Daniel Kahneman: Judgment, Decision, and Rationality

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It is rather ironic that just as rational economic models of politics have emerged as the most influential paradigm in political science, experimental economists have increasingly begun to question the descriptive validity of expected utility theory. The rise of the behavioral economics research program owes a great deal to psychologists Daniel Kahneman and Amos Tversky, whose research on systematic deviations from rationality quickly transcended their own discipline and significantly influenced other fields, including management science, finance, investment, and consumer economics. Their work has recently begun to influence political psychology, international relations, and other areas of political science. This brief summary of some of Kahneman's major contributions is intended to provide a context for his upcoming address at the 2002 APSA meetings.

It is impossible to do justice to the full range of Kahneman's research in the limited space available here, and I restrict my focus to his research programs on judgment and on decision making.[1] Each is defined by an extraordinarily influential article coauthored with Tversky: a 1974 *Science* article on "Judgment under Uncertainty: Heuristics and Biases" (which was followed by a 1982 anthology with the same title with Slovic and Tversky, and a 1979 *Econometrica* article on prospect theory). One measure of the impact of these articles is that they have each been cited over one hundred times per year on average during the last two decades (Laibson and Zeckhauser 1998), and the article on prospect theory is reported to be the most widely cited article ever published in *Econometrica*.[2]

Judgment under Uncertainty: Heuristics and Biases

Judgment involves assessments of the probability or likely frequency of an event. In the tradition of bounded rationality (Simon 1955), the Kahneman/Tversky research program on judgment posits that people rely on a limited number of cognitive shortcuts or judgmental heuristics that simplify the complex task of assessing probabilities in an uncertain world. Three of the most important heuristics are representativeness, availability, and anchoring and adjustment. While these heuristics are often useful and economical, they neglect important information relevant to probabilities and consequently may lead to systematic and potentially severe errors.

The *representativeness* heuristic refers to assessments of the likelihood that one object or event belongs to a particular category based on the similarity of that object or event to typical members of that category. In one experiment (Tversky and Kahneman 1974), subjects were given brief personality descriptions of several individuals and asked to assess, for each description, the likelihood that it referred to an engineer or a lawyer. In one experimental condition subjects were told that the descriptions were sampled randomly from a group of 70 engineers and 30 lawyers, and in a second experimental condition the proportion of the two professions was reversed. A rational assessment of probabilities, following Bayes's law, would involve some combination of prior probabilities (based on the relative percentage of engineers and lawyers) and current information (based on the description), leading to different probability estimates in the two experimental conditions because of differences in prior probabilities. Subjects' estimated probabilities were nearly identical, however, demonstrating the tendency to emphasize representativeness or similarity and to neglect prior probabilities or base rates. Similar patterns have been identified in countless other experiments.

The influence of representativeness also contributes to the violation of the conjunction rule in probability theory. Given two events A and B, the probability of the conjunction or intersection of A and B cannot exceed the individual probability of either A or B. In one experiment, Kahneman and Tversky (1982) gave subjects the following description: "Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations." Subjects were asked to assess the likelihood that various statements about Linda were true, among them being that "Linda is a bank teller" and "Linda is a bank teller and is active in the feminist movement." Over 85% of subjects believed it was more likely that Linda was both a bank teller *and* a feminist than just a bank teller, contrary to the laws of probability.

One interesting implication of representativeness is that assessments of the likelihood of a particular outcome might be less than assessments of the likelihood of the conjunction of that outcome and a particular causal mechanism that might have led to it. A study in the early 1980s found that subjects believed that "a Russian invasion of Poland, and a complete suspension of diplomatic

Editor's Note

Daniel Kahneman is the Eugene Higgins Professor of Psychology and professor of psychology and public affairs in the Woodrow Wilson School at Princeton University. He will deliver the Decade of Behavior Lecture at the Annual Meeting in Boston on Friday, August 30 at 8:30 pm.

The Decade of Behavior Distinguished Lecture Program is designed to showcase behavioral and social science research addressing the goals and themes of the Decade of Behavior initiative <www.decadeofbehavior.com>. The lecture by Kahneman is one of five sponsored addresses held by scholarly societies in 2002.

A renowned scholar, Kahneman has worked in diverse areas of psychology, most significantly work done with the late Amos Tversky, in which they developed some challenges to the descriptive validity of the rationality assumption, and provided psychological analyses of a number of significant facts of judgment and choice. Their pathbreaking work has crossed disciplines and influenced political psychology, international relations, and other areas of political science.

