

Investment and Defense Strategies, Heuristics, and Games: From the Editor . . .

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In our first article, Joseph B. Kadane discusses “Partial-Kelly Strategies and Expected Utility: Small-Edge Asymptotics.” The next article is by Konstantinos V. Katsikopoulos, on “Psychological Heuristics for Making Inferences: Definition, Performance, and the Emerging Theory and Practice.” We then move to papers analyzing strategic national defense. In our third article, David J. Caswell, Ronald A. Howard, and M. Elisabeth Paté-Cornell present “Analysis of National Strategies to Counter a Country’s Nuclear Weapons Program.” Next, Kjell Hausken and Jun Zhuang examine “Governments’ and Terrorists’ Defense and Attack in a T -Period Game.” Finally, Jeryl L. Mumpower analyzes strategy in the sport of squash in “Playing Squash Against Ralph Keeney: Should Weaker Players Always Prefer Shorter Games?” In conclusion, we announce our upcoming special issue on “Games and Decisions in Reliability and Risk.”

Key words: decision analysis; adversary analysis; conflict; constant relative risk aversion; contest success function; decision bias; decision tree; dynamics; heuristics; inference; influence diagrams; Kelly strategies; medicine; national security; nuclear proliferation; optimization; partial-Kelly; philosophy of modeling; probability; sports; strategy; terror capacity; terrorism; threat; uncertainty; utility; editorial

As you walk down the fairway of life you must smell the roses, for you only get to play one round.

Ben Hogan

Our opening quote from famous golfer Ben Hogan is particularly suitable as we begin a new year. I am writing this editorial column at the beginning of January. Having attended the annual Rose Parade and Rose Bowl football game in Pasadena, California, on January 1, I followed Hogan’s advice, both literally and figuratively. Since we parked on the golf course surrounding the Rose Bowl stadium, I even walked down a fairway. (After the game, we saw a person who had accidentally gotten his Mercedes stuck in a sand trap on the course, which reminds us how pursuing life’s rewards comes with risks.) This issue’s final article gives Jeryl Mumpower a chance to “go another round” in life, at least for one strategic choice he made years ago in playing squash against Ralph Keeney.

Our first article investigates a type of investment strategy called a partial-Kelly strategy, in which part of the current fortune f is invested in whatever investment maximizes the expectation of the $\log(f)$,

and the remainder is left in cash. In “Partial-Kelly Strategies and Expected Utility: Small-Edge Asymptotics,” Joseph B. Kadane finds that there is no utility function that is independent of the risks it confronts and that has partial-Kelly strategies as the optimal strategy. Kadane (2011) examines a constant relative risk-averse utility function, with the constant relative risk parameter equal to the reciprocal of the partial-Kelly parameter, and finds that it is a good approximation for a utility function that exactly supports partial-Kelly strategies.

Other papers in *Decision Analysis* addressing Kelly strategies include Johnstone (2007) and Grant et al. (2008). See also Kilgour and Gerchak (2004) on a competitive logarithmic scoring rule. Prior papers in *Decision Analysis* by Kadane include Schervish et al. (2009) on proper scoring rules and Boatwright et al. (2010) on common value or private value online auctions.

Our next topic covers decision and inferential judgment heuristics. I think of heuristics as being similar to rules of thumb. An example of a military decision heuristic, as noted by Carlos Castaneda (1974, p. 154), is “A rule of thumb for a warrior . . . is that he makes

his decisions so carefully that nothing that may happen as a result of them can surprise him, much less drain his power."

In "Psychological Heuristics for Making Inferences: Definition, Performance, and the Emerging Theory and Practice," Konstantinos V. Katsikopoulos defines psychological heuristics as models for making inferences that (1) rely heavily on core human capacities; (2) process the information they use by simple computations and may not use all available information; and (3) are easy to understand, apply, and explain. Then, Katsikopoulos (2011) reviews studies in which computer simulations or mathematical analysis show that psychological heuristics perform well in comparison with optimization models under specific conditions. Finally, he organizes the current results, for the first time, in a tree for helping decision analysts decide whether to suggest heuristics or optimization to decision makers.

