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Reid K. Hastie and Robyn M. Dawes, *Rational Choice in an Uncertain World: The Psychology of Judgment and Decision Making*

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Source: *The American Journal of Psychology*, Vol. 124, No. 2 (Summer 2011), pp. 247-251

Published by: [University of Illinois Press](#)

Stable URL: <http://www.jstor.org/stable/10.5406/amerjpsyc.124.2.0247>

Accessed: 23/08/2011 14:03

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rules for the highly nonlinear processes that control the complex collective behavior. Maybe the simplicity of these macroscopic laws governing swarms is ultimately tied to the simplicity of the underlying microscopic laws that control individuals. At the end Fisher discusses how the lessons learned can be used to harness swarm intelligence for social or individual good and describes practical applications for business, management, community, and economic development.

I strongly recommend this book to anyone interested in complex systems in general and concepts such as emergence, adaptability, and a unifying perspective about the organizational principles of swarm intelligence to solve complex tasks by integrating simple individual behavior for the well-being of the whole group. I learned from both the contents and arguments presented by the author, and I really enjoyed reading this book.

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#### NOTE

I am indebted to Professor Frances Westley. From her talk “Slow Response of Societies to New Problems: Causes, Costs and Perspectives” I learned about Boulding’s devil’s advocate experiment.

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## THE TANGLED WEB OF RATIONALITY

### Rational Choice in an Uncertain World: The Psychology of Judgment and Decision Making

By Reid K. Hastie and Robyn M. Dawes. 2nd ed. Thousand Oaks, CA: Sage, 2009. 374 pp. Paper, \$56.95.

*Many people would sooner die than think;  
in fact, they do so.*

—Bertrand Russell

Nonhuman animals behave in ways that can be modeled in terms of judgments and decisions (e.g., when and how they forage; Gallistel, 2003), but only humans have the capacity to question the origins of their judgments and decisions, to try to account for the mental processes underlying their choices, and to wonder about the consequences for themselves and others.

Reid Hastie and Robyn Dawes have written a brilliant book on the psychology of judgment and decision making (JDM). The book is a revised edition of their 2001 volume, which, in turn, was an expansion of a 1988 text authored by Dawes. Both authors have been among the most influential cognitive social psychologists of the past 40 years. Hastie is a professor at the Booth School of Business at the University of Chicago, and Dawes is a professor emeritus in the Department of Social and Decision Sciences at Carnegie Mellon University.

In line with their respective areas of specialty, the authors contribute distinctive perspectives to the topic. Dawes conceives JDM with a certain mathematical austerity. Outside the laboratory, many of his concerns about rationality are focused on clinical judgment. One of his most stinging complaints is that clinicians often make judgments their data cannot justify. For example, the claim that child abusers never stop on their own is impossible to make without knowing how many of them actually stop without having been in therapy, which is precisely the kind of information therapists do not have. Dawes (2006) called the fallacious they-never-stop-on-their-own inference the structural availability bias.

Hastie draws from his expertise on small group decision making, particular in legal contexts (e.g., jury decision making). One of his most unsettling findings is that jurors tend to evaluate the merits of a case as a function of the coherence of the legal counsel’s narrative (Pennington & Hastie, 1991). They appear to make up their minds holistically rather than analytically, using an aesthetic standard instead of a rational one. In their book, Hastie and Dawes also tell

stories, but they use narratives to illustrate points of science, not to make them.

### Relevance

There are two historical perspectives on JDM. One perspective is prescriptive (or normative). Once a reasoning problem has been defined, the intellectual task is to find the optimal solution. Much of neoclassical economics, and game theory in particular, is based on the premise that the normative solution is the only interesting result. An alternative perspective is descriptive (or behavioral). Here, the interest lies in measuring and explaining what people actually do when judging and choosing. Psychological theories are credible to the extent that they manage to model and predict human behavior as it actually occurs.

The normative and the behavioral perspectives are not always independent. Aristotle, they say, formulated the rules of logic because he believed that these rules reflect how people actually reason. Laplace asserted that the calculus of probability captures how people intuitively think about uncertainty (cf. Mlodinow, 2008). Only when it became clear that people often violate the axioms of logic and probability did scholars begin to ask whether the mathematical principles needed revision or whether people's reasoning should change.

Hastie and Dawes endorse the latter view; they accept the rules of logic and probability as prerequisites for rational choice. When humans fail to conform to these rules, behavior is not optimal, as Hastie and Dawes are quick to point out in the Preface: "We compare basic principles of rationality with actual behavior in making decisions. There is a discrepancy. . . . The overarching argument is that our thinking processes are limited in systematic ways" (p. x). The role of JDM science is to diagnose these problems and to offer ways to solve them.

