**Trends in Decision Analysis Research and Practice: Report on Ramsey Panel Presentation**

Advances in Decision Analysis 2019 conference by the Decision Analysis Society of INFORMS

Bocconi University, Milan, Italy, June 19-21, 2019: https://connect.informs.org/das/conferences#ADA2019

by L. Robin Keller, Panel Chair, with contributions from Ramsey Medalists (Vicki Bier, Simon French, Larry Phillips, Rakesh Sarin, Peter Wakker, & Bob Winkler) and audience members (Manel Baucells, Bob Bordley, Valentina Ferretti, Yael Grushka-Cockayne, Neil A. Hamlett, Melissa Kenney, Elisa Long, Jay Simon, & Sasa Zorc)

Thank you to Advances in Decision Analysis Conference Chair Prof. Emanuele Borgonovo for suggesting that we organize a Ramsey Medalists panel. (emanuele.borgonovo@unibocconi.it)

The Ramsey Panel on trends in decision analysis research and practice was held in the closing session on Friday in Milan, in the impressive Bocconi Aula Magna via Roentgen (the grand hall).

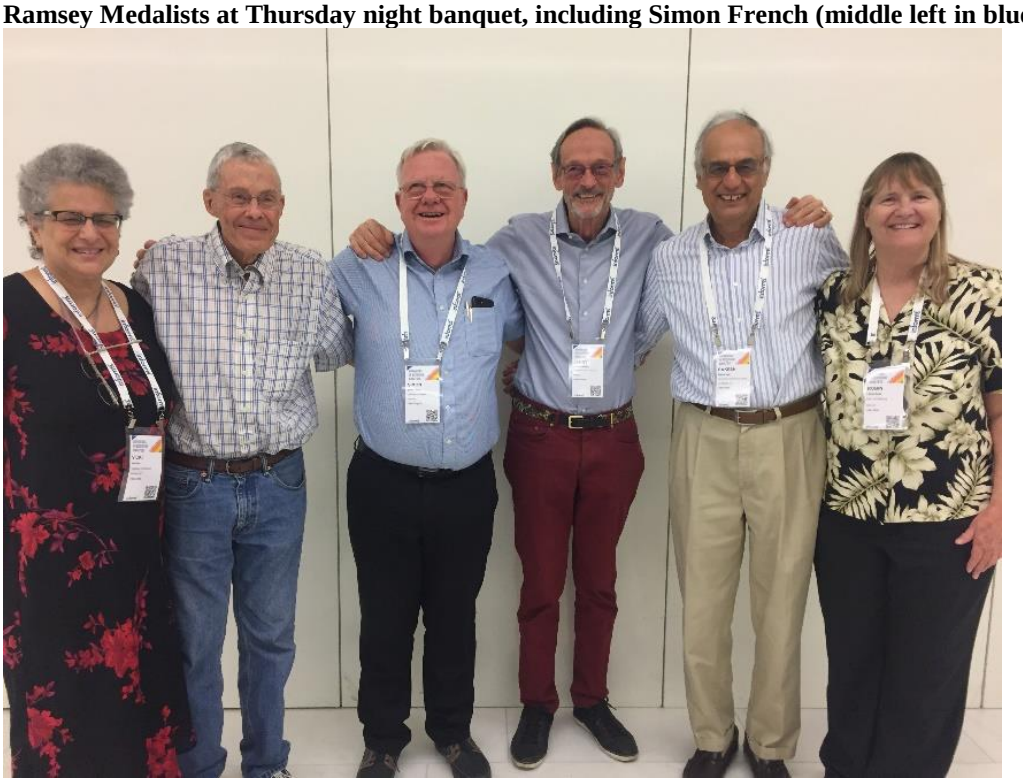
Panelists included: 2016 Medalist Vicki Bier, 2013 Medalist Peter Wakker, 2009 Medalist Rakesh Sarin, 2005 Medalist Larry Phillips, 1990 Medalist Bob Winkler, and 2015 Medalist Robin Keller (panel chair). 2017 Medalist Simon French attended the conference but missed the final panel session; he provided some written comments which are included here.

