10.1111/add.12584

Trueblood, J. S., Brown, S. D., & Heathcote, A. (2014). The multi-attribute linear ballistic accumulator model of context effects in multi-alternative choice. *Psychological Review*, 121, 179-205.

Trueblood, J. S. & Pothos, E. M. (2014). A quantum probability approach to human causal reasoning. In P. Bello, M. Guarini, M. McShane, & B. Scassellati (Eds.), *Proceedings of the 36th Annual Conference of the Cognitive Science Society*. Austin, TX: Cognitive Science Society.

Trueblood, J. S., Pothos, E. M., & Busemeyer, J. R. (2014). Quantum probability theory as a common framework for reasoning and similarity. *Frontiers in Cognitive Science*, 5, 1-4, doi: 10.3389/fpsyg.2014.00322

### **Joachim Vandekerckhove**

Vandekerckhove, J. (in press). A cognitive latent variable model for the simultaneous analysis of behavioral and personality data. *Journal of Mathematical Psychology*.

Wiech, K., Vandekerckhove, J., Zaman, J., Tuerlinckx, F., Vlaeyen, J. W. S., & Tracey, I. (in press). Influence of prior information on pain involves biased perceptual decision-making. *Current Biology*.

Wabersich, D., & Vandekerckhove, J. (in press). The RWiener package: an R package providing distribution functions for the Wiener diffusion model. *The R Journal*.

Oravecz, Z., Vandekerckhove, J., & Batchelder, W. H. (in press). Bayesian Cultural Consensus Theory. *Field Methods*.

Salum, G. A., Sergeant, J., Sonuga-Barke, E., Vandekerckhove, J., Gadelha, A., Pan, P. M., Moriyama, T. S., Graeff-Martins, A. S., Gomes de Alvarenga, P., do Rosário, M. C., Manfro, G. G., Polanczyk, G., & Rohde, L. A. P. (in press). Mechanisms Underpinning Inattention and Hyperactivity: Neurocognitive Support for ADHD Dimensionality. *Psychological Medicine*.

Vandekerckhove, J., Matzke, D., & Wagenmakers, E.-J. (in press). Model comparison and the principle of parsimony. *Oxford Handbook of Computational and Mathematical Psychology*.

Wabersich, D., & Vandekerckhove, J. (2014). Extending JAGS: A tutorial on adding custom distributions to JAGS (with a diffusion model example). *Behavior Research Methods*, 46, 15-28.

Salum, G. A., Sergeant, J., Sonuga-Barke, E., Vandekerckhove, J., Gadelha, A., Pan, P. M., Moriyama, T. S., Graeff-Martins, A. S., Gomes de Alvarenga, P., do Rosário, M. C., Manfro, G. G., Polanczyk, G., & Rohde, L. A. P. (2014). Specificity of Basic Information Processing and Inhibitory Control in Attention Deficit/Hyperactivity Disorder. *Psychological Medicine*, 44, 617-631.

Vandekerckhove, J., Guan, M., & Styrcula, S. (2013). The consistency test may be too weak to be useful: Its systematic application would not improve effect size estimation in meta-analyses. *Journal of Mathematical Psychology*, 57, 170-173.

Pe, M., Vandekerckhove, J., & Kuppens, P. (2013). A diffusion model account of the relationship between the emotional flanker task and depression and rumination. *Emotion*, 13, 739-747.

### **James Weatherall**

Weatherall, J. (2013). The scope and generality of Bell-type theorems. *Foundations of Physics* 43(9), 1153-1169 (2013).

Weatherall, J. and Manchak, J., "The Geometry of Conventionality," *Philosophy of Science* 81(2), 233-247 (2014).

Weatherall, J., "What is a Singularity in Geometrized Newtonian Gravitation?" Forthcoming in *Philosophy of Science*.

### **Douglas White**

Douglas R. White, Malcolm M. Dow, E. Anthon Eff, and J. Patrick Gray, Editors. (in progress). Companion to Cross-Cultural Research, *Blackwell Publishers*.

Douglas R. White. (2014). Preface to the Wiley Companion to the Transformation of Cross-Cultural Research. Advance copy: <http://intersci.ss.uci.edu/wiki/index.php/Preface>

**Jack Xin**

Mathematical Modeling and Signal Processing in Speech and Hearing Sciences (with Y-Y Qi), MS&A, Vol. 10, Springer, 2014.

Asymptotic growth rates and strong bending of turbulent flame speeds of G-equation in steady two dimensional incompressible periodic flows (with Y. Yu), SIAM J. Math Analysis, to appear.

Front Quenching in G-equation Model Induced by Straining of Cellular Flow (with Y. Yu), Arch. Rational Mechanics & Analysis, to appear.

Sharp asymptotic growth laws of turbulent flame speeds in cellular flows by inviscid Hamilton-Jacobi models (with Y. Yu), Annales de l'Institut Henri Poincare, Analyse Nonlineaire, 30(6), pp. 1049--1068, 2013. Turbulent Flame Speeds of G-equation Models in Unsteady Cellular Flows (with Y. Liu, Y. Yu), Math Model. Natural Phenom., 8(3), pp. 198-205, 2013.

Finite Element Computation of KPP Front Speeds in 3D Cellular and ABC Flows (with L. Shen, A. Zhou), Math Model. Natural Phenom., 8(3), 2013, pp. 182-197.

Finite Element Computation of KPP Front Speeds in Cellular and Cat's Eye Flows (with L. Shen, A. Zhou), Journal of Scientific Computing, 55(2), 2013, pp. 455-470.

A Numerical Study of Turbulent Flame Speeds of Curvature and Strain G-equations in Cellular Flows, (with Y. Liu, Y. Yu), Physica D, 243(1), pp. 20-31, 2013.  
DOI:10.1016/j.physd.2012.09.008.

A sparse semi-blind source identification method and its application to Raman spectroscopy for explosives detection (with Y. Sun), Signal Processing, Vol. 96, Part B, pp. 332-345, 2014.

PARTIALLY BLIND DEBLURRING OF BARCODE FROM OUT-OF-FOCUS BLUR (with Y. LOU, E. ESSER, H.K. ZHAO), SIAM Journal on Imaging Sciences, 7(2), 2014, pp. 740--760.

A Semi-Blind Source Separation Method for Differential Optical Absorption Spectroscopy of Atmospheric Gas Mixtures (with Y. Sun, L.M. Wingen, B.J. Finlayson-Pitts), Inverse Problems and Imaging, 8(2), 2014, pp. 587-610.

**Jack Yellott**

Watson, A. B., & Yellott, J. I. (2012). A unified formula for light-adapted pupil size. *Journal of Vision*, 12(10)12, 1–16.

## Hongkai Zhao

Hon, S.Y., Leung, S., and Zhao, H. (2014). A cell based particle method for modeling dynamic interfaces. *Journal of Computational Physics*, 272, 279-306.

Bao, G., Huang, K., Li, P., and Zhao, H. (2014). A Direct Imaging Method for Inverse Scattering Using the Generalized FoldyLax Formulation. *Contemp. Math.*, 615, 49-70.

Lou, Y., Esser, E., Zhao, H., and Xin, J. (2014). Partially Blind Deblurring of Barcode from Out-of-Focus Blur. *SIAM Journal on Imaging Sciences*, 7 (2), 740-760.

Liang J., Zhao, H., (2013). Solving partial differential equations on point clouds. *SIAM Journal on Scientific Computing*, Vol. 35(3), pp 1461-1486.

Lai, R., Liang, J., and Zhao, H. (2013). A local mesh method for solving PDEs on point clouds. *Inverse Problem and Imaging*, 7(3).

Ren, K., Zhao, H. (2013). Quantitative fluorescence photoacoustic tomography. *SIAM Journal on Imaging Science*, 6 (4), 2404-2429.

Wang, C., Wang, J., Cai, Q., Li, Z., Zhao, H., and Luo, R. (2013). Exploring Accurate Poisson-Boltzmann Methods for Biomolecular Simulations. *Computational and Theoretical Chemistry*, 1022:3444.

Liu, H., Zhao, H., and Zou, C. Determining Scattering Support of Anisotropic Acoustic Mediums and Obstacles. *Communications in Mathematical Sciences*, to appear.

Cai, C.-F., Jia, X., Gao, H., Jiang, S.B., Shen Z., and Zhao, H. Cine cone beam CT reconstruction using low-rank matrix factorization: algorithm and a proof-of-principle study. *IEEE Transactions on Medical Imaging*, to appear.

C. TECHNICAL REPORT SERIES

APPENDIX C  
IMBS TECHNICAL REPORTS, 2013-14

MBS 13-01

Unifying Voting Theory from Nakamura's to Greenberg's Theorems  
*Donald G. Saari*

MBS 13-02

Connecting Pairwise and Positional Election Outcomes  
*Donald G. Saari and Tomas McIntee*

MBS 13-03

Strategic and Behavioral Decomposition of  $2 \times 2 \times \dots \times 2$   
*Daniel T. Jessie and Donald Saari*

MBS 13-04

COOPERATION IN *n*-PLAYER GAMES  
*Daniel T. Jessie and Donald Saari*

MBS 13-05

Why Go to Court? Bargaining Failure under the Shadow of Trial With Complete Information  
*Michael McBride, Stergios Skaperdas, and Pi-Han Tsai*

MBS 13-06

Difference-Form Persuasion Contests  
*Stergios Skaperdas, Amjad Toukan, and Samarth Vaidya*

MBS 13-07

On a class of meaningful permutable laws  
*Jean-Claude Falmagne*

MBS 13-08

ON THE COEVOLUTION OF THEORY AND LANGUAGE AND THE NATURE OF  
SUCCESSFUL INQUIRY  
*Jeffrey A. Barrett*

MBS 13-09

ON THE COEVOLUTION OF BASIC ARITHMETIC LANGUAGE AND KNOWLEDGE  
*Jeffrey A. Barrett*

MBS 14-01

Endogenous scheduling preferences and congestion  
*Kenneth Small*





## D. FACULTY PRESENTATIONS

### APPENDIX D COLLOQUIA AND CONFERENCES OF IMBS MEMBERS, 2013-14

#### **Pierre Baldi**

Invited speaker, Deep Learning, Carnegie Mellon University (CMU-Pitt PhD program in Computational Biology (CPCB)) Aug, 2013.

