

“Leaky” Rationality

How Research on Behavioral Decision Making Challenges Normative Standards of Rationality

Daniel J. Keys¹ and Barry Schwartz²

¹Cornell University and ²Swarthmore College

ABSTRACT—*For more than 30 years, decision-making research has documented that people often violate various principles of rationality, some of which are so fundamental that theorists of rationality rarely bother to state them. We take these characteristics of decision making as a given but argue that it is problematic to conclude that they typically represent departures from rationality. The very psychological processes that lead to “irrational” decisions (e.g., framing, mental accounting) continue to exert their influence when one experiences the results of the decisions. That is, psychological processes that affect decisions may be said also to “leak” into one’s experience. The implication is that formal principles of rationality do not provide a good enough normative standard against which to assess decision making. Instead, what is needed is a substantive theory of rationality—one that takes subjective experience seriously, considers both direct and indirect consequences of particular decisions, considers how particular decisions fit into life as a whole, and considers the effects of decisions on others. Formal principles may play a role as approximations of the substantive theory that can be used by theorists and decision makers in cases in which the formal principles can capture most of the relevant considerations and leakage into experience is negligible.*

“In [some] cases, the framing of decisions affects not only decision but experience as well . . . In such cases, the evaluation of outcomes in the context of decisions not only anticipates experience but also molds it.”

—Kahneman & Tversky, 1984, p. 48

Imagine this. You’ve just been awarded tenure, and friends have taken you to an elegant, very expensive restaurant to celebrate.

Address correspondence to Daniel J. Keys, 211 Uris Hall, Cornell University, Ithaca, NY 14853, e-mail: djk54@cornell.edu, or Barry Schwartz, Psychology Department, Swarthmore College, 500 College Avenue, Swarthmore, PA 19081, e-mail: bschwar1@swarthmore.edu.

The menu has more than a dozen entrees, and as you read it, each option sounds more exquisite than the last. You know you can’t go wrong, no matter what you choose, but you also know that you won’t have another meal like this until you get promoted to full professor, if ever.

So you study the menu. You love shrimp, but the preparation seems too plain to give you a sense of what the restaurant can do at its best. The sauce for the veal sounds amazing, but it comes with rice, which is not your favorite side dish. And it’s a little politically incorrect to eat veal. The sole with crab sounds great, but you know that when you eat fish you still feel hungry later. Then there’s homemade pasta with a Bolognese sauce and filet mignon with a peppercorn sauce. On and on it goes; each dish enticing, but no clear winner. What and how will you choose?

In the last few years, there has been an increase in literature that indicates that people often have real difficulty making choices, especially when those choices involve tradeoffs (Luce, 1998; Luce, Payne, & Bettman, 1999). Moreover, the difficulties increase as the number of attractive options increase (Iyengar & Lepper, 2000; Schwartz, 2004). Everything suffers from comparison (Brenner, Rottenstreich, & Sood, 1999). Multiple attractive options may even lead to paralysis.

But you won’t be paralyzed. Eventually you will choose, and a sumptuous, inviting dish will be placed before you. The experience of the results of this choice is the focus of this article. Will you put your anguished decision making behind you and enjoy what you’ve chosen thoroughly and completely, or will your conflict linger, diminishing the satisfaction you ought to be getting from your delicious meal? In other words, do the processes by which people make decisions “leak” into their resulting experience of those decisions? In this article, we argue that the answer to this question is often yes, and that an appreciation of this fact has profound implications when the decisions people make are evaluated against the demanding standards of normative rationality. We also indicate that, whereas the field of judgment and decision making has always known that decisions leak into experience, inadequate attention has been paid to the empirical dimensions and the theoretical implications of such leakage.

SOME CLASSIC “IRRATIONALITIES”

Consider the following hypothetical situations:

1. Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences are as follows:

- A: If Program A is adopted, 200 people will be saved.
- B: If Program B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.

2. The situation is the same as in Example 1, however the scientific estimates of the two alternative programs are now as follows:

- C: If Program C is adopted, 400 people will die.
- D: If Program D is adopted, there is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.

3. You travel into the city by train to see a concert, and when you get to the box office and reach into your pocket for money to buy a \$20 ticket, you discover that you have lost a \$20 bill. Assuming that you have enough money to cover the costs, do you:

- A. Buy a ticket anyway
- B. Go home and not see the concert

4. You travel into the city by train to see a concert, and when you get to the box office and reach into your pocket for the \$20 ticket, you discover that you lost it somewhere en route to the concert. When you explain your predicament at the box office, the attendant is very sympathetic, but explains that because there is no way of proving that you had a ticket and because seats are unreserved, if you want to see the concert, you will have to buy another ticket. Assuming that you have enough money to cover the costs, do you:

- C. Buy another ticket
- D. Go home and not see the concert

5. Suppose you are given a choice between two lotteries, each of which involves drawing one marble from a box of many marbles of different colors:

- A: 90% white—win \$0, 6% red—win \$45, 3% yellow—lose \$15, 1% green—win \$30
- B: 90% white—win \$0, 7% red—win \$45, 2% yellow—lose \$15, 1% green—lose \$10

6. The situation is the same as in Example 5, but the two lotteries are now as follows:

- C: 90% white—win \$0, 6% red—win \$45, 2% yellow—lose \$15, 1% blue—lose \$15, 1% green—win \$30
- D: 90% white—win \$0, 6% red—win \$45, 2% yellow—lose \$15, 1% blue—lose \$10, 1% green—win \$45