Hastie and Dawes grant that human judgment occasionally only appears to be irrational because inappropriate normative criteria are being applied. Dawes (1989) himself once showed that social projection (i.e., the tendency to assume that others are similar to the self) does not necessarily amount to a "false consensus effect" but that it is consistent with Bayes's rule for the rational revision of belief. Imagine that public opinion is split on a particular issue. There is a clear majority for one position, but you do not know which. Then, it makes sense to conclude that your personal opinion is more likely to be shared by a majority of others than by a minority. Indeed, this conclusion is true by definition.

For the most part, however, Hastie and Dawes do not seek to change norms but people. They assert that there is an optimal way to make judgments and decisions and that most people systematically fail to reach this standard. To them, the good news is that rationality is a skill, a habit of mind that can be mastered with proper education, training, and practice. This is the worldview of meliorism, which holds that "principles of rational decision making can help people improve the quality of their choices and, thus, their lives" (p. ix).

### Outcomes

Hastie and Dawes present two master views of rationality: correspondence and coherence. Correspondence rationality recognizes that judgments vary in their accuracy (Hastie & Rasinski, 1987). When plotting a set of judgments against relevant criteria, the degree of correspondence is given by a correlation coefficient or a similar statistic. From a normative standpoint, the question becomes just how good must judgments be before they can be called rational. Indices of correspondence are difficult to interpret because any particular value may stem from a mix of rational and irrational processes. As Hastie and Dawes note, "any significant intellectual achievement is a mixture of both automatic and controlled thought processes" (p. 5). If one equates, as Hastie and Dawes tend to do, automatic processes with irrationality and controlled processes with rationality, one must conclude that irrational processes can contribute to rational judgment, and if Hastie and Dawes believe that rationality can become a habit of mind, then automatic processes are a necessity. An example of such processes are judgmental heuristics, broadly defined as "efficient, but sometimes inaccurate procedures for solving a problem" (p. 88).

Another limitation of correspondence rationality is that often there are no external criteria against which judgments can be evaluated. Decisions involving choices between alternatives tend to say more about the decision maker's preferences than about the objective qualities of the choice items. Rationality is now a matter of coherence, or freedom from contradiction. By definition, contradictions require at least two judgments or decisions; a single behavior cannot be classified as irrational. A person who prefers to take \$100 rather than a 50% chance of getting \$200 cannot be faulted. However, if the same person had received \$200 and now prefers to risk losing all in a fair bet over giving back \$100 (exhibiting typical loss aversion), then she is being incoherent. Hastie and

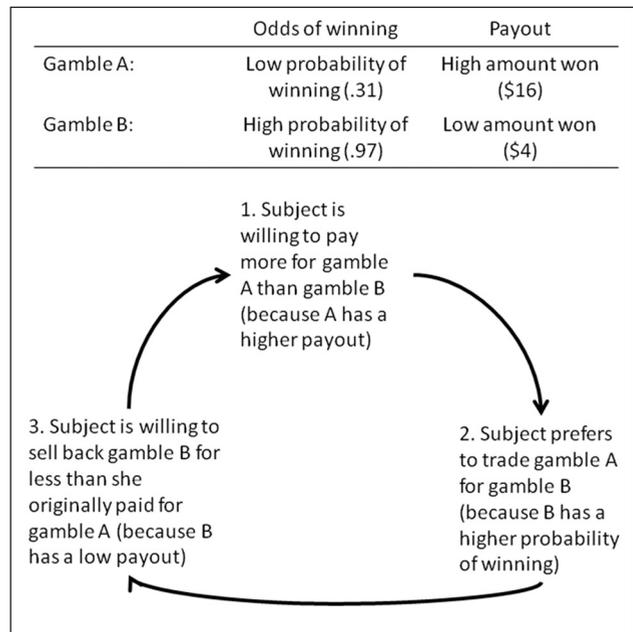
Dawes explain that decisions affected by the framing of the outcome violate the axiom of invariance, which was developed as a mathematical property in expected utility theory (von Neumann & Morgenstern, 1947). To avoid risk when alternative outcomes are framed as gains and to seek risk when they are framed as losses “is irrational—an essential criterion of rationality being that choices be made on the basis of the consequences of behavior—yet with identical consequences people choose different courses of action” (p. 282).