Invited plenary speaker, 20-th anniversary of the Center for Biological Sequence Analysis, Technical University of Denmark (DTU), Copenhagen, Denmark (October 2013)

Invited to the workshop on Learning Data Representation: Hierarchies and Invariance, McGovern Institute, MIT. Sponsored by the new Center for Brain Minds and Machines and the joint IIT-MIT Laboratory for Computational and Statistical Learning. MIT (November 2013).

Invited speaker 2014 Tarragona International Summer School on Trends in Computing (July 2014).

Invited speaker 2014 Summer School on RNA at Boston College (July 2014).

#### **William Batchelder**

Batchelder, W. H. Cultural Consensus Theory: The General Condorcet Model. Paper presented in invited session on Cultural Consensus theory at Annual Classification Society of North America, Milwaukee. June 2013.

Batchelder, W. H. History of Mathematical Psychology. Invited paper presented at Advances in Behavioral Sciences in the Internet Age—Selected Topics in Mathematical Psychology. Forum held at Central China Normal University, Wuhan, China. June 2013.

Batchelder, W. H. Cognitive Psychometrics. Invited paper presented at Advances in Behavioral Sciences in the Internet Age—Selected Topics in Mathematical Psychology. Forum held at Central China Normal University, Wuhan, China. June 2013.

Anders, R. (Presenter), and Batchelder, W. H. A Cultural Consensus Theory Model for the Polytomous Data Case. Paper read at the Annual Meeting of the Society for Mathematical Psychology. University of Potsdam, Potsdam, Germany. August 2013.

Alexander, G. (Presenter), and Batchelder, W. H. Stimulus Similarity in Continuous Recognition Memory. Paper read at the Annual Meeting of the Society for Mathematical Psychology. University of Potsdam, Potsdam, Germany, August, 2013

Batchelder, W. H. Evolving Dominance Hierarchies and Naming Conventions. Invited paper read at New Mathematical Approaches in the Behavioral Sciences. Institute for Mathematical Behavioral Sciences, University of California, Irvine. December 2013.

Alexander, G. (Presenter), and Batchelder, W. H. Effects of Losing Your Marbles: A Tale of Free Recall. Paper read at the 52<sup>nd</sup> Annual Edwards Bayesian Research Conference. Fullerton, CA. February 2014.

Batchelder, W. H. Cultural Consensus Theory: Recent Developments. Paper read at the Annual Meeting of the Society of Experimental Psychologists. University of California, Los Angeles. April 2014.

### **Michael Birnbaum**

Birnbaum, M. H. (2013). Science of JDM as an Efficient Game of Mastermind. Keynote address at Max Planck Institute for Human

Development, Bonn, July, 2013. Small Group Meeting: Efficient Science Download Powerpoint presentation Birnbaum, M. H. (2013).

Theories of decisions under risk and uncertainty by R. Duncan Luce. Presentation in SJDM Tribute to R. Duncan Luce, Society for Judgment and Decision Making Meetings, Toronto, Canada, Nov. 15, 2013.

Birnbaum, M. H. (2013). Website with helpful resources for learning how to conduct research via the Internet. Poster presentation in Society for Computers in Psychology Meetings, Toronto, Canada, 2013.

Link to the Website of Web research resources Birnbaum, M. H. (2014). I keep on digging, well, well, well. (A search for intransitive preferences predicted by Regret Theory and Majority Rule.) 52<sup>nd</sup> Edwards Bayesian Research Conference, Fullerton, February 2014. Conference Website links to papers.

Birnbaum, M. H. (2014). A test of majority rule in decisions based on advice. Foundations of Utility and Risk (FUR XVI), Rotterdam, Netherlands, June-July, 2014. Conference Website with links to papers

Birnbaum, M. H. (2013). Science of JDM as an Efficient Game of Mastermind. Keynote address at Max Planck Institute for Human Development, Bonn, July, 2013. Small Group Meeting: Efficient Science

Download Powerpoint presentation Birnbaum, M. H. (2013). Theories of decisions under risk and uncertainty by R. Duncan Luce. Presentation in SJDM Tribute to R. Duncan Luce, Society for Judgment and Decision Making Meetings, Toronto, Canada, Nov. 15, 2013.

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Birnbaum, M. H. (2014). A test of majority rule in decisions based on advice. Foundations of Utility and Risk (FUR XVI), Rotterdam, Netherlands, June-July, 2014. Conference Website with links to papers

### **William Branch**

Southwest Search and Matching Workshop, U.C. Riverside (May 2014)

Indiana University (November 2013)

Federal Reserve Bank of San Francisco (August 2013)

### **Jan Brueckner**

2014 International Conference on Industrial Organization, Zhejiang University, Hangzhou, China, July 2014.

Keynote Speaker, IEB 3<sup>rd</sup> Workshop on Urban Economics, University of Barcelona, July 2014.

ITEA Conference on Transportation Economics, Toulouse, June 2014.

Federal Reserve Bank of New York, May 2014

Urban Economics Handbook Conference, University of Pennsylvania, May 2014

Conference on “Subnational Government Competition,” University of Tennessee, March 2014.

### **Mike Burton**

“Breadfruit and Chicken: Two Contrasting Circulations of Food in Kosrae.” Association for the Social Anthropology of Oceania. Kona, HI. February 2014.

## **Carter Butts**

``Sampling in a Brave New World: Promises and Cautionary Notes." Invited Presentation, Population Association of America Meeting. Boston, MA, May 2014.

``Curved, Warped, and Lumpy: Some Initial Results from the American Social Fabric Project." Invited Lecture, Sociology Colloquium, University of Chicago. Chicago, IL, October 2013.

``Space, Heterogeneity, and Relational Dynamics." Invited Talk, Fifth International Workshop on Social Network Analysis (ARS 2013). Rome, Italy, June 2013.

## **Conference presentations**

Almquist, Zack W. and Butts, Carter T. ``Bayesian Analysis of Dynamic Network Regression with Joint Edge/Vertex Dynamics." 34th Sunbelt Network Conference (INSNA), St. Pete's Beach, FL, February 2014.

Butts, Carter T. ``Asymptotic Bayesian Inference for Pooled ERGMs." 34th Sunbelt Network Conference (INSNA), St. Pete's Beach, FL, February 2014.

Fitzhugh, Sean and Butts, Carter T. ``Network Lithology: Techniques for Identifying Subgraph Composition." 34th Sunbelt Network Conference (INSNA), St. Pete's Beach, FL, February 2014.

Gibson, Ben; Yu, Yue; Almquist, Zack; and Butts, Carter T. ``Scalable Estimation of Temporal ERGMs with DNR Structure from Egocentrically Sampled Data." 34th Sunbelt Network Conference (INSNA), St. Pete's Beach, FL. February 2014.

Gjoka, Minas; Smith, Emma; and Butts, Carter T. (2/2014). ``Design-based Estimators for Attribute-labeled, Low-semidiameter Subgraphs." 34th Sunbelt Network Conference (INSNA), St. Pete's Beach, FL. February 2014

Yu, Yue; Smith, Emma; and Butts, Carter T. (2/2014). ``Retrospective Network Imputation from Life History Data: the Impact of Designs." 34th Sunbelt Network Conference (INSNA), St. Pete's Beach, FL.

Almquist, Zack W. and Butts, Carter T. (8/2013). ``Dynamic Network Logistic-Regression: A Dynamic Logistic Choice Analysis of DNC and RNC Blog Citation Networks in the 2004 US Presidential Election." ASA Meeting, New York, NY.

Butts, Carter T. (8/2013). ``Baseline Mixture Models for Social Networks." ASA Meeting, New York, NY.

Gibson, Charles; Spiro, Emma S.; Fitzhugh, Sean; and Butts, Carter T. (8/2013). ``Estimating Active User Population Dynamics in Online Social Networks." ASA Meeting, New York, NY.

Spiro, Emma S. and Butts, Carter T. (8/2013). "When Bad Things Happen to Good People: Online Communication Dynamics During Natural Hazard Events." ASA Meeting, New York, NY.

Sutton, Jeannette; Spiro, Emma S.; Johnson, Britta; Fitzhugh, Sean; Gibson, Charles; and Butts, Carter T. (8/2013). "Warning Tweets: Serial Transmission of Warning Messages during a Disaster Event." ASA Meeting, New York, NY.

Sutton, Jeannette; Butts, Carter T.; Spiro, Emma S.; Johnson, Britta; Fitzhugh, Sean; and Gibson, Ben. (7/2013). "HEROIC Project Update: Hazards, Emergency Response, and Online Informal Communications." 2013 Natural Hazards Research and Applications Workshop, Broomfield, CO.

### **Jean-Paul Carvalho**

18 October 2014: "Education, Social Mobility and Religious Movements: A Theory of the Islamic Revival in Egypt", AALIMS workshop, Princeton University.

24 October 2013: "Coordination and Culture", UCLA Anderson, Seminar.

21 November 2013: "Education, Social Mobility and Religious Movements: A Theory of the Islamic Revival in Egypt", IRES Seminar, Chapman University.

5 December 2013: "Coordination and Culture", IMBS Colloquium, UC Irvine.

22 March 2014: "Education, Social Mobility and Religious Movements: A Theory of the Islamic Revival in Egypt", ASREC Conference, Chapman University.