7. Suppose that you are watching a movie, and you find the movie to be boring and unlikely to get any better. Do you:

- A. Keep watching the movie
- B. Stop watching the movie

8. Suppose that you are watching a movie that you paid \$7 to see, and you find the movie to be boring and unlikely to get any better. Do you:

- C. Keep watching the movie
- D. Stop watching the movie

According to the traditional, formal theory of decision making, there is a right way and a wrong way to answer these questions. Examples 2, 4, and 6 are identical to Examples 1, 3, and 5 in all relevant respects, though the situations have been reframed so that some superficial details differ. Options C and D are essentially the same as Options A and B in each pair of questions, so anyone who selects A and D or B and C to consecutive questions is acting in violation of the formal principles of rationality. In this article, we argue in favor of some of the people who display these seemingly inconsistent patterns of responses and against the abstract, formal theory of rationality that always judges such patterns to be irrational. Determining which changes to a situation are relevant to a decision and which changes are merely a superficial reframing is not a simple task, and in scenarios like these, an apparently trivial change can have real consequences for the life of the decision maker.

The Asian-disease problem, presented here in Examples 1 and 2, was devised by Tversky and Kahneman (1981; see also Kahneman & Tversky, 1984) as an example of *invariance*. The principle of invariance states that changes in the descriptions of outcomes should not alter one’s preference order. Invariance is such an obvious principle that many accounts that attempt to formalize the rules of rational decision making use it implicitly, without stating it explicitly. It is obvious that the two Asian-disease problems are identical when they are viewed side by side: when 600 lives are at stake, saving 200 lives is the same as losing 400 lives and a one-third chance of saving 600 lives is the same as a one-third chance of losing 0 lives. However, when answered separately, many people select Options A (72%) and D (78%). This pattern of results violates the principle of invariance, but people make these choices because they think in the way that has been elegantly described by prospect theory (Kahneman, 2003; Kahneman & Tversky, 1979). Because people have diminishing

marginal sensitivity to both gains and losses, they tend to be risk seeking when dealing with losses (people who die) but risk averse when dealing with gains (people saved).

Examples 3 and 4 come from the literature on mental accounting (e.g., Kahneman & Tversky, 1984; Thaler, 1980, 1999). You are in the same financial situation in both cases. Either you could be out \$40 and see the show, or you could be out \$20 and not see the show. However, people do not take this kind of global perspective on their money. Instead, they group their finances into narrower mental accounts (and see Sunstein et al., 2002, for recent evidence that narrow accounting extends far beyond matters of personal finance), and they make decisions on the basis of evaluations of the relevant mental accounts. People who have lost their ticket post both the \$20 cost of the first ticket and the \$20 that would be necessary to buy a new ticket to the “concert” account, which makes the total cost of attending the show seem to be \$40. Because \$40 is a lot to pay, many people who receive this version of the scenario (42% in the study by Kahneman & Tversky, 1984) do not buy another ticket. People who have lost a \$20 bill account for that loss in a way that is unrelated to the concert, so most of them (90% in the study by Kahneman & Tversky, 1984) choose to pay for a ticket. Economists tend to take the global perspective on people’s finances and view the two situations as identical in all relevant respects. Money is fungible—one dollar is the same as any other—so wasting \$20 on a lost ticket is the same as wasting \$20 on a lost \$20 bill. The inconsistency between the two situations, which is caused by mental accounting, is another violation of the principles of rationality.

Examples 5 and 6 exhibit the principle of dominance. Tversky and Kahneman (1986) describe dominance as “perhaps the most obvious” formal rule of the normative theory of decision making (p. S253). The principle of dominance holds that we should choose an option if (a) whatever else happens, that option never turns out any worse than any of the other options, and (b) it is possible that that option will turn out better than the other options. Tversky and Kahneman (1986) reported that people find dominance to be a compelling reason to choose an option, although there are some monetary gambles where many people fail to choose a dominant option when they do not realize that it is dominant. In Example 6, it is transparent that Option D dominates Option C, so nearly everyone chooses Option D. The structure of payouts is identical in Example 5, but the colors of some of the marbles have been changed, which makes the dominance of Option B over Option A difficult to notice. Tversky and Kahneman (1986) found that many people choose Option A, which is a violation of the principle of dominance.

The final two examples illustrate the *sunk-cost principle*. According to this principle, choices should be future oriented. Because our decisions affect the future but not the past, they should be based on the consequences of the actions and not on what has already happened. The \$7 that was spent on the movie in Example 8, for instance, is already gone. Whether you stay to watch the rest of the movie or you leave right away, you will not

be getting your money back. Your options are the same as in Example 7: Either you spend the next hour or two watching this bad movie, or you go do something else. Thus, according to the sunk-cost principle, your decisions in the two situations should also be identical. However, people do not treat the situations identically. Instead, they commit the sunk-cost fallacy. In a study by Frisch (1993; see also Larrick, Morgan, & Nisbett, 1990), 57% of the people who said they would stop watching the movie if it was free indicated that they would keep watching it if they had paid to see it. They did not want to waste money, but because the \$7 has already been spent, the only way to keep it from seeming like a waste is to throw good time after bad money and sit through the boring movie.