Related prior papers in *Decision Analysis* include Hogarth and Karelaia (2006) on when heuristics perform well and when they do not, Baucells and Rata (2006) on factors influencing risk-taking behavior in real-world decisions under uncertainty, Keeney (2004) on making better decision makers, and Schilling et al. (2007) on the effectiveness of decision analyses.

Now it is time for our *Trivia question*: The final year of my editorial term is 2012. On what day will the last Rose Parade of my editorial term be held? (a) Saturday, December 31, 2011; (b) Sunday, January 1, 2012; (c) Monday, January 2, 2012; or (d) Monday, December 31, 2012.¹

We now move on to two articles analyzing strategic national defense. First, David J. Caswell, Ronald A. Howard, and M. Elisabeth Paté-Cornell provide an "Analysis of National Strategies to Counter a Country's Nuclear Weapons Program." From the perspective of U.S. policy makers, Caswell et al. (2011) develop a model to decide the best national strategy to prevent or delay another country from acquiring nuclear weapons, with a case study of Iran's nuclear weapons program.

Other related papers in *Decision Analysis* include Merrick and McLay (2010) and Bakır (2008) on cargo

screening, Barrett (2010) on measures for chlorine truck attack prevention, Feng and Keller (2006) on potassium iodide distribution in nuclear incidents, and von Winterfeldt and O'Sullivan (2006) on protecting airplanes against surface-to-air missile attacks. Prior contributions in *Decision Analysis* by these authors include Paté-Cornell and Dillon (2006) on risk analysis and decision analysis, Howard (2004) on precise decision language, Abbas and Howard (2005) on attribute dominance utility, and Howard and Matheson (2005a, b) on influence diagrams. Also, Garber (2009) contains an interview with Ron Howard.

The next article is by Kjell Hausken and Jun Zhuang on "Governments' and Terrorists' Defense and Attack in a T -Period Game." In a two-stage game model with the government moving first and then the terrorist moving, Hausken and Zhuang (2011) examine choices between attacking the enemy and defending against an attack, and find that when the terrorist's resources are low, the government attacks the terrorist enough to deter the terrorist from attacking, and does not defend. In contrast, when the terrorist's resources are high, both defending and attacking are chosen by both the government and the terrorist.

Some prior papers in *Decision Analysis* have examined two-player games. Building upon a paper by van Binsbergen and Marx (2007), Cobb and Basuchoudhary (2009) present a modified decision-theoretic approach to solve two-player games, where each player has a separate decision tree. Other prior game theory related papers in *Decision Analysis* include Cavusoglu and Raghunathan (2004) on decision theory versus game theory for analyzing detection software, Lippman and McCardle (2004) on dividing an estate, and Rothkopf (2007) on why decision theory, rather than game theory, is the right tool for analyzing auctions.

We now move from professional strategic decisions to a personal decision. In our final paper, "Playing Squash Against Ralph Keeney: Should Weaker Players Always Prefer Shorter Games?," Jeryl L. Mumpower analyzes strategy in the game of squash, revisiting a strategic decision he made while playing Ralph Keeney. Mumpower (2011) challenges the conventional wisdom that weaker players can maximize their probability of winning by playing as few points as possible against superior opponents. He finds that,

¹ *Trivia answer*: (c) The Rose Parade is held on January 1, except when New Year's Day falls on a Sunday, then it is held on January 2.

under certain conditions, it is optimal for a weaker player to play more points rather than fewer points.

Prior papers on sports decisions in *Decision Analysis* include Bickel (2009) on the decision of a baseball batter to “take” a pitch (i.e., not swing at the next pitch, no matter what kind of pitch it is), Hurley (2007) on golf, and Willoughby and Kostuk (2005) on curling.

Be sure to see the announcement in this issue of the Call for Papers for our upcoming special issue of *Decision Analysis* on “Games and Decisions in Reliability and Risk,” with guest editors Refik Soyer, Fabrizio Ruggeri, and Jason R. W. Merrick. The focus of the special issue is on the use of game theory and decision theory in reliability analysis and risk analysis. The special issue aims to bring together novel research from disciplines that have the potential to contribute to this theme, including (but not limited to) economics, engineering, finance, mathematics, medical sciences, military sciences, probability, and statistics. Papers (with submissions due by April 25, 2011) must tackle a problem in risk or reliability using the tools of decision theory or game theory (or both).

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