6 June 2014: "Education, Social Mobility and Religious Movements: A Theory of the Islamic Revival in Egypt", IEA World Congress, Jordan.

27 June 2014: "Education, Social Mobility and Religious Movements: A Theory of the Islamic Revival in Egypt", IAST Economic History Workshop, Toulouse.

### **Charles Chubb**

G Sperling, P Sun, CE Wright, C Chubb (Talk presented by G Sperling at the European Conference on Visual Perception, Bremen, Germany, Aug. 26, 2013) *An automatic, bottom-up process segregates homogeneous elements from similar but different elements in brief visual displays.*

G. Sperling, C. Chubb, P Sun, CE Wright (presentation in the Institute For Mathematical Behavioral Sciences colloquium series, Irvine, CA, Oct. 17, 2013) *The centroid paradigm: A new method for analyzing feature-based attention.*

C. Chubb (Keynote address, Eleventh Annual USC Vision Symposium, University of Southern California, April 22, 2014) *Cuttlefish camouflage*.

C. Chubb (presentation at Department of Psychology, North Dakota State University, Fargo, ND, April 25, 2014) *Cuttlefish Camouflage*.

C. Chubb (presentation at Laboratoire Psychologie de la Perception (LPP), Paris, France, June 16, 2014) *The centroid paradigm: A new method for analyzing feature-based att.*

### **David Eppstein**

Windows into relational events: Data structures for contiguous subsequences of edges, Computer Science Dept., University of Arizona, February 2014.

Structures in solution spaces: Three lessons from Jean-Claude. Conference on Meaningfulness and Learning Spaces: A Tribute to the Work of Jean-Claude Falmagne, Irvine, California, 2014.

Regular labelings and geometric structures, Computer Science Dept., Oregon State University, March 2014.

### **Jean-Claude Falmagne**

*Learning Spaces and the foundation of the ALEKS system.* January 29, 2014. J.-Cl Falmagne, Mathematical Education Program, January 27-29, 2014, Beckman Center, University of California, Irvine

*Deriving meaningful scientific laws from abstract, “gedanken” type, axioms: three examples.* February 27, 2014. J.-Cl. Falmagne, IMBS Conference on Meaningfulness and Learning Spaces. A tribute to the work of Jean-Claude Falmagne. February 27-28, 2014. University of California, Irvine.

*Deriving meaningful scientific laws from abstract, “gedanken” type, axioms: three examples.* July 30, 2014. J.-Cl. Falmagne, Symposium Honoring Jean-Claude Falmagne 80th Birthday. Annual Meeting of the European Mathematical Psychology Group, University of Tuebingen, Germany.

### **Katherine Faust**

“Triadic Structural Signatures in Social Networks” National Institute for Mathematical and Biological Synthesis (NIMBioS) Animal Social Networks Workshop, March , 2014

“Comparing Asymmetry in International Trade Networks between Commodities and through Time” Sunbelt Social Network Conference, St. Pete Beach, Florida, February 2014 (Katherine Faust and Matthew Mahutga)

## **Steve Frank**

ETH Zurich, Pathology from evolutionary conflict, April 2013

Oxford, Three conjectures on organismal design, May 2013

Basel, Three conjectures on organismal design, May 2013

Berkeley, Measurement scale and dissipation of information shape biological pattern, March 2014

Berlin, Unsolved problems in cancer, June 2014

## **Amihai Glazer**

I gave two presentations at Leuven University, Belgium, "Universal service to reduce rent seeking," and "Pricing of public transit under union power."

## **Simon Huttegger**

"An Analogical Inductive Logic for Partially Exchangeable Families of Attributes" Munich Center for Mathematical Philosophy, LMU Munich, May 2014.

"Ein allgemeines Prinzip rationalen Lernens" Department of Philosophy, University of Salzburg, May 2014.

"Learning Experiences, Expected Inaccuracy, and the Value of Knowledge" Munich Center for Mathematical Philosophy, LMU Munich, May 2014.

"Foundations for Boundedly Rational Learning" Department of Philosophy, University of Groningen, April 2014.

"Learning Experiences, Expected Inaccuracy, and the Value of Knowledge" Department of Philosophy, University of Düsseldorf, April 2014.

"Hybrid Equilibria in Costly Signaling Games", Arbeitsgemeinschaft Biomathematik, University of Vienna, March 2014.

"Rational Foundations of Boundedly Rational Learning", keynote lecture at SOPhiA 2013, Salzburg, September 2013.

"Meinungsverschiedenheiten und die Konvergenz von Wahrscheinlichkeiten", Department of Philosophy, University of Salzburg, March 2013.

“Some Measurement-Theoretic Problems of Phenotype Spaces”, Symposium on *The Foundations of Quantification and Measurement in the Biological Sciences* sponsored by the John Templeton Foundation, New York, February 2013.

“Pattern Learning in Games”, Institute for Mathematical Behavioral Sciences, UC Irvine, February 2013 “How to Learn in Strategic Interactions”, Philosophy & Economics, University of Bayreuth, January 2013.

### **Kimberly Jameson**

Jameson, K. A. & Winkler, A. (2014). “Preliminary findings on empirical investigations of potential tetrachromacy.” Invited presentation at the Visual Perception Laboratory. University of Nevada, Reno. July 25, 2014.

Jameson, K. A. & Winkler, A. (2014). “C.A.'s potential tetrachromacy.” Presentation at “The super vision soriee” at The Abbey on 5th Avenue. San Diego, CA. August 15, 2014.

Jameson, K. A. & Winkler, A. (2014). “New results on color appearance space and the potential for human tetrachromacy.” Presentation at the Annual Cognitive Sciences Association for Interdisciplinary Learning (CSAIL). Hood River Valley, Oregon. August 2, 2014.

Jameson, K. A. (2014). “Color Perception and Photopigment Opsin Gene Variation.” Invited presentation. GAVIN HERBERT EYE INSTITUTE and THE DISCOVERY CENTER FOR EYE RESEARCH “BENCH TO BEDSIDE SYMPOSIUM.” May 2014. UCI Medical School.

Jameson, K. A. & Komarova, N. L. (2013) “New formal methods for analyzing conceptual representation of continuous domains: human color similarity relations.” Institute for Mathematical Behavioral Sciences colloquium. UC Irvine, December 2013.

Jameson, K. A. (2013). “Applying internet-based research methods to transform a paper archive of the MesaoAmerican color survey data.” Invited presentation. Host: G.P. Li, Director. Calit2, UCI, October 2013.

### **Poster presentations**

Stehr, D. A., Alvarado, N. & Jameson, K. A. 2014. Interpretation of meaning in neutral facial expressions. Poster presentation at the 2014 Inaugural Conference of the Society for Affective Science, Bethesda, MD.

### **Kent Johnson**

“Factor Analysis: Underdetermination and Uncertainties”, Society for Philosophy and Psychology, Vancouver, CA, June 2014.



“Factor Analysis and Measurement”, UC Boulder Conference on Measurement Across the Sciences, October 2013.

“Factor Analysis: Underdetermination and Uncertainties”, UC Merced, September 2013.

“Notational Variants in Linguistics”, Society for Philosophy and Psychology, Providence, RI, June 2013.

### **Marek Kaminski**

“How strong are soccer teams?” U C Irvine, January 2014

“How strong are soccer teams?” Public Choice Annual Conference, Charleston, April 2014

### **L. Robin Keller**

Sponsored Session co-chaired by L. Robin Keller and Candice Huynh (now a Merage alumna), “Panel Discussion: Teaching Decision Analysis”, INFORMS, Minneapolis, October 2013, in Decision Analysis Society Cluster.

Candice Huynh (presenter) and L. Robin Keller, “Introduction to Panel Session and Tips for Teaching Decision Analysis Software”.

L. Robin Keller, “Quick Decision Analysis for MBAs”

L. Robin Keller, “Recalling Duncan Luce at UC Irvine”, in R. Duncan Luce Memorial Session, SJDM Annual Meeting, Toronto, November 2013.

James Leonhardt (New Mexico State University) and L. Robin Keller (both presented poster), “Possibilities and Probabilities in the Bean Game”, poster, SJDM Annual Meeting, Toronto, November 2013.

Yitong Wang (University of Technology, Sydney, Australia), Liangyan Wang (Shanghai Jiaotong University, Shanghai, China), L. Robin Keller, “Discounting over Subjective Time: Towards a Unified Theory of Intertemporal Choice”, poster presented at 2014 Boulder Summer Conference on Consumer Financial Decision Making, May 18-20, 2014.

L. Robin Keller, “Risk Aversion” is Mislabeled and Misleading”, accepted oral presentation at the Advances in Decision Analysis conference, Georgetown, June 16-18, 2014.

L. Robin Keller also attended the Decision Analysis Affinity Group (DAAG) conference and the INFORMS Analytics conference, Boston, Spring 2014.

### **Natalia Komarova**

Winfrey Lecture, University of Arizona, April 2014.

Max-Planck-Institute for Evolutionary Biology, Ploen, Germany, February 2014.

Arthur M. Sackler Colloquium of the National Academy of Sciences, USA, January 2014.

In The Light of Evolution VIII: Darwinian Thinking in the Social Sciences, The National Academy of Sciences, Irvine, CA.

WhAM! (Women in Applied Mathematics) Research Collaboration Workshop: Dynamical Systems with Applications to Biology and Medicine (Role: Group leader.) Minneapolis, September 2013

OCCAM workshop in Applied Mathematics, Oxford, UK, July 2013.

### **Igor Kopylov**

2014: University of Arizona, FUR (Erasmus University, Rotterdam), Boston University, Southwest Economic Theory Conference, NES (Moscow).