The normative standards of judgment and decision making are often defined in terms of formal, abstract rules like invariance, dominance, and the sunk-cost principle. These rules primarily depend on the structure of the situation, not on all of the particular substantive details, and they are thought to apply to any situation with the proper structure. Taken as exceptionless principles, they are often used as the standard against which individual behavior should be judged. The examples above illustrate people’s systematic violations of these principles, which are usually understood to show that people are not perfectly rational. These deviations from rationality imply that the best descriptive theory of human behavior must be different from the normative theory (e.g., Kahneman, 2003; Kahneman & Tversky, 1984; Tversky & Kahneman, 1986).

In this article, we argue for an alternative interpretation of these examples and the formal principles that they are seen as illustrating. We believe that there are compelling cases in which the rational course of action seems to be contrary to one of these normative principles. These apparent exceptions to the normative principles suggest that such abstract principles may not be as important as they seem. We also argue that most interesting normative claims require a more substantive theory of rationality than these purely formal principles provide—a theory in which the content of a situation, and not just its formal structure, must be taken into account. The general structure that underlies our argument is as follows:

1. In many cases in which people decide among alternatives, it is the subjective, rather than the objective, consequences of the decision that should be the standard for assessing the rationality of the decision.
2. The circumstances under which the decision is made (e.g., the way in which the alternatives are presented) affects the way in which the consequences of the decision are experienced.
3. Various “failures” of rationality that are well-studied and well-understood as determinants of a decision continue to exert their influence after the decision is made. In other words, the decision-making process leaks into the subsequent experience of the results of the decision.

4. Whenever Points 1–3 hold true, a normative assessment of the rationality of a decision will have to be substantive rather than formal. The assessment will have to focus on how the consequences of the decision are experienced and on how the decision-making process fits into the decision maker's life as a whole.

We want to make clear that researchers in the field of judgment and decision making have not been insensitive to this issue (witness the quote from Kahneman & Tversky, 1984, at the beginning of this article). Aspects of Points 1–4 have been the subject of both empirical investigation (e.g., Frisch, 1993; Gilbert & Ebert, 2002; Keren & Wagenaar, 1985) and theory development (e.g., Bell, 1982; Loomes & Sugden, 1982). We suggest that the issue is absolutely central to research on rational decision making and thus has not gotten nearly the attention it deserves.

LEAKAGE INTO EXPERIENCE

Consider this example: Sally's bosses tell her that they appreciate the work she has done during the past year and give her a \$1,000 bonus. On the same day, she receives a \$100 tax refund from the IRS. Erica's bosses also tell her that they appreciate the work that she has done during the past year, but she is only given a \$100 bonus. On the same day, she receives a \$1,000 refund from the IRS. The situation resembles Examples 3 and 4 above, in which the amount of money involved in the two situations was identical but mental accounting led people to treat them differently and choose to buy a concert ticket more often in one case than in the other. For Sally and Erica, though, the difference between the two scenarios seems more meaningful. A larger bonus may be more of a sign that her boss appreciates her work and could be more cause for celebration. Thus, it does not seem inappropriate for Sally and Erica to react differently to the \$1,100 that they gained or even to spend the money differently, with Sally perhaps spending more of it on celebration. In this case, there does not seem to be much temptation to assert that different behaviors by Sally and Erica would be a violation of formal principles of rationality.

Although it is easy to identify differences between this example and the concert ticket example that could allow the mental-accounting framing effect to be rational in one case but not in the other, it is much more difficult to give a systematic account of these differences. To state the point more generally, even if principles like dominance or invariance seem completely uncontroversial, there is often a problem in determining when they apply. There are many situations that closely resemble a case in which a normative principle is thought to apply even if it nonetheless seems clear that the principle should not be followed.

One seemingly straightforward account of the application of formal principles like dominance and invariance is that they

only apply when the outcomes that are regarded as being the same are, in fact, the same and that any outcomes that are experienced as being different must be treated as being different. Thus, the formal rules simply don't apply. This strict application criterion may protect the validity of formal rules, but they do so at the expense of their relevance. If any difference in subjective experiences prevents formal rules from applying, then there are no cases of the sunk-cost fallacy, strictly defined, because no cost that is still remembered is truly sunk. People's memory of paying for the movie that they left will leave at least some trace in the experiences that they have after leaving the movie. Likewise, the strict form of the principle of invariance almost never applies, as decision makers will have implicit or explicit memories of their representation of the decision problem that they faced.

Strict cases of dominance are also infrequent. Tversky and Kahneman (1986) used the marble problems in Examples 5 and 6 to illustrate the principle of dominance and people's tendency to follow the principle only when the dominance is transparent. Example 5 is their chosen case of nontransparent dominance, as Option B dominates Option A in terms of monetary outcomes (indeed, they are identical to Options D and C in terms of monetary outcomes), but this dominance is not clear, as the green marble in Option A yields a better outcome than the green marble in Option B. The seemingly irrelevant change between Example 6 and Example 5—a change in the color of marbles—can leak into experience in a way that favors Option A over Option B. People who lose \$10 from drawing a green marble in Option B might regret their decision and think “I would have won \$30 if I'd drawn a green marble in Option A” (e.g., Zeelenberg, Beattie, van der Pligt, & de Vries, 1996).