**DAS President Karen Jenni and Conference Chair Emanuele Borgonovo making closing announcements**

**Ramsey Medalist Panelists**


**Ramsey Panel Chair L. Robin Keller posed questions for the panel and audience**

**Ramsey Medalists at Thursday night banquet, including Simon French (middle left in blue shirt)**



A complete list of Ramsey Medalists is at https://www.informs.org/Recognizing-Excellence/Community-Prizes/Decision-Analysis-Society/Frank-P.-Ramsey-Medal.

This report combines some written notes from before the conference by panelists, oral comments by panelists and audience members at the conference, and additional edits to this report after the conference.

**1. Compared to 2009, what is the most surprising 2019 DA finding/trend? It is now 2029, name one surprise compared to 2019.**

Rakesh Sarin (UCLA) began his remarks by observing that the conference concert presented works chronologically from Georg Friedrich Händel to Edward Elgar. The second work was by Franz Joseph Haydn from 1759. The field of economics dates back to that time. Decision analysis dates from the 1950's, well later than the last composer in the conference concert (Elgar, 1899), when Savage showed us beliefs and values are independent of each other. At the core of decision analysis is reflection and introspection, basically guided soul searching. Rakesh's hope for the future is that DA will be widely used "at the table" for important social problems, such as health care, climate change and poverty reduction.

Peter Wakker (Erasmus University) is surprised in 2019 that people are not convinced that using von Neumann-Morgenstern utility-based DA is best.

Yael Grushka-Cockayne (Darden at University of Virginia) would be surprised if DA did not change in the next ten years.

Bob Bordley (University of Michigan) hopes all camps would come together using insights across subfields (normative, prescriptive, and behavioral). Bob's comment is based on the paper he presented in Milan which uses prescriptive theory to identify points where the normative utility function changes from being convex to concave and then uses behavioral research on reference dependence to induce a reference point effect at that inflection point. So,

he does see things coming together soon. (He is doing some revisions based on the comments he received at the conference.)

His approach basically draws on Kahneman's distinction between the reflective side of the individual and the non-reflective side. Bob says "you are thinking slow to set a value reference point based on your utility function that would LATER ON, when you are thinking fast, nudge you into making decisions consistent with that utility function." A facilitator helps the reflective side assess their value-focused utility function. The tools of behavioral decision theory are then used to frame decision problems so as to nudge the non-reflective side into being consistent with the value-focused utility function. It is not society nudging the individual, it is the individual's reflective side nudging their non-reflective side.

Now in 2019, Jay Simon (American University) says "I have been very impressed by how many DA people have been willing to take on "big" challenges of our era (e.g., decision problems related to climate change)." He also says in 2029 there might be a gig economy (like Uber, Airbnb, etc.) for a decision analyst to help individuals or small organizations with decisions.

Robin Keller's idea for 2029 is that there could be Apps with DA embedded.

Bob Winkler (Duke) commented that if he could name a surprising finding/trend between now and 2029, it wouldn't be a surprise!

Larry Phillips (LSE) notes that compared to 2009, in 2019 his own practice is less about modelling decisions themselves than modelling the underlying conflicts of objectives that prevent rational decision making. For example, he has used MCDA to model the many harms from abusing drugs, and developed an MCDA model that would enable policies about governmental drug control to be tested for their effectiveness in reducing harm.

Panelists held up cards with **Sì** or **No** on them, to give quick answers to the following Yes/No questions. Audience members also answered the yes/no questions. Thanks to Valentina Ferretti (LSE) for tabulating the audience responses.

**2. Is the field of decision analysis healthy going forward?**

**Panel: 4 Sì vs. 2 No** **Audience: 47% Sì vs. 53% No**

Bob Winkler's comment: I have always been an "old-style-religion" Ramsey/Savage etc. guy. When I was the Department Editor for the DA Dept. in *Management Science* way back when, I received many submissions that did not have this focus. Sorting out those that have close enough relevance for DA from those that are too far afield is not always easy, but it is important not to fill our journals with papers that do not have a prescriptive DA focus. We live in an increasingly multidisciplinary world, and the name "decision analysis" suggests to some that anything that involves a decision in any way is of interest to the journal.