### **Michael Lee**

“Applications of Bayesian graphical modeling to psychophysics”, Invited plenary address, International Society for Psychophysics, Lund, Sweden, 2014.

“How psychological modeling can benefit from Bayesian methods“, Invited address, 26th Annual Convention of Association for Psychological Science, San Francisco, 2014.

“Combining human knowledge”, Invited department plenary lecture, National Autonomous University of Mexico (UNAM), 2014.

“Cognitive models and the wisdom of the crowd”, Invited colloquium, New York University, May 2013.

### **Simon Levin**

“Public Goods: Competition, Cooperation, and Spite” (Keynote Address), Arthur M. Sackler Colloquium: In the Light of Evolution VII: Darwinian Thinking in the Social Sciences Conference, UCI, January 2014.

“Exploration as Investment in the Future,” IBMS Colloquium, UCI, January 2014.

“Modeling Infectious Diseases,” Mathematics Education Program, Beckman Center, UCI, January 2014.

Three Lectures Given as Distinguished Lecturer to the ICTP South American Institute for Fundamental Research, Sao Paulo State University, Sao Paulo, Brazil, February 2014.

“Challenges in Mathematical Ecology”:

1. “Scaling and Collective Phenomena”

2. “Sustainability Science”
3. “Infectious Diseases”

“Public Goods: Competition, Cooperation and Spite,” Seminar Series, Department of Ecology, Evolution and Environmental Biology, Columbia University, March 2014.

“Obstacles and Opportunities in Environmental Management,” Tyler Prize Laureate Lecture, USC, April 2014.

“Discounting and Evaluation of Environmental Policies,” Workshop on Climate Change and Public Goods, Fondazione Eni Enrico Mattei, Venice, Italy (June 2014)

“Public Goods: Competition, Cooperation, and Spite” (Plenary Lecture), Workshop on Discounting and Evaluation of Environmental Policies, Istituto Veneto di Scienze, Lettere ed Arti, Venice, Italy (June 2014)

“The Challenge of Sustainability and the Promise of Mathematics,” Atelier de Réflexion Prospective: Mathématiques en Interactions pour la Terre, Institute Henri Poincaré, Paris, France (July 2013)

“Collective Phenomena, Collective Motion, and Collective Action in Ecological Systems,” Collège de France, Paris, France (July 2013)

Three Lectures Given as Aisenstadt Chair for the Pan-Canadian Thematic Program on Models and Methods in Ecology, Epidemiology and Public Health related to Mathematics of Planet Earth 2013 (MPE 2013) (July 2013):

1. “Collective Phenomena, Collective Motion, and Collective Action in Ecological Systems,” Centre de Recherches Mathématiques, Mathematics of Planet Earth 2013, Université de Montréal

2. “Evolutionary Perspectives on Discounting, Public Goods and Collective Behavior,” Workshop on Biodiversity in a Changing World, Centre de Recherches Mathématiques, Université de Montréal (July 2013)

3. “The Challenge of Sustainability and the Promise of Mathematics,” Centre de Recherches Mathématiques, Université de Montréal (July 2013)

“Challenges in Mathematical Ecology: Scaling and Collective Phenomena” (Public Lecture), 2013 Atlantic Association for Research in the Mathematical Sciences (AARMS) Mathematical Biology Workshop, Memorial University, St. John's, Newfoundland (July 2013)

“Challenges in Viewing Ecosystems as Complex Adaptive Systems,” Special Session: Managing the World’s Forests as Complex Adaptive Systems – Sustainable Pathways for a Changing World, ESA Annual Meeting, Minneapolis, MN (August 2013)

“Public Goods, Common Pool Resources and the City,” Urban Ecology: From Biophysics to Society, ESA Annual Meeting, Minneapolis, MN (August 2013)

“Predicting Dynamics and Uncertainty Across Scales of Ecological Organization,” Ecology: Into the Next 100 Years, International Association for Ecology (INTECOL) 2013, London, UK (August 2013)

“The Ecology of Society: From Microbes to Public Goods,” John von Neumann Public Lecture Series in Complexity and Computation, Center for Complexity & Collective Computation (C4), Wisconsin Institute for Discovery, University of Wisconsin (September 2013)

“Collective Phenomena, Collective Motion, and Collective Action in Ecological Systems,” Santa Fe Institute, Santa Fe, NM (September 2013)

“Evolutionary Perspectives on Discounting, Public Goods and Common Pool Resources,” NorMER Annual Meeting, Reykjavik, Iceland (September 2013)

“The Challenge of Sustainability and the Promise of Mathematics,” MathAcrossCampus Colloquium Series, University of Washington, Seattle (October 2013)

### **Michael McBride**

M. McBride, Economic Science Association, "Limelight on Dark Markets: An Experimental Study of Liquidity and Information," Oct 2013, Santa Cruz

M. McBride, Trends in Social Network Research Workshop, Academia Sinica, Taipei, Taiwan, "Network Formation with Limited Observation," Nov 2013

M. McBride, UCI Institute for Mathematical Behavioral Sciences, February 2014, "An Experimental Study of Network Formation with Limited Observation"

M. McBride, Association for the Study of Religion, Economics, and Culture Conference, Mar 2014, "Why Churches Need Free-riders: Religious Capital Formation and Religious Group Structure"

M. McBride, IEA World Congress, "A Rational Choice Approach to Religious Authority," IEA World Congress, Jordan, June 2014

## **Anthony McGann**

“Revenge of the Antifederalists: Constitutional Implications of Redistricting” With Charles Anthony Smith and Alex Keena. Annual Meeting of the Midwest Political Science Association, Chicago April 3-6, 2014.

“Independence and Policy Mood: Does Scottish Public Opinion Track British?” With Sebastian Dellepiane-Avellaneda. Annual Conference of the European Political Science Association. Edinburgh June 19-21, 2014.

## **Andrew Noymer**

Population Association of America 2014 annual meeting, Boston. “A universal pattern of the evolution of life table entropy and life expectancy” Session 80. With Ciarra Coleman.

Population Association of America 2014 annual meeting, Boston. “Respiratory viruses’ effect on all-cause mortality: Winter and summer pseudoseasonal life expectancy in the United States” Poster session 8. With Rahema Haseeb.

What’s flu got to do with it? Changes in the age-structure of influenza mortality during pandemics. Duke Population Research Institute (DuPRI), 19 September 2013

## **Lisa Pearl**

May 2014, "Language", Developmental Psychology Lecture, University of California, Irvine.

April 2014. “*Bayesian inference as a cross-linguistic word segmentation strategy: Always learning useful things.*” (with Lawrence Phillips), Computational and Cognitive Models of Language Acquisition and Language Processing Workshop, EAACL, Gothenberg, Sweden.

February 2014. “*More learnable than thou? Testing metrical phonology representations with child-directed speech.*” (with Timothy Ho & Zephyr Detrano), 40<sup>th</sup> Annual Meeting of the Berkeley Linguistics Society, Berkeley, CA. (29% acceptance rate)

January 2014. “*More learnable than thou? Testing knowledge representations with realistic acquisition data*”. Linguistics Colloquium, University of California, Santa Cruz.

November 2013. “*More learnable than thou? Empirically testing linguistic knowledge representations*”. Institute for Mathematical Behavioral Sciences, University of California, Irvine.

November 2013. “*More learnable than thou? Empirically testing linguistic knowledge representations*”. Logic and Philosophy of Science Colloquium, University of California, Irvine.

October 2013. “*Knowing where to look: Identifying what children need to make syntactic generalizations*”. Cognition and Language Workshop, Stanford University.

## **Dale Poirier**

“Implicit Distributional Assumptions,” Special Talk, Rimini Conference in Economics and Finance, June 10, 2014.

“Discrete Covariates: An Answer to Whimsicality?,” The 3<sup>rd</sup> Symposium on Methodology of Econometric Modelling and Forecasting held July 17-18, 2013 at Dongbei University of Finance and Economics in Dalian, Peoples Republic of China.

## **Donald Saari**

“Using mathematics to structure laws.” IPAM Conference on Mathematics of Politics, UCLA, April 2014.

“Mathematics and the ‘dark matter’ mystery from astronomy.” The Conference at Centre de Recerca Matemàtica, Universitat Autònoma, Barcelona, April 2014.

“The source of all of those problems and paradoxes in social choice.” Workshop on Social Choice and Law, UCI, IMBS, March 2014.

“From topology to faces.” The Conference on New Mathematical Approaches in the Behavioral Sciences, UCI, IMBS, December 2013.

“Mathematics and the astronomical mystery of ‘dark matter’.” Colloquium at the Department of Mathematics, Penn State, November 2013.

“We vote, but do we get what we want?” MASS Colloquium, Penn State, November 2013.

“Groups decide, but do they really elect who or what they want?” Science Talk at Kennesaw State University, Kennesaw GA. October 2013.

“Decomposing and analyzing games: From selfish to collective and cooperative actions.” The Conference on Power, Games, and Fairness, Public Choice Research Center, Turku, Finland . October 2013.

“Toward a mathematical theory of emergence.” Gateways to Emergent Behavior in Science & Society, Santa Fe Institute September 2013.

“Problems with rankings; from theory to practice.” NIH, Symposium on Ranking, Bethesda, Md., August 2013.

## **Stergios Skaperdas**

“Guns, Lawyers, and Money: Economic Consequences of Costly Conflict,” in Contests conference, Social Science Research Center (WZB), Berlin, Germany, October 28, 2013.

“Nation-building through war,” Leitner Political Economy Seminar, Yale University, November 18, 2013.

“Can the eurozone survive?” Center for Economics and Public Policy (CEPP) Salon, February 19, 2014.