Kahneman (2003) offers a way for researchers to sidestep the problem of determining what counts as a violation of formal normative rules: Let decision makers set their own normative standards. Describing the history of his work on framing effects, Kahneman (2003) reports that “the question of how to determine whether two decision problems are the same or different does not have a general answer. To avoid this issue, Tversky and I restricted the definition of framing effects to discrepancies between choice problems that decision makers, upon reflection, consider effectively identical” (p. 702). Kahneman's approach shelters researchers from the theoretical difficulties of applying formal principles like dominance and invariance to particular, concrete situations. He also implies that the framing effects that he and Tversky studied meet the standard of reflection that he gives for identifying equivalent scenarios.

However, there has been little published research documenting participants' reflective judgments on framing problems. Frisch (1993), in one of the few studies that systematically investigated this question, found that participants who reflect on these types of problems often insist that there are real differences between the two versions of a scenario. Frisch presented participants with 15 pairs of scenarios similar to those described

at the beginning of this article (the members of each pair were not presented side by side). After participants had chosen their responses to all 30 questions (two versions of each of the 15 scenarios), participants were shown both versions of each scenario side by side and were asked a yes-or-no question: “Do you think the difference in these two situations warrants treating them differently?”

In 14 of the 15 scenarios, a majority of the participants who showed the expected framing effect answered that the situations did warrant different treatment. For example, out of the 67 participants who reported that they would sit through the rest of the boring movie if they had paid but would not do so if the movie was free, only 2 (3%) decided that the two situations should have received the same treatment. Only on the Asian-disease problem did a majority of participants favor treating the two scenarios in the same way, but even on this seemingly straightforward violation of invariance, only 21 out of 40 participants (53%) took this position.

Frisch (1993) argued that her results should be taken as evidence that people who are subject to framing effects are not always acting irrationally. She presented her empirical studies as a way of deciding between two accounts of framing effects. The first account is that framing effects are like perceptual illusions that trick decision makers, with framing affecting decisions but not the subsequent experiences. The alternative account, which she attempted to defend, is that “framing has an effect on decisions because it has an effect on experience” (p. 402). She used participants’ reflective judgments about the scenarios as an indirect means to investigate whether framing effects influence people’s subsequent experiences. When Frisch asked participants to justify their reflective judgment, she found that many of their justifications were assertions that there is a subjective difference between the two versions of a given scenario.

One might object to this interpretation of Frisch’s (1993) studies and argue that the people who insist that the two versions of a scenario (such as the Asian-disease problem) are different are continuing to make the same mistake that led them to show a framing effect in the first place. Indeed, some of the most striking studies of biases in judgment, such as Tversky and Kahneman’s (1984) research on the conjunction fallacy, has shown how stubborn judgment errors can be, even after the relevant rules of logic or statistics have been explained to participants. However, this argument against trusting participants’ reflective judgments works in both directions. Participants who assert that the two scenarios are equivalent may also be mistaken.

There is a long line of psychological research showing that people are unaware of many of the factors that influence their behavior and their experiences (e.g., Gilbert, 2006; Nisbett & Wilson, 1977; Wilson, 2002). Participants may not realize, when reflecting on two similar scenarios, how subtle differences such as reframing could create meaningful differences between two scenarios. There is evidence, for instance, that yogurt labeled “95% fat free” tastes less rich than yogurt labeled “only 5% fat,”

(Sanford, Fay, Stewart, & Moxey, 2002), that beef labeled “75% lean” tastes better than beef labeled “25% fat” (Levin & Gaeth, 1988), and that 7UP in a yellow–green bottle tastes more like lemon and lime than 7UP in a green bottle (Gladwell, 2005). There are also counterintuitive cases in which seemingly dominant circumstances lead to an outcome that is worse in some ways. People have been found to perform better after drinking an energy drink that cost \$1.89 than after getting the same energy drink for \$0.89 (Shiv, Carmon, & Ariely, 2005), to have less negative memories of an unpleasant experience if it continues longer at a reduced level of unpleasantness (e.g., Kahneman, 2000), and to be less happy when they have more options (e.g., Schwartz, 2004). In sum, it seems that we cannot count on participants to be aware of everything that they would need to know in order to be able to correctly apply formal principles. Thus, we believe that participants’ reflections do not provide a reliable basis for deciding when these formal normative rules apply.¹

The key idea in this argument is not that framing exerts effects on a decision, as is well known, but that its effects do not stop there. They can continue after the decision is made, when the results of the decision are being experienced. In other words, framing effects often leak from the context of choice into the context of experience. When these framing effects persist, the experience of the result can be consistent with the experience of the decision itself, and such consistency undermines the claim that the framing effect on the decision is irrational (see also Frisch & Clemen, 1994; Frisch & Jones, 1993, for arguments that partly anticipate the arguments in this article).

