Decision Analysis Newsletter

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Inside:

From The President

M. Elisabeth Pate-Cornell

As I complete my term as the president of the society and prepare to pass the baton off to the very able hands of Greg Parnell, I have two appeals for our members.

The first is to participate in society activities.

- I hope that many of you will be attending and presenting in the Decision Analysis track at the INFORMS conference in Denver in October. Our traditional reception/business meeting (with food and drinks) will take place on Monday evening in Denver, so make your travel plans to be there if you can. Also, John Butler and Jianmin Jia are organizing a Decision Analysis track for the International Federation of Operational Research Societies (IFORS) in Honolulu, Hawaii in July 2005. If you would like to go to Hawaii, contact John or Jamie.
- As of this writing, we have published our first two issues of the *Decision Analysis* Journal, but we need more submissions to continue this successful launch. Send your best research or application papers to Bob Clemen and Don Kleinmuntz.
- And most importantly, please vote. The details on the candidates and the voting process are contained in this newsletter. We are electing several new officers, and it is important for your vote to be counted.

My second appeal is to apply your Decision Analysis skills to support the broad, interdisciplinary problems facing today's decision makers both in industry and government. Decision Analysis is an important framework that is necessary to integrate many fields and methodologies. For example, our colleague, Vicki Bier, has been studying intentional threats to system reliability. The goals of her research are to identify optimal strategies for allocating resources among possible defensive investments, and to develop qualitative guidelines that reflect those strategies. The major challenge with modeling intentional threats is that it must include the adversary's behavior. Decision and risk analysis has been used to study resource allocation decisions for example in earthquake mitigation. However, to quote Dr. Bier's recent paper in *Reliability Engineering and System Safety*, "an earthquake will not become stronger or 'smarter' just because we have fortified our buildings to protect against it. On the other hand, an intelligent and determined adversary may adopt a different offensive strategy to circumvent (or destroy) our protective security measures." Decision and risk analysis are tools that need to be included in this interdisciplinary research but we need to reach out to other fields such as economics/game theory and organizational behavior to solve the challenges facing our decision makers.

I look forward to seeing you in Denver and wish you a good summer.

DAS Election 2004

This year's DAS election will be conducted via the web. The URL for the web site is:
http://cfdev.georgetown.edu/faculty/rld9/election.cfm
The positions and candidates are:

President-Elect
- Robert Bordley
- Craig Kirkwood

Secretary/Treasurer
- Robin Dillon-Merrill

Council Members (two vacant positions)
- Manel Baucells
- James Felli
- Jack Kloeber
- Jeff Stonebraker

Instructions for voting and position statements of candidates are available at the election web site. Positions statements are also published in this newsletter. For questions regarding the web site, contact Robin Dillon-Merrill (rld9@georgetown.edu). For questions regarding the election, contact Greg Parnell (gregory.parnell@usma.edu). Deadline for voting is October 8.

A Risk Analysis Program

Probabilistic Risk Analysis: Assessment, Management, and Communication

October 12 – 15, 2004
Harvard School of Public Health
Boston, Massachusetts

www.hsph.harvard.edu/ccpe/programs/APRA.shtml

This program is designed for professionals within government, industry, consulting groups, trade associations, academia, law firms, and other organizations who want to advance their knowledge of probabilistic risk analysis.

Topics Include:

- Developing probabilistic models
- A guided tour of probability distributions
- Developing distributions from data and from expert elicitation
- Value of information analysis
- Using the results of probabilistic risk assessment in risk management
- Communicating uncertain and variable risks

Continuing Education Credits Available. For more information or to register, visit:
www.hsph.harvard.edu/ccpe/programs/APRA.shtml
or call (617) 384-8692. Please be sure to mention your Reference Code: PRA04-DAS.

For information on other programs offered through the Center for Continuing Professional Education, visit:

http://www.hsph.harvard.edu/ccpe.

Secretary/Treasurer Candidate

Robin Dillon-Merrill

Position Statement

I would like to be re-elected Secretary/Treasurer of the Decision Analysis Society because I would like to continue supporting this valuable organization. I have served as Secretary/Treasurer from 2002-2004. Prior to being elected Secretary/Treasurer I was a council member from 2000-2002. With John Butler, I helped organize the society's track for the Salt Lake City INFORMS meeting in May 2000, and with James Felli, I helped organize the society track for the San Jose meeting in November 2002. In Spring 2001, I helped the membership committee prepare and survey the members to try to understand your needs and improve our services to meet any shortcomings. I also chaired the by-laws committee in 2002 to review the by-laws and recommend revisions to reflect the change in the format of INFORMS meetings and to recognize changes in on-line communications and voting.

Biographical Sketch

Robin Dillon-Merrill is an Assistant Professor of Information Systems at the McDonough School of Business of Georgetown University. Her degrees include B.S. and M.S. in Systems Engineering from the University of Virginia, and Ph.D. in Industrial Engineering and Engineering Management from Stanford University. Prior to graduate school, she worked as a systems engineer for Fluor Daniel, Inc.