### **Brian Skyrms**

Sackler Colloquium on Darwinian Thinking in the Social Sciences

Oct. 2013 -- Wesley Salmon Lecture, University of Pittsburgh

Jan 2014 -- Sackler Colloquium - Beckman Center of the National Academy

May 2014 -- Association for Symbolic Logic Boulder, CO.

### **Ken Small**

Speaker and panelist, “Forecasting for High-Speed Rail in California,” special session on Demand Modelling, Kuhmo Nectar Conference on Transportation Economics, Evanston, Illinois, July 10-13, 2013.

Kuhmo-Nectar Confer. on Transport Economics, Evanston, Illinois, July 2013

### **Hal Stern**

Discussant, Session on Statistical Inference in Forensic Statistics

Joint Statistical Meetings, Montreal, Canada, August 2013.

“A Statistical Approach to Detecting Patterns in Behavioral Event Sequences,” Workshop on Recent Advances in Bayesian Inference, UC Irvine, Irvine, CA, March 2013

“Watching Sports Through the Eyes of a Statistician,” MAA Southern California Nevada Spring Meeting, Irvine, CA , April 2014.

“A Statistical Approach to Detecting Patterns in Behavioral Event Sequences,” Department of Statistics, University of California, Irvine, CA, June 2014.

### **Jennifer Trueblood**

Trueblood, J. S. (2014, July). A Quantum Probability Approach to Human Causal Reasoning. The 47th Annual meeting of the Society for Mathematical Psychology, Quebec City, Canada.

Trueblood, J. S. & Hemmer, P. (2014, July). Quantum refrigerators: A quantum model of conjoint recognition in natural scenes. The 47th Annual meeting of the Society for Mathematical Psychology, Quebec City, Canada.

Trueblood, J. S. & Pothos, E. M. (2014, July). A Quantum Probability Approach to Human Causal Reasoning. The 36th Annual Conference of the Cognitive Science Society, Quebec City, Canada.

Trueblood, J. S. (2014, February). A Quantum Probability Approach to Causal Reasoning. The 52nd Edwards Bayesian Research Conference, Fullerton, California.

Trueblood, J. S. (2013, November). Reference-dependent Preference Reversals: A Dynamic Modeling Account. The 34th Annual Conference of the Society for Judgment and Decision Making, Toronto, Canada.

Trueblood, J. S., Brown, S. D., & Heathcote, A. (2013, November). The Multi-attribute Linear Ballistic Accumulator Model: A Dynamic Account of Context Effects in Decision-making. The 54th Annual Meeting of the Psychonomic Society, Toronto, Canada.

Trueblood, J. S., Brown, S. D., & Heathcote, A. (2013, August). The Multi-attribute Linear Ballistic Accumulator Model of Decision-making. The 35th Annual Conference of the Cognitive Science Society, Berlin, Germany.

Trueblood, J. S. (2013, August). A Dynamic Dual-Process Model of Risky Decision-making. The 46th Annual meeting of the Society for Mathematical Psychology, Potsdam, Germany.

Trueblood, J. S. (2013, August). A Dynamic Dual-Process Model of Decision-making Under Uncertainty. The 35th Annual Conference of the Cognitive Science Society, Berlin, Germany.

Trueblood, J. S. (2013, July). Modeling Reference Dependent Preference Reversals. The 12th Annual Summer Interdisciplinary Conference, Cortina, Italy.

Invited talks:

Trueblood, J. S. (2014, February). The Role of Context in Multi-alternative Decision-making. Invited talk given at the Psychology Department Colloquium Series, University of Kentucky, Lexington.

Trueblood, J. S. (2014, January). A Quantum Probability Approach to Decision-making and Causal Reasoning. Invited talk given at the Psychology Department Colloquium Series, University of Virginia, Charlottesville.

Trueblood, J. S. (2013, December). A Quantum Probability Approach to Causal Reasoning. Invited talk given at the Institute for Mathematical Behavioral Sciences, University of California, Irvine.

Trueblood, J. S. (2013, October). Applications of Quantum Probability Theory to Decision-making and Causal Reasoning. Invited talk given at the Center for Cognitive Science Colloquium, Rutgers University.

### **James Weatherall**

"On Particle and Field Interpretations of Quantum Field Theory." 18th Annual Seven Pines Symposium. Stillwater, MN. May 2014.



“The Physics of Wall Street.” UCI CEO Roundtable Retreat. Napa, CA. May 2014.  
Panel Discussion on \emph{The Physics of Wall Street}, with D. Grand and R. Steinke. Morris Arts Center. Morristown, NJ. April 2014.

“The Physics of Wall Street.” Department of Literature, Language, Writing, and Philosophy. Fairleigh Dickinson University. Madison, NJ. April 2014.

“Science and Fake Science in Fiction.” Association of Writers and Writing Programs 2014 Annual Meeting. Seattle, WA. February 2014. (Part of a panel discussion with R. Steinke, H. L. Hix, and D. Grand.)

“Prediction in General Relativity.” The Foundational Questions Institute (FQXi) 4th International Conference. Vieques, Puerto Rico. January 2014.

“Can Newtonian gravitation explain inertial motion?” Department of Philosophy. University of Notre Dame. South Bend, IN. October 2013.

Panel Discussion on The Physics of Wall Street, with V. Bhansali and E. Thorp. Sage Hill Science Lecture Series. Sage Hill High School. Newport Coast, CA. October 2013.

“What is a Scientific Theory? or, How to formalize a scientific theory ...if you're inclined to do so,” w/ H. Halvorson. Department of Philosophy. Carnegie Mellon University. Pittsburgh, PA. September 2013.

“The Geometry of Conventionality.” Foundations of Physics 2013: The 17th UK and European Meeting. Ludwig-Maximilians Universitat. Munich, Germany. July 2013. (Contributed talk jointly delivered with co-author J. Manchak.)

“Inertial Motion, Explanation, and the Foundations of Classical Spacetime Theories.” Munich Center for Mathematical Philosophy. Ludwig-Maximilians Universitat. Munich, Germany. July 2013.

### **Joachim Vandekerckhove**

Vandekerckhove, J. (July 2013). *Cognitive latent variable models*. Paper presented at the Thirteenth Annual Summer Interdisciplinary Conference, Cortina, Italy.

Vandekerckhove, J. (July 2013). *Cognitive latent variable models*. Paper presented at the 46<sup>th</sup> Annual Meeting of the Society for Mathematical Psychology, Berlin, Germany.

Vandekerckhove, J., Nunez, M., Baribault, B., & Srvinivasan, R. (June 2014). *Latent variable methods for data fusion*. Paper presented at the Twelfth Annual Summer Interdisciplinary Conference, Moab, UT.

## **Douglas White**

May 20, 2014, Doug White and Lukasz Lacinski. "CoSSci High Performance Computing for Anthropology and the Social Sciences." Monthly Extended Collaborative Support Symposium for XSEDE (Extreme Science and Engineering Discovery Environment).

April 15, 2014, Ulla Johansen, Doug White. "Power of coherence of a Turkish Nomad Clan: From fieldwork to anthropological theory". Speakers invited by Professor Ayse Hilal Tuztas. Address. aysehilal.tuztas@yeditepe.edu.tr Yeditepe University, Anthropology Department. 0216 578 09 24 - 0537 966 08 36

March 18-22, 2014, Doug White and Tolga Oztan. Session Co-Chairs, SASci Meeting (jointly with the Society for Applied Anthropology), Invited Session: "Science Gateway Analytic Modeling for Comparative Research," Invited Chapter authors, Wiley Companion for Cross-Cultural Research. <http://anthrosciences.org/SASci2014/> Albuquerque, New Mexico. Celebrating ending Galton's Problem with Inferential Statistics and Galaxy Gateways

March 4, 2014, Doug White. "Science Gateways Community Talk: Complex Social Sciences Gateway." XSEDE Science Community On-line talks. Hosted by Suresh Marru, Pervasive Technology Institute, University of Indiana.

November 20-24, 2013, Doug White and Tolga Oztan. "The Evolutionary Lattice of Kinship Behaviors." Nov 22nd Friday 1:45-5:30 - Prime Time. Kinship Panel "THE KINSHIP PAST and THE FUTURE OF A KINSHIP PUBLIC. organized by Dwight Read and Fadwa El Guindi. 2013 American Anthropological Association Annual Meeting, Chicago. How the three basic dimensions in the world's ethnographic formal concept (Galois) lattice of joking, avoidance and respect are organized by a Network of Variable Analysis (NoVA) reproducible at the Complex Social Science (CoSSci) Supercomputer Gateway.

Aug. 18 - Aug. 28. 2013. Organizer, Complex Social Science Galaxy Databases and Modeling aka SFI Causality/Robustness Working group Meeting 5. Douglas R. White, Tolga Oztan, Amber Johnson. Santa Fe Institute. Focus on LRB forager data, modeling LRB, SCCS, EA, map generation, R code for maps and kinship networks.

Aug 5-9, 2013, Wednesday. Doug White, and Robert Sinkovits. Plenary Speakers. "Cohesive subgroups and analysis of networks." SDSC Summer Institute. San Diego Super Computer, UCSD.

July 22-26, 2013, Doug White and Tolga Oztan. "The Probable Evolution of Kinship Behavior." XSEDE Gateway to Discovery Conference, San Diego. How the three basic dimensions in the world's ethnographic formal concept (Galois) lattice of joking and avoidance are organized by a Network of Variable Analysis (NoVA) reproducible at the Complex Social Science (CoSSci) Supercomputer Gateway. abstract submitted Keywords: Causal analysis, Galois lattice, Human evolution, Cooperativity, Kinship, Cross-cultural database, CoSSci supercomputer gateway.

July 22-26, 2013, Doug White and Tolga Oztan. "The SoSSci Gateway for Research and Online Training in the Social Sciences." XSEDE Gateway to Discovery Conference, San Diego.