¹Even if they were aware of the relevant information, participants’ reflective judgments could still be unreliable. One factor that might cause a bias in either direction is if the participants are evaluating the scenarios side by side, in what Hsee (1996) has called a joint evaluation. Joint evaluations sometimes lead people to focus on attributes that differ from the ones that they would have considered if they were only faced with one of the two things (see also Kahneman, 2003, who recommended between-participant designs over within-participant designs for precisely this reason). Reflective judgments may produce views that are not attuned to the experiences that a person would have when going through one of the situations. Joint evaluation in a reflective judgment may cause participants to focus on and exaggerate the subtle differences between scenarios. Alternatively, it may encourage reframing (such as recognizing that the lost \$20 bill and the lost \$20 concert ticket can be accounted for in the same way), which could lead participants to see the outcomes in the two scenarios as equivalent. In real life, however, spontaneous reframing appears to be uncommon (Kahneman, 2003; see also Tversky & Kahneman, 1984), and people’s experiences depend on their construal of the events. Reflecting on two scenarios can change people’s mental accounting practices, and, in the words of Thaler (1999), “mental accounting matters.” People may also erroneously judge two scenarios to be equivalent if they try to make judgments that have a “rationalistic” justification (Hsee et al., 2003; see also Hsee & Zhang, 2004). When making choices, people sometimes give undue weight to attributes that seem “hard” (i.e., those that are objective, of economic value, or related to the primary function of an object) while neglecting “soft” attributes (i.e., those that are subjective or peripheral). For example, many people choose a larger cockroach-shaped chocolate candy bar over a smaller heart-shaped candy bar, even if they predict that they would enjoy the heart-shaped candy more, as the value of the nicer shape is less tangible than the value of getting more chocolate (Hsee, 1999). People who act as “lay rationalists” may endorse formal principles based on hard factors like financial circumstances while neglecting soft subjective factors like leakage into experience.

We think that Frisch's findings make a simple but profound point. Changes to the description of a set of options should not be ignored if they affect people's experiences, and almost any change to a situation that a decision maker faces, even one that seems superficial and irrelevant, may end up having some effect on the decision maker's experiences. Even in scenarios that are designed to manipulate the decision maker's choice without changing the outcomes that result from the different options, the alterations to the situation may end up changing the outcomes subjectively because they leak into the decision maker's experience.

Belief in the importance of subjective experiences is widely shared by psychologists, economists, and many others. Indeed, much of Kahneman's recent work (e.g., Kahneman, 2000) has been focused on subjective experience. He has developed the concept of *experienced utility*, which is based on a moment-by-moment evaluation of pleasure and pain, and he has used experienced utility as the standard for assessing the accuracy and rationality of people's predictions, decisions, and memories. But it is interesting to note here that despite Kahneman's attention to the nature of the experience of decisions over the last decade, he has not combined this line of work with the work he and Tversky did for 25 years on the determinants of the decisions themselves. It is as if heuristics, biases, and the dynamics of prospect theory exert their effects while a decision is being contemplated, but once the decision is made, the experience of the results is "path independent." The result of a decision is experienced on its own and carries no trace of how the decision was arrived at (but see Kahneman, 1994).

It is this notion of path independence that Frisch's findings challenge. Walking out of a movie that costs money leads to the feeling of regret (Examples 7 and 8), manipulating mental accounts changes the subjective sense of how expensive an item is (Examples 3 and 4), and reframing a gamble (as in the Asian-disease problem) can affect people's experienced utility, in accordance with prospect theory.

It is easy to accept the importance of subjective experience and still fail to apply this view in a thoroughgoing way when thinking about decision making. Path dependence is often hidden by a way of thinking that treats experiences as if they were caused directly by objects and episodes in the world rather than as an interaction between the thing that is experienced and the person who is experiencing it. Gilbert and Ebert (2002) compared this "illusion of intrinsic satisfaction" with the perceptual illusion of direct access to the world, writing that "ordinary decision makers ignore the complexities of psychology and act instead as though their hedonic experiences were due entirely to the enduring intrinsic properties of their outcomes, as though the wonderfulness or awfulness they are experiencing was always there 'in the outcome' waiting to be experienced and none of these properties was altered or induced by the mere act of making the outcome their own" (p. 511). But this variant of "naive realism" is mistaken: The value of \$30 (in Examples 5 and 6) or of an evening at a concert (in Examples 3

and 4) depends on how the person who is receiving that money or attending that concert construes and experiences the outcome (see also Gilbert, 2006).

As a first approximation, it may be reasonable to treat the value of an outcome as if it resides in the object and to assume that the subjective value of the experience follows from the intrinsic properties of the outcomes in a relatively direct and straightforward way, independent of context or history. However, decision-making researchers have been chipping away at this approximation for many years (e.g., Thaler, 1985, who included transaction utility in his model of consumer choice). A systematic application of the principle that subjective outcomes matter must include all the ways in which context influences a decision maker's experience at the time of the decision, at the time of the consumption, and at any other time. Empirical evidence for the leakage of framing effects into people's subjective experiences is all that is necessary to conclude that reframing a situation is not irrelevant to postdecision experience.

CONNECTING DECISION AND EXPERIENCE

If it is true that psychological effects produced by the context of decision leak into the context of experience, a "rational" decision maker will anticipate this leakage so that it exerts an influence on the decision that is made. Consider, for example, the Miller and Taylor (2002) discussion of the common bias towards inaction (the omission bias). They argue that omission bias can often be a rational way to reduce regret. There is a superstition among the Spanish bullfighting community that bullfighters should not substitute for other matadors at the last minute, out of fear of being gored. However, this superstition may be rational, as the negative consequences of a matador being gored include not just the physical damage to the matador but also the regret, doubt, and other emotional suffering that can spread throughout the bullfighting community after a goring. A last-minute matador switch is a salient event that tends to induce counterfactual thinking and increase susceptibility to regret (Kahneman & Tversky, 1982). The superstition that counsels against last-minute substitutions may serve to protect the psychological status of the bullfighting community rather than the physical health of the matador (see Baron, 1992; Ritov & Baron, 1995.)