Professor Dillon-Merrill specializes in decision and risk analysis. The focus of her research is using programmatic risk analysis to improve project management in complex, resource-constrained environments. Applications have included supporting the Department of Energy's selection of a new tritium supply facility, aiding NASA's Jet Propulsion Laboratory in decision making for the Mars Exploration Program, and understanding how decision-makers incorporate precursor events into their decision calculus. NSF and NASA currently fund some of her research.

President Elect Candidates

Robert Bordley

Position Statement

It is truly an honor to be nominated for President. The decision analysis society has always been a great community with a wide diversity of truly brilliant and energetic individuals from business, academia and government. Together we've had many important successes which have left us with a great legacy. But we've also had reversals: Hence we must continue to improve the value we deliver to our members, our employers, our society and our intellectual tradition — with initiatives like the new *Decision Analysis* journal. If elected President, I would focus my energy on promoting the society and its individual members.

Biographical Sketch

Robert F. Bordley has a PhD & MS in Operations Research (as well as an MBA), from UC, Berkeley. He also has an MS in Systems Science, a BS in Physics and a BA in Public Policy from Michigan State University.

He is an experienced practitioner with 25 years of experience with General Motors as manager in its Research Labs, Technical Director in its Corporate Strategy Staff and Technical Fellow in its Engineering Staff. His contributions earned him the GM Research Award of Excellence, the GM-UAW People-Make-Quality-Happen Award and GM's Chairman's Council Award.

He is an adjunct professor at U of M, Ann Arbor with 70 publications in *Management Science, Operations Research* and other technical journals. He recently joined a small team of practitioners and deans that successfully convinced the AACSB to modify its previous decision to de-emphasize quantitative methods (including management science) in business school curriculum.

He was Program Director for the Decision,Risk & Management Science Program at the National Science Foundation. In that time, he was involved in efforts to successfully lobby the government into elevate the social sciences to a directorate at NSF. He also personally lobbied NSF's education directorate to fund the first grant for decision education.

In addition, he also briefly joined a lobbyist group in Washington D.C which persuaded Congress to create a National Consumer Cooperative Bank.

He joined the Decision Analysis Society when it first started and has twice served as decision analysis cluster chair and twice as council member. He also served on the INFORMS Board. He has been active in the American Statistical Association and helped start (and later became President) of its Risk Section. Currently he is program chair of the ASA's marketing section which stresses Bayesian methods in marketing.

Craig Kirkwood

Position Statement

I am honored to be nominated for President of the INFORMS Decision Analysis Society. There are two current activities involving DAS that are especially significant, the new journal *Decision Analysis* and Ralph Keeney's work to identify and assess university decision analysis programs. DAS has formally expressed support for both these efforts, and we have important roles to play in them.

As President, I will continue working to ensure that the journal *Decision Analysis* becomes financially secure. Specifically, this requires systematic efforts to increase subscriptions from institutional libraries and individuals. Assessing decision analysis academic programs can provide valuable information as well as a way for academic decision analysts to demonstrate to their administrators that there is external recognition of their decision analysis programs. With any evaluation process there is potential for misunderstanding and even possibly conflict about the process, and I will work to ensure that we communicate this as a positive and valuable tool.

Besides these two specific issues, the relationship between DAS and the decision analysis practice community, especially the Decision Analysis Affinity Group, continues to merit attention. My extensive experience working with managers indicates that many of them still find such basic decision analysis concepts as probabilities and decision options to be confusing, and DAS needs to continue working to address issues related to practice.

Biographical Sketch

Craig Kirkwood is a professor in the W. P. Carey School of Business at Arizona State University. He has been department chair and acting dean at Arizona State, and also was on the faculties of the University of Michigan and the University of Colorado. For five years he was a member, and then manager, of the decision analysis group at Woodward-Clyde Consultants, San Francisco. He is currently on the Decision Analysis Society Council, and has been Secretary-Treasurer of DAS. He has held numerous positions within INFORMS, including Treasurer, and he recently received the George E. Kimball Medal for distinguished service to INFORMS and the profession. He received S.B., S.M., E.E., and Ph.D. degrees from the Massachusetts Institute of Technology, and his research addresses approximation methods to simplify decision analysis applications, as well as decision analysis approaches to supply chain design. His publications have appeared in *Decision Analysis*, *Management Science*, *Operations Research*, *Interfaces*, *Organizational Behavior and Human Decision Processes*, and other journals, and he authored *Strategic Decision Making: Multiobjective Decision Analysis with Spreadsheets*, Duxbury Press (1997).

