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From the Editor

Decisions over Time (Exploding Offers or Purchase Regret), in Game Settings (Embedded Nash Bargaining or Adversarial Games), and in Influence Diagrams

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Our first two articles address decisions involving the passage of time. First, Steven A. Lippman and John W. Mamer explore the question of whether making "Exploding Offers" is beneficial to an employer seeking to hire or, in a more general framing of the question, to a purchaser of an asset. Next, in "Dynamic Purchase Decisions Under Regret: Price and Availability," Enrico Diecidue, Nils Rudi, and Wenjie Tang examine situations in which a person can make a forward purchase in period 1 or a spot purchase in period 2. Our next two articles involve game theoretic models. In our third article, Steven A. Lippman and Kevin F. McCardle model joint decision making (motivated by dividing up a fortune) via "Embedded Nash Bargaining: Risk Aversion and Impatience." The fourth article is "Robust Adversarial Risk Analysis: A Level-k Approach," by Laura McLay, Casey Rothschild, and Seth Guikema. The final article is on "A Framework for Solving Hybrid Influence Diagrams Containing Deterministic Conditional Distributions," by Yijing Li and Prakash P. Shenoy.

Key words: decision analysis; adversarial risk analysis; bargaining; consumer behavior; deadlines; deterministic conditional distributions; dynamic purchase; exploding offers; influence diagrams; hybrid influence diagrams; job search; level-k game theory; mixture of polynomials; Nash bargaining; regret; risk aversion; robust optimization; sequential decision making; sequential search; solving hybrid influence diagrams; type inconsistency; editorial

Well, when we inherit property, it does not occur to us to throw it away, even when we do not value it.

—Mark Twain,
A Connecticut Yankee in King Arthur's Court

I have chosen this opening Mark Twain quote for two reasons. One is that we have recently passed the holiday gift-giving season, while we are preparing the first issue for 2012. Happy New Year! The other is that our third article addresses the division of an inheritance.

I know a woman who is a good person to visit on the day after Christmas. She has a policy that any gift she receives is now hers and she can choose how to dispose of it at will, even if it means giving it away one day after receiving the gift. So, we have often benefited from her strict policy of giving away gifts of holiday chocolates or other fattening treats. I tend to be on Mark Twain's side of the fence, accumulating and storing (or eating) all gifts that have been given to me over the years, even if they are no longer being actively used. In contrast, I tend to not be an impulse purchaser of items that I do not yet own. So, I suffer from the endowment effect, and she does not. Merely endowing me with a gift makes me value it more than I would if I had not been given it as a gift.

Our first two articles address decisions involving the passage of time, with time modeled first via a continuous time model and second with two time periods. In their article, "Exploding Offer," Steven A. Lippman and John W. Mamer define an exploding offer as one that is in effect only at the specific point in time when it is made, and define a permanent offer

as one that remains available until the end of the time period in which the asset must be sold, or in the more specific case of an employment offer, until a potential employee's job search will end. Assuming that just one buyer considers making an exploding offer instead of a permanent offer, Lippman and Mamer (2012) analyze when making the exploding offer will maximize the buyer's probability of purchasing the asset, using a continuous time finite horizon search model with recall. They find that different decisions can occur, depending on specifics of the situation. For the special case of a uniform distribution of offer amounts, they derive an explicit characterization of when an exploding offer (versus a permanent offer) is optimal. In the academic job market for rookie professors, exploding offers with short time spans for the candidate to accept or decline the offer are common, so the insights in Lippman and Mamer (2012) may lead to practical insights.

In our next article, "Dynamic Purchase Decisions Under Regret: Price and Availability," Enrico Diecidue, Nils Rudi, and Wenjie Tang examine situations in which a person will purchase a product with uncertain value, and can decide to purchase it early or at the time of use. A buyer could feel buyer's regret if the product is bought in period 1 ahead of use and pays more than the product turns out to be worth when experienced in period 2. The buyer could also feel hesitater's regret for not having taken advantage of a good deal to buy the product in period 1 when it was available under the early purchase option. Diecidue et al. (2012) show that people who are more averse to hesitater's regret are more likely to buy ahead of time, and in contrast, those who are more averse to buyer's regret are more likely to delay the purchase decision. A prior paper in *Decision Analysis* that examined decision regret is Engelbrecht-Wiggans and Katok (2009). Enrico Diecidue serves as an associate editor for *Decision Analysis*.

Our next two articles involve game theoretic models, for dividing a fortune and for terrorism protection. Having just watched three football bowl games in four days, and having my team (UCLA) and my husband's teams (Iowa and Wisconsin) all lose, I looked up a football quote by the late American author Lewis Grizzard to introduce the next section on games: "The game of life is a lot like football. You have to tackle your problems, block your fears, and score your points when you get the opportunity."

Steven A. Lippman and Kevin F. McCardle model joint decision making (motivated by dividing up a fortune) via "Embedded Nash Bargaining: Risk Aversion and Impatience." In a prior article in *Decision Analysis*, Lippman and McCardle (2004) introduced embedded Nash bargaining, in which bargaining games are embedded in a joint decision tree, and then they calculated expected payoffs to two players assuming the Nash bargaining solution is used for intermediate payoffs. Lippman and McCardle (2012) provide theoretical support for their approach, showing that, assuming the potential payoff is random, the "decision maker's embedded Nash bargaining payoff decreases with both his risk aversion and impatience, and it increases with his opponent's risk aversion and impatience" (p. 31). In addition to his prior publications in *Decision Analysis* (including McCardle et al. 2009 on fundraising tiers), Kevin McCardle is on the editorial board of *Decision Analysis* and has served as an associate editor (Keller et al. 2007).