Another reason to be concerned about the health of DA going forward is the lack of enough Ph.D. students coming out with a primary emphasis on DA. There are some strong young DA scholars, but we need to increase the birth rate in our field. In terms of the academic market, students perceive, with some justification, that there aren't many DA-related positions, and that if they want to go to the academic market they need to label themselves more broadly. In contrast, Ph.D. students in psychology see many academic options for JDM folks in business schools and other academic units. Similarly, in the practitioner market there are more jobs for people who are oriented toward some mix of CS/OR/Statistics than for DA scholars. These things, as well as lack of exposure to DA as undergraduates, influence students applying to Ph.D. programs, too.

Should we worry that the golden age of DA is over? Overall, I still try to remain optimistic about the future of the field. The conference turnout (higher than the prior two ADA conferences) is an encouraging sign, suggesting broadened interest in the field, although it included quite a few attendees who would probably not list prescriptive decision analysis as a primary interest.

Vicki Bier (University of Wisconsin-Madison) said her answer to this question was inspired by her experience as Editor-in-Chief of *Decision Analysis* over the last five months.

"Although not large in number, something like 15% of submissions or more are papers where the topic is potentially of interest to the journal, but the methodology is not appropriate. Examples include non-probabilistic treatments of uncertainty, analytic hierarchy process for elicitation of value judgments, fuzzy sets, rough sets, etc. It seems strange to me that some of the greatest minds of the 20th century (e.g., Frank Ramsey, Jimmy Savage, and others) are dependent on the likes of me to protect their legacy from vanishing under a sea of mediocre and non-axiomatic approaches. However, we don't seem to be doing a good enough job currently of making sure analysts who are interested in decision making learn about rigorous decision-making methods."

Simon French (Warwick) provided comments earlier in the conference that he would have made at the panel if he could have attended the last session of the conference. Bayesian decision analysis is not the only form of decision analysis; there are many forms of non-Bayesian multiple criteria decision analysis. Many of these are motivated by arguing that there are uncertainties that are not well modeled by our methods: e.g.

- fuzzy/possibility modeling of uncertainty
- the "new" Decision Making under Deep Uncertainty Society/movement

We might consider these methods dubious and irrational in terms of their mathematical structure. But their proponents are intelligent people. They see problems in our methods and processes. Moreover, their approaches find a sympathetic audience with many decision makers. They and we all agree that much of the benefit from any decision analysis – Bayesian or not – arises from the discussion, reflection and creativity that the process stimulates. So we may have a lot to learn from each other. Certainly we should listen to and address their criticisms. Our Society must not hunker down and ignore other approaches. We need to listen and learn as well as promote our methods.

In hindsight, the audience members are more pessimistic than the panelists. Larry Phillips voted No because we are not increasing our membership. He thinks we come off to potential clients as overly prescriptive. We need to listen better to our clients in the spirit of process consultancy.

**3. Should the focus in DA move beyond analyses of single big decisions to management of decision processes for many decisions (or is it moved already)?**

**Panel: 4 Sì vs. 2 No Audience: 44% Sì vs. 56% No**

Vicki Bier supported Ward Edwards' longstanding push to get decision analysis "out of the boutique," saying:
….."I think there is a lot to be gained by analyzing CLASSES of decisions, rather than individual decisions, with the goal of generating qualitative insights. The burden of conducting a new analysis from scratch is high, which means it will tend to be done only for decisions that are (a) large in impact, and (b) not highly time-critical. For smaller repeated decisions, or for time-critical decisions, conducting a decision analysis from scratch will typically not be feasible, but decision makers could still benefit from guidance prepared by decision analysts, and ponder where in the parameter space their unique situation lies."