Council Member Candidates

Manel Baucells

Position Statement

I'm delighted to be nominated to run for election to the Council of INFORMS' Decision Analysis Society. I believe that the exchange of ideas and experiences is fundamental for the professional growth of everyone. This is especially true in our field, which assembles contributions from several academic fields and from practice.

My intention is to direct efforts towards two goals. The first goal is to bridge the gap between theory and practice, so that our ideas have more of an impact in classroom and consulting. This implies expanding in the direction of supporting the *Decision Analysis* journal, the current theory and practice awards, and fostering the links with other sister societies and the consulting world. The second goal is to promote the DA society internationally. This can be achieved by organizing a spring-summer DA conference outside of the US. I hope that my European affiliation, together with my links to the Latin-American world, will contribute to this end.

If elected, I will actively work towards both of these important goals.

Biographical Sketch

I am assistant professor at IESE Business School (Barcelona). Iam a mechanical engineer (UPC, Barcelona), and I completed MBA (IESE, Barcelona), and Ph.D in management (UCLA, 1999). For two academic years (2001-03) I held a double appointment with the Fuqua School, Duke University. My research interests cover both normative and descriptive aspects of decision making, with publications in *Management Science* and *Organizational Behavior and Human Decision Processes*. I was DA cluster chair for Euro/INFORMS conference in Istanbul, Turkey, 2003. I won the 2001 DA student paper competition, and mentored the winner of the 2003 competition. I have been successfully teaching DA in existing core courses and newly designed elective MBA courses, as well as in executive education. I have been involved in a number of consulting jobs that required application of decision modeling.

James Felli

Position Statement

I'm honored to be nominated to run for election to the Council of INFORMS Decision Analysis Society. I have served our society as editor of our newsletter and as cluster/session chair at various INFORMS conferences, and look forward to the chance to serve as a member of the DAS Council.

I'm proud to belong to the Decision Analysis Society and believe it to be the premier organization for professionals facing problems of choice. As a practitioner in the private sector, I understand the trepidation that many decision makers feel as they debate whether to call for decision analytic support. Some of this anxiety arises from poor understanding of the DA process; some from a lack of appreciation of the power of DA tools; some from misgivings around the role and intent of the DA professional. While these are daunting barriers that regularly limit our effectiveness in improving decision quality, they are not insurmountable. I envision the DAS as a powerful, unifying force that not only enables practitioners to fuel the research engines of academia, but also facilitates the translation of decision science advances into information and recommendations relevant to and executable by practicing decision makers. If elected to the Council, I will work to help realize this vision. To that end, I will seek to strengthen and enhance our society's relationships with our sister societies (e.g., Medical Decision Making, Risk Analysis), other decision related organizations (e.g., Decision Analysis Affinity Group) and industry groups (e.g., Pharmaceutical Research and Manufacturers of America). I will further strive to increase the awareness and appreciation of our methods and tools in the private sector.

Biographical sketch

Jim Felli is a Research Advisor at Eli Lilly and Company in the Decision Sciences Department. In addition to advising senior management, his responsibilities include designing and delivering decision analysis courses, developing new decision tools, and engaging in applied research and internal consulting. His current research interests focus on the modeling and analysis of stochastic multi-criteria decision problems. Prior to joining Lilly, he served as Associate Professor of Decision Science with the Defense Resources Management Institute of the Naval Postgraduate School in Monterey, California. He holds a Ph.D. in Industrial Engineering and Management Science from Northwestern University and two masters degrees, one in Management Science from the Krannert School of Management at Purdue University and one in Mathematics from the State University of New York at Buffalo. Jim is an active member of the Decision Analysis Society of INFORMS and the Decision Analysis Affinity Group. His work has been published in numerous journals including: *Medical Decision Making*, *Interfaces*, *Military Operations Research*, *Health Economics* and *Decision Analysis*.

Council Member Candidates

Jack Kloeber

Position Statement

I am honored to have been nominated as Councilor for the DA Society Council and the opportunity to serve my colleagues. As an Army officer I have learned key lessons of leadership, organization, and commitment. As an educator I have experienced the excitement of guiding students who are smarter than I but willing to learn. As a consultant, and now a corporate decision analyst, I have learned the value of constantly educating the decision maker and focusing on the customer's values. Finally I have learned the tremendous value of a good network – friends and colleagues with different experiences and knowledge that make each member of the network a much better analyst. The DA Society is a very important part of that network for me. The InfORMS conferences, special DA meetings, international conferences, the DAS Newsletter, and the new DA Journal all add to the value of the network. I plan on working with the DA Society's members and leadership to increase the size, communications, and usefulness of this network, helping each member increase her contribution and increase her gain from participating. Finally, I will work to increase the emphasis on DA education – starting at the high school level by supporting the Decision Education Foundation.