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relations between the USA and the Soviet Union sometime in 1983," was more likely than the suspension of diplomatic relations alone (Plous 1993).

People use the *availability* heuristic when they judge probabilities based on the ease with which instances of the phenomenon in question come to mind, based on familiarity, vividness, salience, or emotional impact, regardless of whether such cognitively retrievable events constitute a representative sample of the universe of relevant events. Television coverage of a single act of terrorism or airlines crash has far greater impact than statistical evidence on peoples' perceptions of risk. Availability is a central mechanism underlying many important hypotheses about learning from the past based on analogical reasoning. People tend to learn from events that have a major impact, affect the individual or society directly, have occurred recently, and that are observed first-hand and at a formative period in a person's life (Jervis 1976), despite such events' not necessarily representing the class of events that one wants to predict.

A third important judgmental heuristic is *anchoring and adjustment*. Whereas Bayes's law prescribes the optimum way to combine new information with prior probabilities, evidence suggests that people's adjustment mechanisms are inefficient, that initial values have a disproportionate impact on final estimates, that people update their beliefs more slowly than a rational Bayesian model would predict, and that updated probabilities converge with true values slowly if at all.[3]

Prospect Theory

Kahneman and Tversky's research on prospect theory has had an even greater impact, at least in economics, than their work on judgment. Reacting to the hegemonic position of expected-utility as a theory of decision under conditions of risk, they demonstrated experimentally that people systematically deviate from the predictions of expected utility-theory and some of the axioms upon which it is based.[4] Kahneman and Tversky (1979) constructed prospect theory to integrate these behavioral anomalies in rational decision theory into an alternative theory of risk choice.

The central analytic assumption of prospect theory is that people define value relative to a reference point (*reference dependence*) rather than in terms of net assets, based on evidence that people are more sensitive to changes in assets than to net asset levels. People give more weight to losses from that reference point than to comparable gains (*loss aversion*), and they value what they have more than comparable things not in their possession (the *endowment effect*), which in turn makes actual losses hurt more than foregone gains. Individuals' strong aversion to losses, particularly to losses that are perceived as certain (as opposed to those that are perceived as probabilistic), induces them to take significant risks in the hope of avoiding loss, even though the result may be an even greater loss and even though the expected value of the gamble may be considerably worse than the value of the certain loss. The result is risk-averse behavior with respect to gains and risk-acceptant behavior with respect to losses.

With value defined in terms of deviations from a reference point, how people identify their reference points and hence "frame" a choice problem is critical. A change in reference point may lead to a change in preference (*preference reversal*) even if the values and probabilities associated with possible outcomes remain unchanged. People facing decisions over medical treatments, for example, respond differently to a 90% survival rate than they do to a 10% mortality rate, although the two are logically equivalent. These *framing effects* are difficult to reconcile with rational choice, which assumes that logically identical choice problems lead to identical outcomes.[5] Similarly, evidence that an individual's preference between two goods can be affected by the introduction of a third alternative (which may induce a new reference point) violates formal utility theory's basic assumptions of "independence of irrelevant alternatives" (Kahneman and Tversky 1982).[6]

Despite the importance of framing for choice, we know little about how people identify their reference points. In static situations, people often (but not always) frame their choice problems around the status quo. In dynamic situations, evidence suggests that people *renormalize* their reference points much more quickly after making gains (the *instant endowment effect*) than after suffering losses.

Experimental studies also show that individual choice behavior demonstrates a *nonlinear response to probabilities*, in contrast to the linear combination of utilities and probabilities posited by expected-utility theory. People overweight outcomes that are certain relative to outcomes that are merely probable (the *certainty effect*). They also overweight small probabilities and underweight moderate and high probabilities. This means that, except for small probabilities, people tend to give more weight to the utility of a possible outcome than to its probability of occurrence.[7]

Kahneman and Tversky (1979) developed prospect theory to integrate these observed patterns into an alternative theory of risky choice. They distinguish two phases in the choice process. In the *editing phase* the actor identifies the reference point, the available options, the possible outcomes, and the value and probability of each of these outcomes. In the *evaluation phase* she combines the values of possible outcomes (as reflected in an S-shaped *value function*, which is characterized by concavity above the reference point, convexity below it, and a steeper slope on the loss side) with their weighted probabilities (as reflected in the *probability weighting function*) and then maximizes over the product. Attitudes toward risk are determined by the combination of the S-shaped value function and the probability weighting function and not by the value function alone. Although this combination usually generates risk aversion for gains and risk acceptance for losses, it can also produce (depending on the precise shape of the two functions) risk acceptance for gains and risk aversion for losses when probabilities are small, as illustrated by gambling and insurance behavior, respectively.