Framing effects are among the best evidence for coherence irrationality. Choices appear to depend on something that should not matter: the frame in which the problem is presented. These effects are strongest when the decision consequences are identical across frames. However, Hastie and Dawes’s normative view demands that choices be made such that the most desirable consequences are obtained. If the consequences are the same, that is, if the expected values of the chosen and the rejected alternatives are identical, then why get upset if the frame predicts which alternative is chosen and which is rejected? Framing effects offer evidence for irrationality that may be pure, but it is inconsequential.

Coherence irrationality matters most when it is accompanied by a lack of correspondence. Hastie and Dawes observe that “because reality cannot be characterized in contradictory ways, contradictory thinking is irrational thinking. A proposition about reality cannot be both true and false” (p. 19). Incoherence is troublesome if it reduces a person’s well-being or the welfare of others. Preference reversals in gambling are good examples of self-defeating incoherence.

Ordinarily, people buy the gambles they want to play, such as lottery tickets. There is no distinction between willingness to buy and willingness to play. The two types of preference can be separated experimentally, however. Citing classic work by Slovic, Fischhoff, and Lichtenstein (1982), Hastie and Dawes report that the willingness to pay for a gamble increases with the size of the potential payoff, whereas the desire to play the gamble increases with the probability of winning *anything*. The trouble is that a gambler with conflicting preferences may be turned into a “money pump” by a savvy and unscrupulous trader. Figure 1 displays the potential cycle of exploitation.

Perhaps the most disturbing hybrid of coherence and correspondence occurs when a “true” preference conflicts with a “bogus” one, and the person acts on the latter. In the absence of coercion it is irrational



**FIGURE 1.** Exploiting labile preferences: The money pump

to do what one does not want to do. Superficially, this kind of irrationality seems a logical impossibility, and to claim that it exists would itself be irrational. When making a choice, the person has reasons, and by definition, the reasons favoring the chosen alternative must be stronger than the reasons favoring the rejected alternative (Kruglanski & Orehek, 2009). Could it be otherwise?

Hastie and Dawes believe so, and they illustrate their claim with research on sunk costs. Victims of sunk costs throw good money after bad or continue a military campaign despite knowing that the war is already lost. In an experimental demonstration, Arkes and Blumer (1985) asked participants whether they would rather go on a weekend ski trip that they had already paid for even if they knew they would be happier and more comfortable staying at home by the woodstove (e.g., because of foul weather on the mountain). Many participants indicated they would rather ski and hence do what they prefer to avoid.

The sunk cost effect raises complex issues. As in the case of other heuristics, there may be an overall adaptive advantage. For example, sensitivity to sunk costs may stem from an overgeneralization of the basically sound rule that one should not be wasteful (Arkes & Ayton, 1999). Yet the impulse not to be wasteful must be overridden when there is clear evidence that a further deployment of resources will only reduce wealth or happiness.

What if reasoning about the sunk cost effect con-

tains higher-order thinking about one's own choices? It is conceivable that the hypothetical skier is aware of the sunk cost error and commits it for that very reason. The question is whether the skier truly accepts the idea that staying at home would be more enjoyable. Perhaps he or she anticipates having regrets when letting the ticket go to waste and decides to go to the mountain to forestall that regret. In other words, the skier makes a second-level decision by asking how he or she would feel given a particular choice. Hastie and Dawes recognize that reasoning about one's own choices can become bound up with the choices themselves, but they caution that such secondary aspects of the decision process "are difficult to integrate with the costs and benefits of payoffs, because they are of a qualitatively different type" (p. 225).

#### Processes

Definitions of rationality refer to patterns of judgments and decisions, not to the way they are mentally constructed. Psychological research is concerned with the way people think, of course, and Hastie and Dawes mine this research to locate sources of irrationality and opportunities for improved reasoning. They endorse the popular dual-system model of automatic versus controlled reasoning (Evans, 2008). To Hastie and Dawes, the critical attribute of intuitive processes is that they are associative in Locke's sense: "Most of our thinking most of the time is governed by that ubiquitous law of association" (p. 114). This type of associative thinking lazily lets salient stimuli dominate behavior, such that there is no consideration of that which is not in the immediate environment. "We attend to one item of evidence at a time as we make estimates" (p. 73).