Biographical Sketch

Jack Kloeber is Director and Head of Johnson & Johnson's Pharmceuticals Group Portfolio Management. He coordinates and standardizes the portfolio management effort across 5 R&D companies to align business strategy with portfolio actions. Jack has used techniques from monte carlo and discrete event simulation to influence diagrams to multi-objective decision analysis to integer programming to help senior decision makers make tough choices. Before entering the Pharmaceutical Industry, he retired from the US Army in October, 2000 after 23 years of service, including assignments as a Field Artillery Battery Commander, mathematics instructor at West Point, and Associate Professor of Operations Research at the Air Force Institute of Technology. His education includes a BS and MS in Industrial Engineering at Lehigh University and PhD from Goergia Tech in the Economic Decision Analysis program, Industrial and Systems Engineering School. He has taught and used decision analysis since 1994, working with 34 masters students and four doctoral students. Jack has been active in InfORMS since 1991 with many presentations to his credit, most recently co-authoring, with William Klimack, the winner of the DA Practice presentation award in 2003.

Jeff Stonebraker

Position Statement

During my initial four years as an officer in the U.S. Air Force, I often felt that decisions took on the appearance of a random event. In fact, I envisioned decision-makers would divide a dartboard into partitions representing various alternatives and then would throw a dart at the board to determine the preferred direction. While investigating graduate schools in the Peterson's College Guide, I discovered a better way of making decisions called "decision analysis." I was hooked!

This was all the motivation I needed to convince the Air Force to send me to Stanford's Department of Engineering-Economic Systems for my Master's degree and later to Arizona State for my Ph.D. While serving on the faculty at the Air Force Academy's Department of Mathematical Sciences, I wanted to "spread the wealth" of decision analysis to others. At the Academy, I taught a course where the undergraduate students/cadets first learned the principles of decision analysis and then practiced these principles with actual clients in the local Colorado Springs business community. From teaching this course three times at the Academy, the students completed 16 decision consulting projects, made 9 presentations at INFORMS, and published a practice abstract in *Interfaces*. As an adjunct, I also taught this course to graduate students at Colorado Tech, Santa Clara University, and Arizona State resulting in over 40 decision consulting projects with local organizations.

What are we as a society doing to spread the wealth of decision analysis? If elected, I will bring together the academic and practice decision analysis communities to explore best practices of increasing the awareness of decision analysis.

Biographical Sketch

Jeff Stonebraker is a decision analyst at GlaxoSmithKline. Before joining GSK, he was a decision analyst with Bayer Biological Products and Applied Decision Analysis, Inc. He also early retired from the Air Force, including five years as a full-time faculty member at the Air Force Academy. In 1996, he was awarded the Air Force Academy's Outstanding Operations Research Instructor Award. He won the fourth annual (2002) INFORMS DAS Practice Award Competition. He has co-chaired the DAS Student Paper Award Competition the last two years. Jeff's primary research interest is improving drug development decision-making. His work has been published in *Interfaces*, *IEEE Transactions on Engineering Management*, and *Haemophilia*.

Decision Analysis Journal - Update

Bob Clemen and **Don Kleinmuntz**

By the time this newsletter appears, you may already have Volume 1, Issue 3 of *Decision Analysis* in your hands. This issue leads with two articles that we hope will inspire our readers to think hard about the interface between game theory and decision analysis. Specifically, these articles ask the question, "How can decision analysts best use results from game theory in developing prescriptive models for decision makers in competitive or strategic situations?"

As you know, this question is not new. Raiffa's (1968, 1982) view was that an analyst would want to provide *prescriptive* advice for the decision maker that is based in part on a *descriptive* model of the other parties or stakeholders whose choices also play a role in determining the outcome. In the early 1980s, Kadane & Larkey (1982, 1983) prompted a debate with game theorists (Harsanyi, 1982; Shubik, 1983) that focused on how an analyst could best incorporate beliefs about an opponent's strategic behavior in a decision-analytic model. Kadane and Larkey's position was similar to Raiffa's; one might think of an initial decision node indicating the decision maker's alternatives, followed by a chance node indicating the possible actions the opponent might take, with probabilities assigned to the opponent's action branches. Those probabilities presumably incorporate beliefs about the opponent's strategic behavior. In contrast, Harsanyi and Shubik argued for explicitly considering the nature of the game and the strategic interactions that would occur between rational players. Little has occurred since that debate to change the minds of decision analysts or game theorists.

In Volume 1, Issue 3 of *Decision Analysis*, Cavusoglu and Raghunathan (2004) follow up on the Ulvila & Gaffney (2004) article from the first issue about configuring a computer-intrusion-detection system. Cavusoglu and Raghunathan note that Ulvila and Gaffney's decision-analysis framework ignores potential strategic interactions between the firm that is trying to protect itself and potential intruders. In their article, Cavusoglu and Raghunathan develop and compare decision analytic and game theoretic models of the intrusion detection problem. Their analysis highlights differences between the two; we leave it to readers to decide which model makes the most sense for firms implementing intrusion detection solutions.