Bob Winkler's comment (not given orally): "Yes. I realized this when reading Savage's comments on "small worlds" vs "the grand world" when I was an undergraduate. In dynamic decision making, for instance, the optimal first period strategy can be very different from what it would be if we considered it as only a single-period decision in isolation. In another example, when multiple units in an organization are making decisions that affect the organization (and each other), some coordination of their decisions would be desirable. It can be challenging to move toward the "grand world" in practice, but we should try to move in that direction insofar as possible."

Larry Phillips' comments: "Two strands seem to characterise my own experience: big-ticket decision analyses, like the design of the UK's Type 45 destroyer, and modelling alternative policies for the disposal of the UK's radioactive waste, as compared to small-scale decision analyses, like modelling the harm of psychoactive drugs, and the benefit-risk balance of prescription drugs." He encourages us to carry on investigations into big decisions, but not at the expense of looking at smaller scope decisions.

**4. Should there be greater consideration of behavioral economic nudges (and lab or field experiments) by DA researchers and practitioners?**

**Panel: 5 Sì vs. 1 No Audience: 82% Sì vs. 18% No**

Peter Wakker commented that many developments in current behavioral economics are natural continuations of the original spirit of decision analysis of the 1960s. Behavioral Economics (BE) uses new knowledge about descriptive deviations from normative models to see where human decisions can be improved, but more realistically than DA did in the 20th century. Exemplary in this regard is the work by Richard Thaler with, for instance, his subtle nudge technique. Similar comments on BE came from the audience before, from Bob Bordley.

Rakesh Sarin said he agreed with Peter. He said we all know the prescriptions to exercise and eat right, but prescriptions alone are not enough to get us to do what we should.

Bob Winkler noted that some of behavioral economics (e.g., Thaler's work) is much closer to being prescriptive than judgment and decision making work, which is descriptive. But he questions whether we should really encourage DA folks to move in this direction.

**5. Should environmental and other societal risk issues gain greater attention within DA?**

**Panel: 4 Sì vs. 2 No Audience: 95% Sì vs. 5% No**

As mentioned above, Larry Phillips has worked on modelling alternative policies for the disposal of the UK's radioactive waste (as Ralph Keeney did in the early 1980s), as well as modelling the harm of psychoactive drugs, and the benefit-risk balance of prescription drugs. He also adds that Robin Gregory has been a pioneer in environmental risk modelling.

Vicki Bier emphasized the importance of this topic: Given the uncertainties (and political controversies) over climate change, and the other environmental challenges facing the world (for example, the "insect apocalypse" highlighted in the *New York Times* last fall), she suggested that there are few areas more in need of good decision analysis.

Bob Winkler's comment: I agree with Vicki's comments. These are important decisions, and DA could have a lot to offer. An issue here is whether the real decision makers would pay any attention to what DA has to say. In this time of polarization, we're seeing valid scientific findings being labeled as "fake news," which is disturbing. But efforts in this direction are worthwhile.

Melissa Kenney (University of Minnesota): More attention should be placed on public policy making and including values and voices from a diversity of stakeholders. This means that we need to give special attention to include people who have been historically disadvantaged and have lacked the power to have their voice and their values influence decisions, especially because of the lack of diversity amongst those in our field. Additionally, other scientists sit "at the table", but usually not decision analysts, for many important environmental and societal decisions involving risks; this is a missed opportunity and means that heuristics or sub-optimal processes can dominate complex decisions where prescriptive approaches would be advantageous.

Bob Bordley (Michigan) notes that we should pay more attention to group decision making processes (such as the *dialog decision process* ("snake diagram") originally from SDG and heavily used at General Motors, in which analysts check in repeatedly with decision makers as the analysis proceeds through steps).

Larry Phillips countered that he prefers the approach of getting all stakeholders together at the table, such as in his *decision conferencing* approach.

**6. Should medical decision making gain more attention?**

**Panel: 2 Sì vs. 4 No** **Audience: 90% Sì vs. 10% No**

Peter Wakker expressed one disagreement with most decision analysts. He argued that DA is NOT broadly applicable. It provides limited techniques that are of some use only in very particular situations. He learned this the hard way, when naively entering a hospital where he worked eight years in the medical domain. He quickly learned that DA is of some use for 1 in every 1000 diseases, and of no use at all for 999 in every 1000 diseases. But he takes this as "half-full," and thinks this is valuable enough to work on for all his life.