These basic principles lead to a rich and varied set of propositions about political behavior.[8] (1) When actors define their reference points around the status quo, there is a "*status quo bias*" that tends to reinforce the status quo. If actors frame their choices around a reference point that is preferred to the status quo (an expectation or aspiration level, for example), there is a tendency to move away from the status quo, which is destabilizing. (2) State leaders take more risks to maintain their international positions, reputations, and domestic political support against potential losses than they do to enhance their positions. The same is true for political leaders and bureaucratic actors in domestic politics. In addition, domestic publics punish their leaders more for losses than for the failure to make gains. (3) Because people renormalize their reference points after gains but not after losses, losers are risk acceptant in their efforts to recover losses (sunk costs matter) while winners are risk acceptant in their efforts to defend the new status quo against subsequent losses, so that both sides engage in more risk-seeking behavior than expected-value theory predicts. (4) People (and the law) treat errors of commission or action as more blameworthy than errors of omission or inaction. Social norms against hurting another are more compelling than norms to help another. Similarly, both contract and tort law distinguish between losses incurred and gains denied, and judges are much more reluctant to compensate people for unrealized profits than for losses.

There are related propositions about strategic interaction and bargaining. (5)

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Deterring an adversary from making gains is easier than deterring her from recovering those losses or compelling her to accept losses. (6) It is easier for political actors to cooperate in the distribution of gains than in the distribution of losses, because they will take more risks and bargain harder to minimize their share of the costs than to maximize their share of the gains. (7) Knowing that "losers" in political primaries who outperform low expectations are often better off than "winners" whose margins of victory are less than expected, political actors try to influence observers' reference points by lowering expectations of their own performances and raising expectations of their adversaries' performances.

This is not the place for a critique of the potential utility of prospect theory for the study of politics.[9] Let me note, however, that one key set of questions concerns the generalizability of highly controlled laboratory studies of individual behavior in simple choice problems to political contexts in which the stakes are far higher; the actors are collective decision-making bodies rather than individuals; choices are interactive or strategic rather than decision-theoretic; time frames are sequential and dynamic; and key variables of interest are difficult to measure or even conceptualize along an interval-level scale that is necessary to test the theory empirically.[10] There are also questions about the utility of a referent-dependent theory that lacks both a theory of the reference point and an established methodology for identifying reference points empirically.

Conclusion

Kahneman has made seminal contributions to the interdisciplinary study of decision and judgment. His work is central to the bounded rationality research program and to ongoing debates about the descriptive accuracy of the expected-utility microfoundations of rational choice models of politics. Determining whether his theory of individual choice can be extended to the strategic behavior of collective actors, and tested empirically against observed behavior in real-world settings, remains a formidable task for future research.

Notes

1. These are Kahneman's most influential lines of research. His more recent work on the psychology of happiness and well-being (Kahneman, Diener, and Schwarz 1999) constitutes another major research program.

2. Lowenstein, Roger, "Intrinsic Value: Outside Who Challenged Dismal Science," *Wall Street Journal*, 6 June 1996.

3. The influence of the anchor is illustrated in one experiment in which high school students, given five seconds to estimate the product of 8x7x6x5x4x3x2x1, produced an average figure that was four time higher than for the product of 1x2x3x4x5x6x7x8 (Tversky and Kahneman 1974, 15).

4. The evidence is quite robust. Findings of departures from rationality have been confirmed with subjects of considerable expertise in probability and statistics, including medical professionals, and it has been supported by empirical studies of investment and insurance behavior (Kahneman and Tversky 2000). The same patterns have been confirmed by experimental economists who were determined to (and expecting to) demonstrate that the findings were the artifacts of flawed experimental designs (Camerer 1995).

5. Tversky and Kahneman (1986, S252–57) refer to this as the "invariance" assumption. Arrow (1982, 6) labels it "extensionality" and describes it as a "fundamental element of rationality."

6. Kahneman's (1994) recent research on people's difficulty of correctly anticipating, at the time they make decisions, the utility they will experience from a given outcome also has potentially profound implications for rationalist theories of behavior.

7. Applications of prospect theory to political science have given far more attention to loss aversion and framing than to probability weighting.

8. This discussion builds on Levy (2000). See also Farnham (1994) and McDermott (1998).

9. See Levy (1997) and O'Neill (2001).

10. Kahneman has always been extremely cautious about possible generalizations from highly controlled laboratory settings to real-world behavior.

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