Abstract: The UC Irvine Complex Social Science Gateway (CoSSci): provides researchers and online courses (MOOCs, Coursera, Moodles and & Open Access for Online Education) with Human Sciences and Environmental databases, autocorrelation modeling, cooperative bonding in k- and pairwise cohesion and network modeling in small and large networks; including kinship, exchange and social or informational bonds. abstract submitted May 21-26 2013, Tolga Oztan, Doug White, Robert Sinkovits and Telmo Menezes. Complex Social Science Gateway: Autocorrelation Modeling, Kinship Modeling, k- and pairwise cohesion in Large Networks, & Open Opportunities for Online Education. Friday am, May 24, 2013, Session on Large Scale Networks Analysis-2. XXXIII Sunbelt Social Networks Conference of the International Network for Social Network Analysis (INSNA). Hamburg, Germany.

#### FORWARD LOOKING

2015 AAAS Annual Meeting, San Jose, Feb. 12-16, 2015. Title of Symposium: The Science of Human History Symposium. 90 min (two talks, each 45 min including 15 min of discussion) Two speakers: (1) Douglas White: Causalities in Human Societies and the Challenge of Cliodynamics; (2) Lui Lam: Histophysics: Quantitative Laws in Human History

#### **Jack Xin**

NSF Algorithm Workshop, March 9-12, 2014, Boulder, Colorado.

Medical Imaging Seminar, Electrical Engineering Dept, USC, Mar. 25, 2014.

Colloquium, Department of Mathematics and Statistics, San Diego State Univ, May 7, 2014.

Math Education Workshop, DC, June 27, 2014.

#### **Jack Yellott**

“Precompensating for defocus by spatial filtering”. Invited talk at the Fall Vision Meeting of the Optical Society of America, University of Houston, Oct 4-6, 2013 (Abstract published in the Journal of Vision, Vol.13, No.15, 2013.

#### **Hongkai Zhao**

Mathematics Department Colloquium, 5/2014, UCLA.

International Workshop on Multiscale Modeling and Simulation, IPAM, UCLA, 4/25-4/27, 2014.

International Workshop on Fluid-Structure Interaction Problems, Shanghai, 7/27-7/30, 2013.

6th International Congress of Chinese Mathematicians, Taipei, 7/14-7/19, 2013

## E. FACULTY AWARDS AND ACHIEVEMENTS

### APPENDIX E IMBS FACULTY AWARDS AND ACHIEVEMENTS, 2013-14

#### **Pierre Baldi**

2013 Fellow International Society for Computational Biology (ISCB)

#### **William Batchelder**

Two Post Doctoral people visited my lab for an extended period  
Dr. Zita Oravecz and Professor Stephen France

#### **Michael Birnbaum**

Shields Award--"L. Donald Shields Excellence in Scholarship and Creativity Award"  
More info: <http://news.fullerton.edu/2014sp/Birnbaum-Shields-Award.asp>

#### **Carter Butts**

I joined the ChaMP program in 2013, reflecting my interest in applying network analytic and statistical ideas to problems in the physical and biological sciences; this has led to a regular interdisciplinary summer "lab rotation" workshop that employs techniques from the mathematical social sciences to study physical and materials science problems, and support for one PhD student from materials science in my group (Spring 2014) to work on the application of network analytic models to problems in protein NMR. These activities reflect the importance of IMBS as a site of two-way exchange with disciplines outside of the social sciences.

In 2013 I began a term on the University of California Cancer Research Coordinating Committee (to my knowledge, I was the only serving sociologist or statistician this year). The CRCC awards grants within the UC system to new faculty seeking to engage in cancer research, and seed grants to support new projects in in the area. The committee considers proposals involving any aspect of cancer research, from biochemistry and drug design to medical imaging, disease surveillance, diagnosis, and prevention. Per the interdisciplinary nature of the committee, I provide input not only on proposals with an explicit social/behavioral component, but also on proposals that involve simulation (e.g., molecular dynamics) or data analysis (e.g., applications of machine learning to imaging-based diagnostics). This illustrates the role that IMBS has in helping to support important research goals throughout the UC system, by assisting with the hiring and retention of faculty with broad-based technical expertise..

Group alumni Emma Spiro and Zack Almquist both started tenure track faculty positions in the past year, Spiro at the UW Information School and Almquist in the Departments of Sociology and

Statistics at the University of Minnesota. In both cases, their IMBS training was key to their success on the job market.

### **Mike D’Zmura**

[Through the Wormhole](#), hosted by Morgan Freeman, Science Channel, Season 4, How Do Aliens Think? First appeared mid-2013.

[Futurescape](#), hosted by James Woods, Science Channel, Episode "I know what you're thinking". First appeared late 2013.

### **David Eppstein**

My student Michael Bannister won the best presentation award at the International Symposium on Graph Drawing for his talk on our paper, "Superpatterns and universal point sets", and another of my students, Will Devanny, was awarded an NSF Graduate Fellowship.

### **Jean-Claude Falmagne**

Creation of Three Endowed Chairs, UCI, August 2013.

Creation of Charitable Remainder Trust, UCI, August 2013.

One Edited Volume-J.-Cl. Falmagne, D. Albert, C.W. Doble, D. Eppstein, and X. Hu. *Knowledge Spaces: Application in Education*. Springer-Verlag, Berlin. 2013.

This book describes up-to-date applications and theoretical results. These applications come from various places, but the most important one, numerically speaking is the internet based educational system ALEKS. The ALEKS system is bilingual English-Spanish and covers all of mathematics from the third grade to the end of high school, and chemistry. It is also widely used in higher education because US students are often poorly prepared when they reach the university level. The chapter by Taagepera and Arasasiingham deals with the application of knowledge spaces, independently from ALEKS, to the teaching of chemistry. The four chapters by Albert and his collaborators strive to give cognitive interpretation to the combinatoric structures obtained and used by the ALEKSsystem. The contribution by Eppstein is technical and develops means of searching the knowledge structure efficiently.

### **Steve Frank**

Velux Visiting Professor, ETH Zurich, April - September 2013

Fellow, Wissenschaftskolleg zu Berlin (Institute for Advanced Study), June 2014 - July 2015  
Head of special research group at Berlin Institute on Gene Regulation and Organismal Diversity

## **Michelle Garfinkel**

Served on the editorial boards of several journals.

Journal of Conflict Resolution

European Journal of Political Economics

Journal of Macroeconomics

Defence and Peace Economics

Journal of Economics and Business.

## **Simon Huttegger**

Chancellor's Fellow, UCI, 2013-2016.

## **Kimberly Jameson**

Jameson was awarded 3 years of funding from National Science Foundation for an interdisciplinary research project involving collaborative efforts among IMBS faculty from UCI departments of Mathematics, Ecology and Evolution and Cognitive Sciences.

**Color and Cognition Reading Group:** For Spring quarter 2014, Jameson resumed (with Christian Herrera, Cognitive Sciences Graduate Student, co-organizing) the popular Color and Cognition Reading Group. This is an active multidisciplinary group of faculty, students and postdocs that meets weekly, or bi-monthly, on topics related to the mathematical modeling and empirical investigations of color cognition and perception. The group was strongly attended in Spring quarter, <http://aris.ss.uci.edu/~kjameson/ColorCogSPRING2014.html> And already has a full schedule for Fall 2014.

### **Advisory Committee Member of The New Horizons Message Initiative:**

2013 - present: Advisory Board Member. ``New Horizon's Message Initiative" and ``One Earth: New Horizons Message". (URL: [www.newhorizonsmessage.com](http://www.newhorizonsmessage.com) and [www.oneearthmessage.org](http://www.oneearthmessage.org) ). A crowdsourced self-portrait of humanity to send to the stars on NASA's Pluto Mission, New Horizons. Project consulting includes advising on scientific content, data collection, internet-based research approaches, and grant writing and submission. Project Description: The One Earth Project's vision is the first of its kind: A concerted effort across all humankind to speak for the entirety of planet Earth. It is a unique opportunity for organic global collaboration on a scale the likes of which has never been seen. And it is being mentored by a collection of highly experienced volunteer global citizens with the primary aim to optimize balance and representativeness of the One Earth Message and its construction. Together these features make the One Earth Project not just a message to the cosmos, they make it a chance to build a framework for cooperative human processes in support of the entire global community. Thus, as model for dynamic and collective altruistic cooperation, the One Earth Project represents an opportunity that has never been seen before, and its undertaking is likely to serve as a valuable template for any large-scale humanitarian collaboration that follows. NASA is currently reviewing the project with great interest, and has said that it is pleased to participate in the effort and the New Horizons mission has agreed to upload it.

Jameson continues her active role as Section Editor for the Language and Cognition portions of The Encyclopedia of Color Science and Technology (Springer Publishers) Ronnier Luo (Ed.). (URL: <http://refworks.springer.com/mrw/index.php?id=2981>). As described on the project's site: The project is to create an encyclopedic reference on color science and technology is an interdisciplinary, up-to-date and comprehensive reference on the topic. All entries will be written by leading experts, and edited by section editors with deep topical knowledge. The target audience for the encyclopedia consists of graduate students in color science and technology programs, as well as those studying chemistry, optics, imaging, design, vision, materials science. Researchers, managers, and other professionals in academia, government, and industry working in these fields will also find the encyclopedia of color science and technology an informative reference. Jameson has served as Section Editor since 2010.

**Community Service City of Newport Beach, California :**

October 2006 -- present. Appointed member of the City of Newport Beach Environmental Quality Affairs Committee. A committee for advising and oversight, focusing on project environmental impact reports and notices of project descriptions for public and private work proposed within the city of Newport Beach.