Former *Decision Analysis* Editor-in-Chief Rakesh Sarin gave an example of an impactful medical decision analysis study by Elisa Long (UCLA) and co-authors on breast/ovarian cancer, which is now taught in medical schools. (Eike Nohdurft, Elisa Long, Stefan Spinler, "Was Angelina Jolie Right? Optimizing Cancer Prevention Strategies Among BRCA Mutation Carriers", *Decision Analysis*, Vol. 14, No. 3, September 2017, pp. 139–169, http://pubsonline.informs.org/journal/deca/)

Larry Phillips added that medical decision analysis isn't just about diagnosis and treatment decisions, it's also about the benefit-risk balance of drugs that inform the decisions of regulators and also the benefit-cost considerations of health technology assessment organizations.

**7. Should current trends in big data analysis and artificial intelligence be incorporated into DA research, practice, or teaching (or be treated as separate, but related, areas)?**

**Panel: 2 Sì vs. 4 No** **Audience: 95% Sì and 5% No**

Bob Winkler's comment: Yes, I think they should be incorporated to the extent that they are relevant to some aspect of DA. Certainly data can be useful in helping us assess probability distributions for events/variables of interest in decision-making under uncertainty.

Robin Keller asked a question being asked at UC Irvine about the future of optimization: Will optimization methods like linear programming not be needed if complete enumeration or other big data analytics can find good solutions without the structured models?

Sasa Zorc (University of Virginia, Darden School of Business) pointed out that AI models/machine learning still do optimization within the algorithm.

Larry Phillips noted that the past does not always provide a good basis for forecasting the future, so decision analysis will continue to be needed.

Neil A. Hamlett (IBM Virginia) pointed out that perhaps decision analysis has at least as much to teach to the AI, Machine-Learning, Analytics, etc., community as vice versa. Our conference contained several beautiful discussions on the different types of uncertainty. Uncertainty characterization in the machine-learning community is not always altogether complete.

No estimate is complete without a characterization of its associated uncertainty. (This is a corollary to a concept from the metrology community's international standard https://www.bipm.org/en/publications/guides/gum.html). The machine-learning, analytics, etc. community often effectively assumes — if even considered to this extent — that all uncertainty fits into the category that Massimo Marinacci calls "aleatory". Employing analytics and machine-learning evidence in a decision-making context requires a more-thorough characterization.

Some in the audience (by a show of hands) were currently using these approaches.

**8. What social processes will enable DA modeling to be deployed, and how can DA can become institutionalized in an organization?**

Larry Phillips said decision conferencing remains alive and effective. He said to let him know (Larry_Phillips@msn.com) if you'd like to be invited to his invitation-only early October 2019 meeting of the International Decision Conferencing Forum (IDCF), their 20th meeting since their founding in 1989.

**Final comments:**

Vicki Bier, Editor-in-Chief of *Decision Analysis*, invited people to consider proposing a special issue (and/or being the special-issue editor) on topics of broad interest, such as medical or environmental decision making.

Manel Baucells said "on the behavioral economics side of the Decision Analysis department of *Management Science* (which integrates the former Behavioral Economics stand-alone department), our goal is to focus on advances in implementation of mechanisms (e.g., kidney exchange programs or auctions)."
https://pubsonline.informs.org/page/mnsc/editorial-statement

Peter Wakker was glad to be able to see so many people in Europe at the ADA conference, since he often can't travel due to teaching during INFORMS Fall conferences.

**Finally, we'd welcome suggestions for future questions for Ramsey (or other expert) panels for future conferences.**

These questions did not make the final cut, but could be in future Ramsey panels.

Should online teaching methods impact the way DA is practiced or taught? (Will practice be more automated via online programs?)
Should trends in operations management (cooperative game theory models, empirical operations studies) or operations research (link optimization and simulation, social media networks) impact DA?
Should there be greater international cooperation and communication in DA research, practice, or teaching?

**Università Bocconi**