In contrast, controlled thinking has the capacity to step out of the associative box and ask "what if" questions. This type of reasoning is systematic, effortful, and sometimes counterfactual. It comprises "the creation of mental representations of what *is not* in the immediate environment" (p. 3) and treats perceived evidence "as a set of possible instances that *could* be observed" (p. 126). To Hastie and Dawes, formal Piagetian operations and the scientific method exemplify the purest forms of this type of reasoning. Difficult and precious, this reasoning sits at the pinnacle of cognitive development and is ever threatened by the lure of association, the temptation to be simple-minded. "It takes willpower and training to escape from the 'dominance of the given' and to actually *think* about events and relationships that are not salient and explicit in our experience" (p. 114). Indeed, recent work shows that intuitive and automatic

reasoning dominates when regulatory resources are depleted (Masicampo & Baumeister, 2008).

How can we become more rational? Hastie and Dawes suggest two strategies to succeed without being overwhelmed by mental strain. The first strategy, noted earlier, is to attain expertise through rigorous repetition of rational reasoning. Like other mental activities, reasoning can be routinized. Once it is a honed skill, rational reasoning can be performed with the ease of intuitive processes. The second strategy is to externalize tasks that are too complex to be performed reliably. It may be fair to expect people to have a basic appreciation of the laws of probability, but it is cruel to ask them to do a chi-square test in their heads. The trick is to know when to yield to the spreadsheet. "An essential part of wisdom is the ability to determine what is uncertain—that is to appreciate the limits of our knowledge" (p. 329).

#### Critique

Even with the most prodigious scholarship, it is hard to do justice to the complexities of rationality. We point to two unresolved issues, not to criticize the authors but to speculate about where theory and research might turn in the future. Hastie and Dawes themselves are aware that the quest for a good theory of rationality is an ongoing one.

The first question is whether JDM is really so bad that systematic irrationality must be regarded as a sickness in search of a cure or as a tragic flaw that evolution failed to wipe out. Despite their spirited rhetoric stressing the broken that needs fixing, Hastie and Dawes themselves doubt that our irrationalities dominate all thinking: "Humans have an exceptional ability to choose appropriate means to achieve their goals" (p. 1); "Making judgments on the basis of one's experience is perfectly reasonable, and essential to our survival" (p. 158); "It is likely that we are adapted to be approximately rational in our behaviors; our optimistic hypothesis is that people are at least half-smart in achieving their personal goals" (p. 271); and the whopper, "It may well be that optimal, ideally rational judgment calculation is not the *adaptively* best judgment process under more realistic conditions" (p. 169).

The last statement undercuts the project of making people more rational by fostering their controlled reasoning. Therefore, the second question is whether controlled reasoning should always prevail. The answer appears to be "No" because controlled, reflective reasoning can also lead to errors. Consider Hastie and Dawes's example "of a systematic mis-prediction

that occurs when we deliberately infer what we will like” (p. 212). There is a “diversification bias” when people expect to enjoy a variety of experience in the future, when in fact their preferences are bound to remain rather stable (Simonson, 1990; see also Ariely & Levav, 2000, for a similar effect). In a rhetorical flourish, Hastie and Dawes call this bias “the calculation heuristic” (p. 212), when in fact it appears to arise from rule-based reflection.

Intuition can sometimes win the battle for rationality. “When the deliberate, controlled strategies of our cognitive system are unable to make a decision, they will be overridden by more automatic, implicit, intuitive systems” (p. 313). Astoundingly, Hastie and Dawes concede that they “cannot cite any research-based proofs that deliberate choice habits are better in practical affairs than going with your gut instincts” (p. 232). If this is not enough to raise doubts about the two-system framework, consider “the scientific problem [which] is that there are no clear boundaries between the two systems and no generally accepted operations to identify the workings of one or the other system” (p. 309).

Over the past thirty years, scientists have learned much about JDM, with Hastie and Dawes at the forefront providing a valuable service in presenting issues and evidence from a principled and persuasive point of view. The holes they have discovered in current theory and research should inspire us to work harder to fill them. To stop thinking now, as Russell said, would be to invite death.

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#### NOTE

We thank the students in the laboratory course on social cognition, taught at Brown University in the spring semester of 2010, for discussing the Hastie and Dawes book with us and responding so well to the many ideas presented therein. One of the students, Charles Crandon, generously offered insightful comments on a draft of this review.

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#### Erratum

The review of *Ethics for Psychotherapists and Counselors: A Proactive Approach* by Sharon K. Anderson and Mitchell M. Handelsman that appeared in the Spring 2011 issue (volume 124, number 1, pp. 113–116) did not list the book's publisher: Wiley-Blackwell. The journal apologizes for the omission.