**Support and Supervision:**

Cognitive Sciences graduate student: Daniel A. Stehr.  
UCI IMBS graduate student: Dan Wolf.  
UC Berkeley Linguistic undergraduate student: Ayden Parish.  
IMBS Assistant Specialist, Alissa D. Winkler.

**2013-14 Ad Hoc REVIEWING:**

Journal of Vision  
Color Research & Application  
Journal of the Optical Society of America

**The Encyclopedia of Color Science and Technology:**

2010 - present: Associate Field Editor of the "Language and Cognition" section of the Encyclopedia of Color Science and Technology.  
On-going duties as Section Editor for The Encyclopedia of Color Science and Technology (Springer Publishers), section on Color Cognition and Language (including more than 40 top-tier research scientists contributing section entries).

**L. Robin Keller**

INFORMS (The Institute for Operations Research and the Management Sciences, [www.informs.org](http://www.informs.org))

President-elect of INFORMS- 2014,  
Board Liaison to INFORMS Roundtable (heads of OR groups in companies)- 2014  
President- 2015

Past-President- 2016

Kimball Medal Committee Chair for Fall 2013 award  
Nominations committee member for 2015 elections- 2014  
Chair of Ad Hoc Board Committee on Open Access-2014

Decision Analysis Society of INFORMS: DA 50-Year Celebration Program Committee Meeting

*Decision Analysis* editorial board member

National Research Council of the National Academies Expert Meeting  
**Empowering the Miner: Gaps and Needs- A Meeting of Experts**

*I was an invited expert for this “think tank” meeting, held to talk through how decision science, particularly in risky situations, can help to inform miner safety. The National Institute for Occupational Safety and Health (NIOSH) - Office of Mine Safety and Health Research asked the National Research Council to put together a one time (2 day) meeting of experts at the Beckman Center in Irvine, CA on Feb. 19-20, 2014. The sponsor, the Director of NIOSH Mining Division, wanted to explore the most current research from decision science relevant to improving hazard recognition and response skills.*

The Paul Merage School of Business at UCI: Member, Search Committee for Merage School Dean, 2013-14

### **Igor Kopylov**

**Refereeing:** *Econometrica*, *Review of Economic Studies*, *American Economic Review*, *Journal of Economic Theory*, *Journal of Mathematical Economics*, *Economic Theory*, *Operations Research*, *Theory and Decision*, *Economics of Governance*, *Journal of Economic Psychology*, *Theoretical Economics*, *Games and Economic Behavior*, *Mathematical Social Sciences*.

Associate Editor, *Theoretical Economics*, 2011- present

### **Mark Machina**

I have continued my editorial work as a Co-Editor of *Economic Theory* and the *Journal of Mathematical Economics*, and a member of the editorial boards of *Mathematical Social Sciences*, *Theory and Decision*, *The Geneva Risk and Insurance Review* and the *Journal of Risk and Uncertainty*.

### **Simon Levin**

Co-author of President’s Award for best paper in the *American Naturalist*, “Competition for Water and Light in Closed Forest Canopies” (with C. Farrior et al., 2013) (awarded in 2014).



The Mathematical, Computational and Modeling Sciences Center at Arizona State University Relunched in Honor of Simon A. Levin as The Simon A. Levin Mathematical, Computational, and Modeling Sciences Center.

Tyler Prize for Environmental Achievement, 2014.

Elected as Foreign Member of the Instituto Lombardo, in Milan, one of the principal Italian academies of science.

### **Penelope Maddy**

Phi Beta Kappa Romanell Professor, 2013-14. (Three public lectures to be delivered during 2014-2015 at UCI.)

### **Michael McBride**

Courtesy appointment, Department of Logic and Philosophy of Sciences, November 2013-present.

Research on Religion Podcast, Anthony Gill, "Mike McBride on the Economics of Religious Leadership," 28 July 2013.

### **Anthony McGann**

Associate Editor, *Research and Politics*

Member of the Editorial Board, *Political Research Quarterly*.

### **Andrew Noymer**

I continue to collaborate closely with IIASA, the International Institute for Applied Systems Analysis in Laxenburg (near Vienna), Austria.

Public service: Member, Metrics Group for California HAI (Hospital Acquired Infections) Reporting

Editor, *PloS One*.

### **Lisa Pearl**

Faculty Mentor of the Month, May 2014, Undergraduate Research Opportunities Program, UCI.

### **Donald Saari**

Fellow, American Mathematical Society

Vice Chair, Governing Council, International Institute for Applied Systems Analysis, Vienna, Austria

Chair-Elect, Conference Board for the Mathematical Sciences

Chair, NRC Board on Mathematical Sciences and their Applications

Chair, NAS, National Member Organization, International Institute for Applied Systems Analysis

### **Stergios Skaperdas**

Clifford S. Heinz Chair, UC Regents, 2013

### **Ken Small**

Eric Pas Dissertation Award, International Association for Travel Behaviour Research, October 2013.

Book Proposal: Routledge, February 2014.

Promotions or senior appointments at Resources for the Future, UC San Diego, UC Berkeley, International Monetary Fund, Brown University.

#### Ad hoc service as referee for:

Energy Journal (Sep 06, Apr 07, Jul 07, Aug '13)

Journal of Housing Economics (Nov '13)

Journal of Transport Economics and Policy (Nov 06, Feb 07, Sep 07, Jun 08, Aug 09, Jun'10, Jul'10, Aug'10, Mar. '13, Aug '13)

Regional Science and Urban Economics (Feb 06, May '10, Dec '11, Mar '13, Jul '13)

Transportation Research B (Nov 06, Feb 07, Dec 07, Feb 08, Dec 08 (2), Mar '10, Apr '12, Jan '14, Feb '14, May '14)

Transportation Research Record: Journal of the Transportation Research Board (Sep 06, Sep 07, Sep 09, Sep '11, Sep '12, Sep '13)

Member, UCI Expert Database (referrals to media), continuing.

### **Hal Stern**

Member, Committee on National Statistics (CNSTAT) (2008-2014) – Committee of the National Research Council of the National Academies of Science that tries to improve statistical methods and information for public policy. (Just completed 6-years of service)

Chair, External Review Committee, College of Natural Sciences, University of Hawaii-Manoa, Honolulu, HI 2014

Chair, National Academy of Sciences Panel on Research Methodologies for Understanding Driver Fatigue, 2013-

Member, Mitchell Prize Committee, International Society for Bayesian Analysis 2013

Member, Ad Hoc Advisory Committee on Forensic Statistics, American Statistical Association, 2012-present

**Rein Taagepera**

2014 Outstanding Emeritus Award, UC Irvine Emeriti Association

**James Weatherall**

Review of The Oxford Handbook of Philosophy of Physics. Notre Dame Philosophical Reviews (2013).

**Douglas White**

Continuation as External Research Professor, Santa Fe Institute, 2009-2016.

**Jack Xin**

Editor-in-Chief, SIAM Multi-scale Modeling & Simulation, since Jan 8, 2014.

**Hongkai Zhao**

Distinguished guest professorship at Beijing International Center for Mathematical Research

F. FACULTY ADVISING

**APPENDIX F**  
**GRADUATE STUDENTS AFFILIATED WITH IMBS**

**(i) Current Student Participants and their IMBS Advisors**  
(\* advanced to Ph.D. candidacy; \*\* received Ph.D. during year)

<u>Student</u>	<u>Advisor</u>
** Royce Anders	Batchelder
** Kalin Agrawal	Batchelder
* Gregory Alexander	Batchelder
Blake Allison	McBride/Skaperdas
Jerrold Anderson	Carvalho/McBride
Jiwon Baek	Brueckner
Jiaru Bai	Keller
Beth Baribault	Vandekerckhove
Michael J. Bannister	Eppstein
Zach Becker	Eppstein
Andrew Berdahl	Levin
Mark Bloxsom	McBride/Skaperdas/McBride
Bonnie Bui	Faust
Justin Bruner	Huttegger/Skyrms
Eleanor Brush	Levin
Michael Caldara	McBride/Skaperdas
Anne Carpenter	McBride/Skaperdas
Charlotte Chang	Levin
Jack Zhanpeng Cheng	Eppstein
Stephen Cole	Branch
** Robert Coleman	D'Zmura
Andrew Colopy	Kaminski
Scott Crawford	Smyth
Irina Danileiko	Lee/Vandekerckhove
Tyler Dean	Chubb
Archie Delshad	Kaminski
William E. Devanny	Eppstein
Steve Doubleday	McBride/Skaperdas
Chris DuBois	Smyth
Christopher Elias	Branch
Ben Feintzeig	Weatherall
Jie Feng	Zhao
Katelyn Finley	Kaminski
Samuel Fletcher	Weatherall
** Robert Forbes	Narens
Jimmy Foulds	Smyth
Andrew Frank	Smyth
Emma Fuller	Levin
Nancy Gonzalez	Narens
** Giorgio Gosti	Batchelder