A more familiar example from Miller and Taylor (2002) is the problem of switching checkout lines at the grocery store. People who switch to a different line that seems to be moving faster and then discover that the original line would have been quicker are likely to regret their decision more than people who choose to stay in their original line (Kahneman & Tversky, 1982). It can be rational to avoid this regret by sticking with the original line, even when it looks like the other line probably will be faster (Miller & Taylor, 2002; see also Zeelenberg, 1999).

Sometimes, people who choose not to switch lines at the grocery store are predicting their emotions ("It would feel awful if I switched and then this line went faster"). In this causal

structure, the frame affects the experience, and the decision maker’s accurate prediction of the experience in turn affects the decision. Much of the research on affective forecasting (e.g., Gilbert, 2006) focuses on this explicit, predictive link between decision and experience. Some researchers have defined optimal decisions as those that are based on accurate predictions of the experiential consequences (Hsee & Hastie, 2006). Likewise, Frisch (1993) seemed to be identifying this process when she argued that framing effects are not necessarily irrational if “framing has an effect on decisions because it has an effect on experience” (p. 402).

However, there are other ways in which the effects of framing on decisions could reliably track people’s experiences. Judgment and decision-making research has emphasized the importance of emotions, intuitions, and other rapid, associative, automatic processes (sometimes referred to as *System-1 processes*; see Kahneman, 2003; Sloman, 2002). Kahneman (2003) has argued that “most behavior is intuitive, skilled, unproblematic, and successful” (p. 717). One way in which intuitive System-1 processes can produce decisions that match a person’s subsequent experience is if some aspect of the situation that tends to affect the person’s experience also affects the person’s decision directly. In the grocery-store line, a person who was merely imagining switching lines might feel a little bit of an emotion akin to regret when considering the possibility that the original line will go faster after the switch. These kinds of emotions that a person feels during the decision-making process itself, what Loewenstein, Weber, Hsee, and Welch (2001) termed *anticipatory emotions*, can influence decisions just as reliably as people’s predictions of the emotions that they will feel when they experience the outcome of their decisions, which Loewenstein and colleagues called *anticipated emotions* (see Bell, 1982; Loomes & Sugden, 1982).

There is a view with a long-standing historical pedigree that appraisals of the consequences of a decision are a rational contributor to decision making, whereas the emotions that a decision maker is feeling at the time of the decision are non-rational or irrational forces that should not contribute to rational decision making (see Hauser, 2006; Nussbaum, 1995, 2001, for both an articulation and a criticism of this view). However, the centrality of System-1 processes to decision making and the evidence that an inability to base decision on affect can inhibit successful learning and decision making (Damasio, 1994) run contrary to this view. Although there may be some advantages to being aware of the consequences of a decision, there is good reason to deny that decisions are irrational if emotions or intuitions help the decision maker choose an option with better subjective consequences.

In some cases, the factor that influences a person’s decision involves a judgment or a belief and not merely a System-1 process like imagination-sparked anticipatory regret. Sunk-cost reasoning involves thoughts and judgments (e.g., “I can’t let the \$7 that I spent on this movie go to waste”) and not just aversive

emotions. There is a sense in which this reasoning is irrational, as the \$7 is just as “wasted” whether the person leaves the movie early or stays until the end. However, when this reasoning is used to justify sitting through the movie, it can play the same role as anticipatory emotions in anticipating future experiences. The person watching the movie considers the goal of avoiding waste to count in favor of sitting through the movie because the waste is more salient when leaving the movie early than when staying until the end. This difference in salience, however, is precisely the reason why the person is likely to feel more regret when experiencing the outcome of the decision after having left the movie early. Thus, though it fails as financial reasoning, sunk-cost thinking sometimes may serve as an effective proxy of future regret and may thereby encourage decisions with better subjective consequences.

False beliefs can serve the same predictive function as sunk-cost thinking or anticipatory regret. A shopper in a grocery-store line who refuses to change lines because of a version of Murphy’s Law (“If I change lines, then the line I left will probably end up going faster than the line I joined”) could be acting on a false belief that appears to be mere superstition. However, the factors that led the shopper to believe in Murphy’s Law and its application to grocery store lines are likely to include past experiences of regret in similar situations, which made the negative outcomes memorable. It may be that anticipated or anticipatory regret based on imagining similar situations also plays a role. Social influences are also important, and other people’s superstitions, and their tendency to share their superstitions, are also likely to derive, in part, from their own regret-inducing experiences (see Heath, Bell, & Sternberg, 2001, on the role of emotion in the spread of ideas). Thus, the superstitious person who refuses to switch lines, like the superstitious bullfighter who is sure that he will be gored if he fills in for another matador at the last minute, may be acting on the basis of a belief that reliably reduces negative psychological consequences like regret, even if it is a false description of reality.

There is a sense in which decisions based on accurate predictions of their consequences are made rationally, whereas those based on emotions are nonrational, and those that result from false beliefs are irrational. However, this sense of “rationality” is not the only one and may not even be the most important (e.g., Parfit, 1984). Any decision-making process that helps people get better subjective results is not clearly contrary to normative principles. Experienced utility matters, and procedural considerations that fail to take this fact into account are, at the very least, incomplete.