Lippman and McCardle's (2004) article starts with an intriguing true story of a paternity lawsuit by one Junior Larry Hillbroom, claiming to be the offspring and hence heir to the estate of deceased Larry Hillblom, founder and wealthy owner of DHL, Incorporated. The authors argue that Junior Larry's attorneys should have accepted an early settlement offer, and they offer a series of models to support this position. Notably, one model explicitly considers the negotiations with attorneys representing Hillblom's estate by using the Nash bargaining solution to value the outcome of an uncertain negotiation. In a sense, the Nash bargaining solution becomes a stand-in for the expected value of an implicit negotiation subtree. We encourage readers to draw their own conclusions regarding this modeling device as well as the wisdom of Junior Larry's attorneys in declining an early settlement.

Although decision analysts typically model most decision problems as "games against nature," there are clearly many important decision problems that would benefit from an explicit consideration of the strategic interactions among parties. The state of the art on methods to embed strategic interactions within a decision analysis model is not well developed, and has yet to be proven in practice. As editors, we hope that these two interesting articles stimulate further research on using the interface between game theory and decision analysis to provide useful prescriptive advice.

Finally, we offer a word about the state of the journal. Although we have been encouraged by a modest increase in the submission rate since the appearance of the first issue, we want to reiterate a point we made in the last newsletter. Although it is wonderful to see the journal in print, our comfortable pipeline of papers accepted for publication is shrinking quickly. The journal needs good submissions, and it needs them now. At this point, we are continuing to emphasize fast turnaround cycles both for reviews and for publication in print. If your article is accepted within the next nine months, chances are excellent that it will appear in 2005. We know that you are all working diligently to finish writing your masterworks this summer. Please send them to us as soon as possible!

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Appraisal of DA Programs

Ralph Keeney

At the 2003 National Meeting, the Council of the DAS voted to sponsor "An Inventory and Appraisal of Decision Programs in the United States". Over the past year, Kelly See of the Wharton School of the University of Pennsylvania, Detlof von Winterfeldt of the University of Southern California, and I, with the help of numerous decision folks (over forty) at several universities have conducted a project to produce such and appraisal and evaluation.

At the upcoming Denver Meeting, we will present the results in a session dedicated to the report on the study. It is currently scheduled for Sunday October 24th. In this session, the results will be made public for the first time.

The following summarizes the motivation for the project.

Background

What gets measured is usually paid more attention. There are many national surveys of schools and departments. Programs concerned with decision-making are never explicitly evaluated, possibly because we are often a program (not a department or school) and we are often located in different schools (e.g. engineering, business, policy) at different universities. Evaluations of departments in business schools typically have several ratings departments, but they also never include decision areas.

The evaluations of departments and schools are often not based on the best logic available for evaluation. We in our field know how to do these evaluations in a logical manner and better than others. Perhaps our evaluation will provide a model for some of the other studies. A trial inventory and appraisal of programs at 12 universities was conducted prior to September 2003 to test the methodology and to provide a better concept for the DAS Council to consider for support.

Objectives

The objects of the project are the following:

1. Enhance knowledge of the decision field and increase our current opportunities and future prospects.
2. Promote the decision sciences within our schools and universities and externally to business and government.
3. Spread the knowledge that decision analysis and behavioral decision research are interesting and legitimate areas of study. Indicate the breadth of programs available.
4. Recognize the many quality programs.

Why do this?

If we achieve the objectives above, this will help all of us, our programs, and our field in the following ways:

- Attract better and more students to the programs
- Provide a basis for better support from deans and university administrators
- Increase recognition by universities and business and government of our skills and knowledge and hence create more inquires for employment and help on significant decision problems.

DAS Council

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CORS/INFORMS 2004

Seth Guikema

The Decision Analysis Society sponsored 6 sessions at the joint CORS/INFORMS meeting in Banff, May 16-19. Overall we drew a diverse crowd of speakers from a number of different universities, companies, and countries. The sessions were also attended by a diverse group of people from, with some reporting that it was the first DAS event they had attended. The topics of the presentations ranged from applied DA to the theoretical underpinnings of utility theory. The kick-off session on Sunday (chaired by Eric Bickel) focused on using DA to manage natural resources in Canada, and it included talks from industry executives and a consultant. On Monday we had sessions on special topics in DA (chaired by Marc Sachon), military DA (chaired by Greg Parnell), supply chain risk analysis (chaired by Russ Garber), and business DA in the medical and petroleum industries (chaired by Jimmy Benjamin). The DA sessions closed out on Tuesday morning with a session on engineering applications of DA (chaired by Seth Guikema). All of the sessions were well attended with the Military DA session (cross-listed with the INFORMS Military Applications Section) and supply chain sessions drawing particularly large crowds. The official DAS events ended Tuesday evening with a well-attended happy hour sponsored by Schlumberger Information Solutions, Calgary. Their sponsorship was greatly appreciated, and we heartily thank them. Finally, thank you to all of the session chairs and all of the presenters for participating in the Banff conference, for all of your hard work, and for a job well done. We hope to see you all in Denver this fall.