	Hongyang (Maime) Guan	Lee/Vandekerckhove
	Michael Guggisberg	Poirier
	Santiago Guisasola	Narens
	Lisa Guo	Narens/Trueblood
	Christopher Ha	Branch
	Yuhong He	Keller
	Christian Herrera	Chubb
	Michael Ho	Xin
	Candice Huynh	Keller
	Matt Inverso	Chubb
**	Fan Jiang	Brueckner/Carvalho
	Justin Jarvis	Brueckner
	Kip Jackson	Breckner
**	Rolf Johnson	Narens
**	Deven Kapadia	Poirier
	Katelyn Finley	Kaminski
	Alejandro Komai	McBride
	Si-Yuan Kong	Brownstone/McBride
	Colin Kupitz	Vandekerckhove
	Paulos Lakew	Brueckner
	Simon Leblanc	Levin
	William Leibzon	Narens
	David Licata	Branch
	Robert Lichtman	Sperling
	Alicia Lloro	Small
**	Xiaolong Long	Xin
**	Dan Luo	Brueckner
	Amine Mahmassani	Brownstone/McBride
	Joshua Malnight	Uhlaner
	Daniel Mann	Chubb
*	Brian Marion	Hoffman
	Justin Mark	Hoffman
	Thomas McIntee	Saari
	Lisa McManus	Levin
	Greg McWhirter	Skyrms
	Peter Miller	Uhlaner
	Percy Mistry	Trueblood
	Abraham Morrison	Huttegger
	Michael Nunez	Vandekerckhove
	Cailin O'Connor	Huttegger
*	Tolga Oztan	White
	Erick Peterson	Carvalho/McBride
	Lawrence Phillips	Pearl
	Andrew Porter	McBride
	Garret Ridinger	McBride/Skaperdas
	Jacquelyne Rische	Komarova
	Marian Rogers	Weatherall
	Sarita Rosenstock	Weatherall
	Hannah Rubin	Huttegger
	Michael Sacks	Carvalho/McBride
	Ryan Shirah	Uhlaner

Joseph Simons  
Paul Stroik  
Andrew Tilman  
\*\* Pi-Han (Christine) Tsai  
\*\* Heidi Tucholski  
\*\* Andrea Vandom  
Jamie Wang  
Alex Washburne  
Andrew Wisti  
\* Dan Wolf  
Tim Wong  
Howard Yang  
Penghang Yin  
\* Shuai Zhang  
Penghe Zu

Visiting Graduate Researchers

Ravi Selker

Eppstein  
McBride  
Levin  
Brueckner/McBride/Skaperdas  
Saari  
McGann  
Brueckner  
Levin  
D'Zmura  
Kaminski  
Brownstone  
Chubb  
Xin  
Xin  
Xin

Lee

G. VISITORS TO IMBS

APPENDIX G  
VISITORS' LETTERS

Donald G. Saari, Director  
Institute for Mathematical Behavioral Sciences  
University of California  
Irvine, CA 926797-5100

Dear Don,

Here are the activities I took part in while at UCI in January 2014.

This year, as usual, I spent January at UCI, primarily based in IMBS, but also with an affiliation with Ecology and Evolutionary Biology. I gave three lectures during that period,

- (1) Sackler colloquium: *Public goods: Competition, cooperation and spite* (This was an NAS Colloquium held at the Beckman Center, organized by Francisco Ayala, John Avise and Brian Skyrms; mine was the keynote lecture for the meeting)
- (2) IMBS Colloquium: *Exploration as investment in the future*
- (3) Mathematics Education Program: *Challenges in the theory of infectious diseases* (This was a joint UCI-Iran meeting organized by Don Saari at the Beckman Center, and will lead to a published report).

Abstracts for all three are attached below.

Furthermore, I met with Adam Martiny (ESS/EEB), Steve Allison (EEB), Jasper Vrugt (ESS), their research groups and our postdoctoral fellow, Juan Bonachela, in connection with our NSF grant, and we made substantial progress on several new projects and manuscripts. I also met on a regular basis with Don Saari (IMBS).

Qing Nie (Math) and I met on a regular basis to finalize the manuscript from our work on stem cells; that paper was accepted during my visit and has now appeared.

[Mathematical model of adult stem cell regeneration with cross-talk between genetic and epigenetic regulation](#)

J Lei, SA Levin, Q Nie Proceedings of the National Academy of Sciences 111 (10), E880-E887

In addition to these in-depth activities, I also had interactions, some formal and some informal, with a variety of faculty, including Steve Frank, Larry Mueller, Arthur Lander, Brian Skyrms, Francisco Ayala, Fred Wan, Sue Bryant, David Gardiner, and Kim Romney. I also took part in the luncheon meeting of faculty who are members of the national honorary academies. Throughout the period, I carried out research on public goods, on mechanism design, on ocean modeling, on collective decision making and on other topics.

Abstracts of lectures given:

(1) Sackler:

*Public goods: Competition, cooperation and spite*

Abstract

Public goods and common pool resources are fundamental features of biological and social systems, and pose core challenges in achieving sustainability; for such situations, the immediate interests of individuals and the societies in which they are embedded are in potential conflict, involving game-theoretic considerations whose resolution need not serve the collective good. Evolution has often confronted such dilemmas, for example in bacterial biofilms, in the challenges of cancer, in nitrogen fixation and chelation, in the production of antibiotics, and in collective action problems across animal groups; there is much to learn from the Darwinian resolution of these situations for how to address problems our societies face today.

Addressing these problems involves understanding the emergence of cooperative agreements, from reciprocal altruism and insurance arrangements to the social norms and more formal institutions that maintain societies. At the core are the issues of how individuals and societies discount the future and the interests of others, and the degree that individual decisions are influenced by regard for others. Ultimately, as Garrett Hardin suggested, the solution to problems of the Commons is in “mutual coercion, mutually agreed upon,” and hence in how groups of individuals form and how they arrive at decisions that ultimately benefit all.

(2) IMBS:

*Exploration as investment in the future*

*Abstract*

In evolutionary ecology and socioeconomics alike, a fundamental issue is how organisms deal with uncertainty, and the complementary roles of spatial and temporal strategies. This lecture will explore such strategies, with a focus on exploration vs. exploitation, and on search in heterogeneous environments.

(3) UCI-Iran Education Conference:



*Some mathematical challenges in the theory of infectious diseases*

*Abstract*

The mathematical theory of infectious diseases has a rich history, dating back at least to the work of Ronald Ross on malaria. It is a wonderful example of the application of powerful mathematical tools to address critical societal problems, and also provides excellent pedagogical examples in the teaching of differential equations.

Despite a century of elegant theory, much of which has found application in disease management, new diseases like HIV-AIDS emerge and old diseases like tuberculosis reemerge, causing global pandemics.

Antibiotic resistance is a problem of growing importance, threatening the effectiveness of our most powerful weapons against bacterial infections, and creating the real possibility that even routine surgical procedures will once again present risks of infection that have, in our lifetimes, been well controlled.

Significant theoretical challenges remain in the theory of vaccination. Whom should we vaccinate, those at greatest risk or those, like health care workers, who have multiple contacts and are most likely to spread infections? Disease systems are complex, characterized by nonlinearities and the potential for sudden transitions, for example from endemic to epidemic modes. They are also complex adaptive systems, integrating phenomena at multiple scales. Understanding and managing such systems, therefore, present significant mathematical challenges, with the potential for substantial rewards for the human condition.

Recurrent diseases are of particular importance, because their robustness presents a continual threat to humanity. Many important diseases, like influenza and measles, exhibit oscillations in abundance on multiple temporal and spatial scales, and an important challenge is to sort out the influence of the multiple mechanisms that can give rise to oscillations.

The classical theory of infectious diseases subdivides the host population into various categories, for example, susceptible (S), latent (E), infectious (I), and removed (including recovered and immunized) (R). Perhaps the simplest model of this type ignores the latent class, allows no births and deaths, and assumes that recovered individuals are permanently immune:

$$\begin{aligned}dS/dt &= -\beta SI \\dI/dt &= \beta SI - \gamma I \\dR/dt &= \gamma I\end{aligned}$$

Which says simply that new infections occur at a rate that is proportional to the product of the number of infectious and the number of susceptible individuals, that infected individuals recover and become permanently immune at a fixed rate, and that the total population size  $N=S+I+R$  is constant. Analysis of these equations shows that an outbreak can occur in a fully susceptible

population only if the total population size is larger than the critical value ( $\gamma/\beta$ ), or equivalently the basic reproduction number  $R_0 = \beta N/\gamma$  is larger than 1. This latter condition has a very intuitive interpretation, since it is easily seen that  $R_0$  represents the number of new infections a single infectious individual is responsible for before it recovers. If each such infectious individual more than replaces itself, the infectious class will increase; otherwise, it will not. If the critical threshold condition is met, the disease will spread in the population until the susceptible pool is depleted below ( $\gamma/\beta$ ), and then die out, leaving a portion of the population unaffected. Obviously, no oscillations are possible.

Even the simple model presented above leads to immediate insights concerning disease control. Since the disease will die out once  $S < \gamma/\beta$ , control can focus on reducing  $S$  (for example through vaccination), increasing  $\gamma$  (by speeding up recovery) or decreasing  $\beta$  (by reducing contacts or introducing other measures that minimize transmission). The model also is easily modified to include births and deaths, constant-rate loss of immunity, or disease-induced mortality; but none of these typically will result in sustained oscillations unless they include explicit temporal forcing. How then can sustained oscillations arise?

There are a variety of mechanisms that can lead to sustained (not necessarily periodic) oscillations, including stochastic factors, seasonal forcing (for example in transmission factors, long periods of temporary immunity, other explicit delays (like incubation periods), age structure, variable population size, more complicated transmission (incidence) functions, and interactions with other diseases. All of these have received mathematical attention; and in any particular application of the theory, the task is not to find how oscillations might occur, but rather to sort among the possible mechanisms to ascertain which are primarily responsible for the observed oscillations. The mathematical challenges can be daunting; for example, for influenza A, one typically must deal with the interactions of hundreds of strains of the virus, necessitating the introduction of a variety of techniques (like clustering and symmetry) to reduce the dimensionality of the system.

In this brief abstract, I have touched on only a few of the applications and challenges that infectious diseases present mathematics and mathematicians. The rich history of the subject laid the groundwork for a much richer set of approaches, and an ever-expanding repertoire of mathematical techniques, from dynamical systems and stochastic processes, to graph theory and topological data analysis, to the theory of games. There is much more to be done.

Simon Levin  
Professor, Ecology and Evolutionary Biology  
Princeton