We do not mean to contend that these alternative processes always produce rational decisions. For example, it is widely held by people who take multiple-choice exams that their first instinct is the most likely to be correct, and that they are more likely to change answers from right to wrong than vice versa. There is much evidence that this belief is false (Kruger, Wirtz, & Miller, 2005), and it seems to be one of the superstitions that we have

been considering, as getting a question wrong after switching answers produces more regret. If trusting your first instinct leads to lower test scores but also to less regret, what should you do? The question that this example raises is whether people are better off avoiding regret with lower grades or experiencing regret with higher ones. This example, and others like it, may call for educating people so that their experienced utility more accurately reflects reality rather than accepting the experienced utility function as it is. We will consider this possibility in more detail below (see the section on “leak plugging”).

SUBSTANTIVE RATIONALITY

What we refer to as leakage implies that there are limits on what formal principles of rationality can tell us, as there are surprisingly few cases in which the formal principles apply in their strictest forms. Even seemingly inconsequential changes to the situation may leak into experience, affecting one’s subjective outcomes and, hence, the reasonableness of different choices. Formal rules of rationality may allow researchers to draw important normative conclusions based on minimal, widely accepted structural claims about rationality. However, once the importance of subjective experiences and the prevalence of leakage are taken into account, it becomes clear that much more needs to be known before anything approaching a satisfactory theory of rationality is in hand. In particular, a substantive theory of rationality is needed—a theory that considers the content and not just the structure of decisions and evaluates that content in light of the decision maker’s goals and life as a whole. What is needed, in the words of Evans, Over, and Manktelow (1993), is a theory explaining rationality of purpose to augment the formal theory explaining rationality of process.

We should make clear that we do not have a full substantive theory of rationality to offer. In this article, we discuss a set of features that any adequate substantive theory should possess. A substantive theory must consider the very broadly construed consequences of decisions. That is, it must consider short- and long-term consequences, consequences to the self and to others, consequences that are central to the decision at hand, and consequences that may be more peripheral. It must also consider consequences of decisions for the character of the decision maker, as the effects on character may have a significant impact on a host of future decisions. As we will see, research in behavioral decision making has, in fact, examined each of these classes of consequences and has a good deal of interest to say about them. But virtually all of this previous work has been descriptive rather than normative. What we suggest is that a normative substantive theory is an essential complement to a normative formal theory if we are to be able to say anything significant about how well people make decisions.

If researchers accepted that anything that affects a person’s experience can be relevant to a decision but did not make any further normative claims, then it would not be possible to make

an overall assessment of a person’s decisions if different relevant factors pointed in different directions. If the colors of the marbles affect your experience, then we can never say that it is irrational for your gamble to be influenced by marble color in addition to monetary outcomes. If reframing the lives at stake in the Asian-disease scenario influences your experience, then we cannot say that it is wrong for it to influence your decision. Because of the ubiquity of leakage into experience, this stance effectively withdraws from many normative debates.

An obvious choice for a substantive theory that incorporates the importance of subjective experience is the theory that the rational course of action is the one that maximizes experienced utility. Determining which decisions will maximize experienced utility is a difficult empirical problem, and in particular cases it may not be possible to have firm knowledge of the answer, but it is an interesting and important question that psychologists are in a good position to investigate (Gilbert, 2006; Kahneman, 2000).

However, the theory that maximizing experienced utility is the rational thing to do involves an extensive normative commitment on a contentious philosophical question. It is one thing to say that experienced utility matters, but quite another to say that only experienced utility matters. Also, if experienced utility maximization is extended to situations in which multiple people are involved and is used as a theory of morality in addition to rationality, then it becomes more controversial still (Sen & Williams, 1988). When compared with this kind of comprehensive and contentious substantive theory, the “anything goes” option may start to seem more attractive (but see Baron, 1986, for a powerful defense of this kind of normative theory).

There is an intermediate position. Sunstein (2002, 2005a) argues for a normative standard that he calls *weak consequentialism*, which holds that consequentialist concerns are among the things that matter, though there may be many other things that matter as well. Subjective experiences are one type of consequentialist concern that matters. Thus, a decision’s impact on experienced utility is always a relevant factor, though it is not necessarily the only relevant factor. Figuring out the net effect of a decision on experienced utility, which is the only relevant task according to the utility-maximization theory, remains an important task. However, it is not necessarily irrational to choose an option other than the one that is optimal in terms of its effects on experienced utility. Further considerations about the particular situation may strengthen the case for the utility-maximizing option, or they may undermine it. Decision makers’ reflections may serve as a useful process for exploring the potentially relevant factors that extend beyond experienced utility rather than serving as the standard for the application for formal principles. This version of weak consequentialism puts the researcher in more complicated normative terrain than the formal principles of rationality, but it at least allows for the possibility of using relatively limited and uncontroversial assumptions about rationality to make interesting claims about what people should do (but see the commentary to Sunstein, 2005a, and also

Sunstein, 2005b, for discussion of subtler concerns about weak consequentialism).

BEYOND ISOLATED DECISIONS

The formal view of decision making often treats a decision as an isolated event. A person in a particular situation with a finite set of options (frequently two) can make a single choice from that set of options. Everything else is assumed to be fixed, including the decision maker’s history, the shape of the paths that can be chosen from, and the future consequences of choosing one path or another. Up to this point, our discussion has largely accepted this focus on a single decision and its outcomes. However, this limited view of decision making neglects the ways in which the decision-making process is integrated into a person’s life. Stepping back from this narrow view of decisions to a broader view can highlight problems with assessing rationality in isolated situations.