Photo by Roberto Ley Borras

Dr. and Mrs. Bodily are flanking two other attendees

Photo by Roberto Ley Borras

Two other attendees are flanking (L to R) Russ Garber, Ningxiong Xu and Laura Kornish

FUR XI

Jayavel Sounderpandian

The eleventh Foundations & Applications of Utility, Risk and Decision Theory (FUR XI) conference was held in Paris, June 30 to July 3, 2004. Plenary speakers included Itzhak Gilboa, Larry Epstein, Peter Wakker, Elisabeth Pate-Cornell, Colin Camerer and Jacques Dreze.

Photo by Hiroyuki Tamura

Coffee breaks were good times for mingling

Photo by Hiroyuki Tamura

A few buses took the participants to the conference dinner site. The approach road to the site was lined with trees forming this perspective. Hiroyuki could not resist taking this picture. When our bus stopped, we were at...

Photo by Hiroyuki Tamura

Vaux le Vicomte

Abstracts Received

John Butler

Title: A Generative Bayesian Model for Aggregating Probabilities of Categorical Events
Author: Joseph M. Kahn <http://www.stanford.edu/~jkahn/> , Stanford University
Date: July 2004
Status: Working Paper

In order to improve forecasts, a decision-maker often combines probabilities given by various sources, such as human experts and machine learning classifiers. When few training data are available, aggregation can be improved by incorporating prior knowledge about the event being forecasted and about salient properties of the experts. To this end, we develop a generative Bayesian aggregation model for probabilistic classification. The model includes an event-specific prior, measures of individual experts' bias, calibration, accuracy, and a measure of dependence between experts. Rather than require absolute measures, we show that aggregation may be expressed in terms of relative accuracy between experts. The model results in a weighted logarithmic opinion pool (LogOps) that satisfies consistency criteria such as the external Bayesian property. We derive analytic solutions for independent and for exchangeable experts. Empirical tests demonstrate the model's use, showing its accuracy to be either on par with or better than other commonly-used aggregation methods.

Title: Assigning subjective probabilities to event trees: Partition dependence and bias toward the ignorance prior
Authors: Craig R. Fox <http://www.anderson.ucla.edu/x1693.xml> University of California Los Angeles and Robert T. Clemen <http://www.fuqua.duke.edu/faculty/alpha/clemen.htm> , Duke University
Date: July 2004
Status: Working Paper

Decision and risk analysts have considerable discretion in designing procedures for eliciting subjective probabilities. One popular approach is to specify a particular set of exclusive and exhaustive events for which the assessor provides subjective probabilities. We show that assessed probabilities are biased toward a uniform distribution over all events into which the relevant sample space happens to be partitioned. We surmise that an assessor begins with an "ignorance prior" probability distribution that assigns equal probabilities to the specified events, then insufficiently adjusts those probabilities to reflect his or her beliefs concerning how the likelihood of the events differ. In five studies, we demonstrate partition dependence for both discrete events and continuous variables (Studies 1 and 2), show that the bias decreases (but may or may not disappear) with increased domain knowledge (Studies 3 & 4), and that top experts in decision analysis are susceptible to this bias (Study 5). We relate our work to previous research on the "pruning bias" in fault-tree assessment (e.g., Fischhoff, Slovic, & Lichtenstein, 1978) and show that previous explanations (enhanced availability of specified events, ambiguity in interpreting event categories, demand effects) cannot fully account for the effect. We conclude by discussing implications for decision-analysis practice.

IFORS 2005

The 17th Triennial Conference of the International Federation of Operational Research Societies (IFORS) will be held in Honolulu, Hawaii, July 11-15, 2005. The Decision Analysis Cluster chairs will be Jianmin Jia (Jamie) and John Butler. Jamie and John invite you to consider sessions you would like to chair, topics you would like to see covered, and presentations you would like to make: *jjia@cuhk.edu.hk* and *butlerj@cob.ohio-state.edu*. We will follow up with messages through DAList and future editions of the DAS Newsletter.

Website: *www.informs.org/Conf/IFORS2005*

ISF 2005

The Silver Anniversary International Symposium on Forecasting is to be held in San Antonio, Texas, June 12-15, 2005. (web site: isf2005.org). This is the leading conference on forecasting and celebrates 25 years of progress in the thought, theory, and applications. Among the keynoters is Daniel Kahneman, Nobel laureate. The conference is organized by the International Institute of Forecasting. Contact:
Tom Yokum (tyokum@angelo.edu) or Benito Flores (isf2005@cgsb.tamu.edu).

Student Awards

John Butler

DAS has made the following three student travel awards of $200 each for the Denver meeting. The students will present the work outlined below.