Now it is time for our *Trivia question*, which involves quotes on decision making.

Trivia question: Match the quotes below with these book authors:

- Dogbert as told to Scott Adams
- Dan Ariely
- Malcolm Gladwell
- Robert J. Shiller
- Nassim Nicholas Taleb
- Richard H. Thaler and Cass R. Sunstein
- Jack Welch with John A. Byrne

Quotes:

A. Time and again I have provided examples that are contrary to Shakespeare's depiction of us in "What a piece of work is man." In fact, these examples show that we are not noble in reason, not infinite in faculty, and rather weak in apprehension.

B. I had noted how important it was for organizations to continually remove the bottom 10 percent of their employees. The manager brought me to a secluded section, under a staircase, where no one could hear us. He explained that he had 20 people in his sales force....he asked, "do I really have to let two go?" "You probably do, if you want the best sales staff on Fifth Avenue."

C. The results from these experiments are, obviously, quite disturbing. They suggest that what we think of as free will is largely an illusion: much of the time, we are simply operating on automatic pilot, and the way we think and act—and how well we think and act on the spur of the moment—are a lot more susceptible to outside influence than we realize.

D. Your objective is to convince each employee that his performance review is a measure of his performance. In reality, of course, the performance review only measures your ability to predict changes in the environment that are inherently unpredictable.

E. Too much success is the enemy (think of the punishment meted out on the rich and famous), too much failure is demoralizing. I would like the option of having neither.

F. A choice architect has the responsibility for organizing the context in which people make decisions.

G. It is odd that there appear to have been no practical proposals for establishing a set of markets to hedge the biggest risks to standards of living.

See the footnote for the trivia answer.[1]

The fourth article is "Robust Adversarial Risk Analysis: A Level-*k* Approach" by Laura McLay, Casey Rothschild, and Seth Guikema. McLay et al. (2012) propose using the increasingly popular approach of robust optimization to "model the actions of conservative players facing 'deep' uncertainties," which can be challenging to model using probability distributions, applied to a level-*k* game theory model for adversarial risk analysis (with attackers and defenders). They then develop a computationally tractable model of boundedly rational players facing difficult-to-quantify uncertainties. Prior papers in *Decision Analysis* using game theory modeling to examine terrorism risks are Wang and Bier (2011), which assumes the attacker has a multiattribute utility function; and Haphuriwat et al. (2011) on deterring the smuggling of nuclear weapons in container freight, which extends the findings on cargo screening from Merrick and McLay (2010) and is related to Bakır (2008) on cargo screening. Other *Decision Analysis* authors have also addressed national security, including Barrett (2010), Caswell et al. (2011), Feng and Keller (2006), Hausken and Zhuang (2011), and von Winterfeldt and O'Sullivan (2006). Prior papers on game theory include van Binsbergen and Marx (2007), Cavusoglu and Raghunathan (2004), Cobb and Basuchoudhary (2009), Lippman and McCardle (2004), and Rothkopf (2007).

In our final article, Yijing Li and Prakash P. Shenoy present "A Framework for Solving Hybrid Influence Diagrams Containing Deterministic Conditional Distributions." Li and Shenoy (2012) present an algorithm for approximately solving a specific class of influence diagrams, and illustrate their method on two small examples. They consider influence diagrams with (1) a mix of discrete and continuous chance variables, (2) a mix of discrete and continuous decision variables, and (3) deterministic conditional distributions for chance variables. (A conditional distribution is deterministic if its variances, for each state of its parents, are all zeroes; such deterministic conditionals for continuous chance variables are computationally challenging.) A related paper in *Decision Analysis* on probability distributions is Keelin and Powley (2011). Prior *Decision Analysis* papers on influence diagrams include Boutilier (2005), Buede (2005), Cobb (2007), Detwarasiti and Shachter (2005), Horvitz (2005a, b), Howard and Matheson (2005a, b), Matheson and Matheson (2005), Pauker and Wong (2005), Pearl (2005), and Rios and Rios Insua (2009).

This issue begins the last year of the second (and final) three-year term for me as editor-in-chief. Following the standard procedure, INFORMS has appointed Robert T. Clemen as the chair of the search committee to appoint a new editor-in-chief, who will take office in January 2013. The new editor-in-chief will appoint a new set of associate editors and editorial board members.

Looking forward to completing volume 9 in 2012, in June we plan to publish the special issue of *Decision Analysis* on "Games and Decisions in Reliability and Risk," with guest editors Refik Soyer, Fabrizio Ruggeri, and Jason Merrick; see Keller et al. (2011). Our last special issue was in honor of Michael H. Rothkopf's legacy of rigor and relevance in auction theory (Bordley et al. 2010).

As we end this column, we again remind authors that all INFORMS journal editors have the Ithenticate software (http://www.Ithenticate.com) for checking if submitted papers have significant overlap with

[1] *Trivia answer*: A: Dan Ariely (2009, p. 310); B: Jack Welch with John A. Byrne (2001, p. 434); C: Malcolm Gladwell (2005, p. 58); D: Dogbert as told to Scott Adams (Adams 1996, section 2.16); E: Nassim Nicholas Taleb (2001, p. 148); F: Richard H. Thaler and Cass R. Sunstein (2008, p. 3); G: Robert J. Shiller (1993, p. 3).

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