1. **Ashsish Gupta** at The University of Wisconsin-Madison (with Vicki Bier)

"Myopic Agents and Interdependent Security Risks"

Abstract: We present the optimal strategies in an interdependent security model in which threats occur over time. In such models, one myopic agent can make it undesirable for non-myopic agents to invest when that would otherwise be optimal. We explore the effect of different attack rates, investment costs and so on.

2. **Barry Cobb** at the University of Kansas (with Prakash Shenoy)

"Decision Making with Hybrid Influence Diagrams Using Mixtures of Truncated Exponentials."

Abstract: Mixtures of truncated exponentials (MTE) influence diagrams are models where all probability distributions and the joint utility function are represented by MTE potentials. MTE influence diagrams can represent decision problems without restrictions relationships between continuous and discrete chance variables, distributions of chance variables, or the nature of the utility function.

3. **Neda Farzinnia** at The Anderson School at UCLA (with Kevin McCardle)

"Optimal Investment Scale-up With Noisy Returns"

Abstract: The investment strategy of a firm depends in part on its resources that pertain to an investment. There are different types of resources with various levels of specificity; we examine a firm's decision to scale up its general investment, scale up its specialized investment, or cease investment. The firm invests and observes the return on general and specific assets. However, these observations are noisy and so the optimal investment policy is obtained through sequential decision-making.

Answers to items from last issue

Jayavel Sounderpandian

1. Why worry, dude

8 * 52778 = 422224

Gus Stuart, Itzhak Ravid, Scott Cantor and **Ralph Keeney** sent in correct answers.

2. Places Everyone!

The seven points are at the vertices of the graph in Figure 1. The pairs of points that are one inch apart are joined by edges.

Itzhak Ravid and **Manel Baucells** sent in correct solutions.

3. Minimal Perimeter I

a. Such problems are best solved by reflection technique. Reflect point P on the two sides of the triangle to get P' and P''. See Figure 2. Join P' and P'' by a straight line. It is clear that this line must be the shortest perimeter.

b. Note that CP = CP' = CP'' and angle CPB = 2*angle C. In the isosceles trianlge CP'P'' the length of the side P'P'' is therefore = 2*CP*sin C. To minimize this length choose P that minimizes CP. In other words P must be the foot of the perpendicular from C to AB.

c. If angle A is obtuse it could happen the P'P'' does not meet CA but an extension of it. If so, the shortest path is P'AP'' and the point to be selected on side CA is A. If you can choose P, you should make it coincide with A. Similar is the case when angle B is obtuse. If angle C is obtuse then P'P'' will miss both the sides AC and BC. The shortest path then is P'CP'' meaning the point chosen on side AC and BC is C. The shortest perimeter is 2*CP. If you can choose P, once again it should be the foot of the perpendicular from C to AB.

Itzhak Ravid sent in correct solution.

4. Minimal Perimeter II

Reflection here produces P', P'', P''' as shown in Figure 3. Joining P and P''' we get the shortest path. Since PP''' is equal and parallel to BB''' the unreflected path is always parallel to one of the diagonals of the rectangle and the length of the path is twice that of a diagonal regardless of where P is.

Itzhak Ravid sent in correct solution.

5. Batteries not included.

1. f4, Kh3 2. Kf2, Kh4 3. Bd2, Kh3
4. Be1, Kh4 5. Kg2 mate.

Figure 1

Figure 2

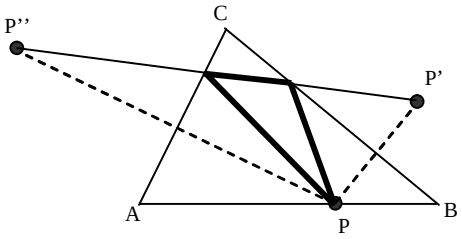
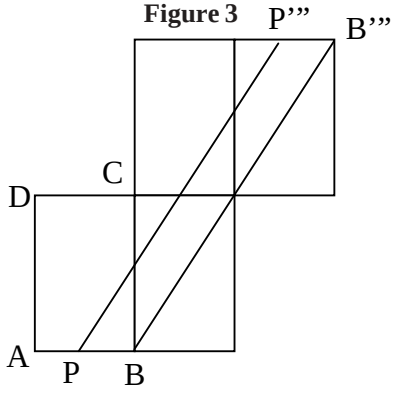


Figure 3



New Book

Arithmetic of infinity by Sergeyev Ya.D., Edizioni Orizzonti Meridionali, 2003.

The book presents a new type of arithmetic that allows us to execute arithmetical operations with infinite numbers in the same manner as we are used to do with finite ones. The problem of infinity is considered in a coherent way different from those proposed by Georg Cantor, Abraham Robinson, and John Conway. However, the new approach does not contradict Cantor, but complements his theory. The new viewpoint gives detailed answers to many questions and paradoxes regarding infinite and infinitesimal quantities. Particularly, simple applications of the new approach to limit theory, measure theory, and set theory are given. The book opens new interesting perspectives for the theory of computations too. The book is mainly addressed to mathematicians, physicists, computer scientists, and students. However, it is written in such a way that any person having a high school education and who is interested in the foundations of these sciences will be able to understand it.

DAS Officers

The Provocative Page

Jayavel Sounderpandian

E-mail your solutions to the puzzles on this page to me (sounderp@uwp.edu) before December 1, 2004. Names of those who submit correct answers will be mentioned in the December issue.

1. A Pedagogical Conjecture

An average MBA class has approximately 40 students, which prompts me to make the conjecture encrypted below. Can you decode it?

MBA TOTAL STANBY CUB CRYIN IB ITRKU R FRIUTFRIHKRP KBYKTSI IUTAT RAT MBAIL STBSPT CUB EBY'I CRYI IB PTRAY HI.

Hint: The picture at the bottom of this page was taken at FUR XI conference opening ceremony. The first name of the person in the middle will be STITA in the same code.

2. The Accidental Tootist.

Solve the cryptarithm:

TOOT * TOOT = BOOOMBOM

3. Program Bee to Freedom

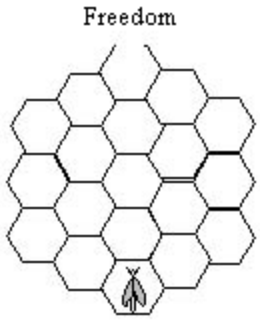
In every cell of the beehive shown in the figure there is an arrow (like a hand on a clock dial). The arrow can be turned about the center of the cell so as to point at one of the six sides of the cell. Initially, every arrow is pointing at a randomly selected side of its cell. A bee-robot is trapped in the bottommost cell, and you can program it with any one of the four programs A, B, C, D below. The bee can move from cell to cell, but its only way out of the hive is through the topmost cell. The top side of the topmost cell opens to freedom. Which program(s) is/are guaranteed to lead the bee to freedom?

Program A. Start. If the current cell is the topmost cell, escape to freedom. Else, turn the arrow in the current cell zero degrees clockwise. If the arrow points to a side that is shared by a neighboring cell, move to the neighboring cell and repeat this set of instructions from Start. If the arrow points to a side not shared by another cell, repeat this set of instructions from Start.

Program B: Same as A, but with 60 degrees in place of zero degrees.

Program C: Same as A, but with 120 degrees in place of zero degrees.

Program D: Same as A, but with 180 degrees in place of zero degrees.



4. Jayasri's Choice

As a parent and a teacher I get the urge to teach my daughters things that I consider useful. Years ago, I taught my daughter Jayasri that the shortest path from A to B is the straight line joining A and B. Hence, I told her, one should walk in a straight line aimed at one's destination to minimize time and effort. Whenever she wandered I would say, "Now, Jayasri, let's walk in a straight line." She would smile to acknowledge she understood why, and obey.

One weekend I took her to my office. As we chatted, I told her that I do research about how to make decisions and that two Howards, Howard Raiffa and Ron Howard, have written a lot about it.

"Oh, Howard is their first name and last name," she observed.

When it was time to leave we came out of the office, and I realized we had a decision problem—whether to take the elevator or the stairs. I thought, what a nice opportunity to teach Jayasri one of Howards' lessons. I could teach her how to weigh alternatives and choose the best. I hurriedly assembled in my mind the things to tell her about weighing our alternatives: the elevator is comfortable but you might get stuck in case of power failure; stairs are a good exercise but you might trip and fall. Before I could think up more, we had reached a fork in the corridor, one way leading to the elevator and the other to the stairs.

Stopping her at the fork I said, "OK, Jayasri, we have to make a decision here. We can take either the elevator or the stairs. How should we decide?..."

I had more to say but I paused because I saw her face brightening up so triumphantly. She wasted no time and shouted, "I know how," and continued, "Eeny, meeny miny mo, catch a tiger by his toe, if he hollers let him go, eeny meeny miny mo. Oh, it's the elevator, dad. Let's go." She pulled me toward the elevator.

"What the…" I mumbled and reeled. Steadying me, she said, "Now, dad, let's walk in a straight line."

At this point I wanted to scream, "How can you be wayward about where to go and howard about how to go?" But I could not. I had tripped into a reverie…

Is it possible to be not-wayward about where to go? If our objectives, criteria and tradeoffs should decide where to go, then how do we choose our objectives, criteria and tradeoffs? It looks as though at some level we are destined to be wayward. Does being howard matter no matter how wayward we are? Unable to find answers I felt lost and hopeless. But as they say, when one door closes making you hopeless, another door opens to bring you back to life.

What door opened for me?

Photo by Jay Sounderpandian