An Example: The Rationality of “Asking for Punishment”

One problem with considering decisions in isolation is what might be called *decision-specific myopia*. A situation studied by Ariely and Wertenbroch (2002) illustrates the limitations of decision-specific myopia, as well as the limitations of formal principles of rationality more generally. Their findings suggest that it can be rational to ask for punishment. The study in question took place in an academic setting. There were two approaches that students could take to having their professors grade their essays: normal grading, which involved professors reading the essay and giving it the grade that they felt it deserved, and “punishment grading,” which involved giving the essay a lower grade than it deserved. Students had to write three essays during the semester, and each student could set a “punishment date” for any time during the semester for each essay. The essay would receive normal grading if it was turned in before the punishment date but would receive punishment grading if it was turned in after the date.

When one considers the decision in isolation, it seems obvious that the students should set the punishment date for each essay as late as possible (i.e., at the end of the semester). The argument can even be made that this is, in a sense, the dominant alternative, as it is better to receive normal grading than punishment grading regardless of when a student chooses to turn in a given essay. Ariely and Wertenbroch (2002), who used the more familiar term *deadline* rather than our terminology of *punishment date*, found that students who chose this seemingly dominant alternative received worse grades than those who set deadlines spaced throughout the semester. The reason is that students who were setting deadlines were not merely deciding what kind of grading to receive. They were also deciding when to write their essays. Throughout the semester, students had to make the decision of when to work on their essays. Their options were usually “now” and “later,” and “later” had a tendency to seem

like the more attractive answer. That is, the students, like other people, tended to procrastinate. They did not write their essays until just before their deadlines, and so students who chose the seemingly dominant alternative had three essays due on the same day and thus tended to spend less time on each essay and write worse essays than did the students who wrote their essays evenly spaced throughout the semester. The dominance argument fails to establish that asking for punishment is irrational, as it incorrectly assumes that the students would be unaffected by the deadlines they imposed on themselves. By asking for punishment grading, students were, in effect, deciding in advance when to write their essays. The threat of punishment that they brought on themselves may seem to be irrational, but it ended up leading to different behavior and better essays and grades.

The Ariely and Wertenbroch (2002) study is, of course, an example of the challenge of self-control and its failures. Most of the students in the study appreciated that they would be well served by deadlines and penalties that induced them to space out their work, though almost none of them spaced their self-imposed deadlines out well enough to perform as well as students who were simply assigned evenly spaced deadlines. The results of the study suggested a kind of compromise by students between the formal principle of dominance and an acknowledgement that they could use a little help with self-discipline.

Asking for punishment grading can be seen as a type of a second-order decision (Sunstein & Ullmann-Margalit, 2000), a decision that a person makes in an attempt to influence or obviate future decisions (like when to do the various written assignments). Second-order decisions can be used to make a commitment to some course of action or to set a procedure that one will use to make future decisions. There are many sorts of decisions that are easier to make correctly and consistently by forming a principle to follow in every case rather than by re-considering the situation on a case-by-case basis. The risks of driving without wearing a seatbelt, engaging in sexual activity without a condom, or smoking a cigarette may be more difficult to appreciate in a single instance than when forming a general policy. This is in part because the difficulty of recognizing how small risks accumulate (e.g., Slovic, 2000), in part because of people’s tendency to get caught up in the moment and neglect distant risks, and in part because of the fact that some risks are more salient and easier to imagine than others (Loewenstein et al., 2001; Prelec & Herrnstein, 1991). It can also be a mistake to treat a decision as an isolated choice because the decision can influence character or future behavior by forming a habit, setting a precedent, or creating a self-fulfilling self-image (Ainslie & Monterosso, 2003). Smoking one cigarette can make it harder to resist the next.

In many cases, people can develop a policy about how to act in certain situations, like “always wear a seatbelt,” and consistently act on it out of their respect for their earlier decision and the simple force of habit. The cases that appear to be irrational when one uses a myopic view of decision making are those in

which people use some kind of enforcement mechanism to bind themselves to their earlier decision (see Schelling, 1978, 1980, 1984, 1992). The simplest kind of enforcement is to make a commitment that takes the decision out of the hands of one's future self. A person who is going out drinking, for instance, could give the car keys to a friend so that drunk driving will not even be a possibility. In other cases, the second-order decision is enforced by changing the nature of the later decision in a way that will motivate the future self to do what the present self wants, as by asking for punishment if the future self fails to comply with the person's earlier wishes. This was the function of setting a punishment date in connection with essay assignments

In one view, asking for punishment is irrational, as a violation of the principle of dominance. But this view ignores the real benefits of such self-control devices. Indeed, these second-order decisions can be seen as representing a commitment to rationality, as they help people remain steadfast in following the best plan that they can devise when temptations arise or moments of weakness sneak up. Knowing one's own limitations and acting on that knowledge can be seen as essential components of rationality or wisdom. It is important to have a normative theory that credits these self-control decisions and does not treat them as if they are irrational. A substantive theory that recognizes the ways in which decisions made at different times are interrelated can identify and acknowledge the value of second-order decisions.

An Example: Leak Plugging by Learning Rationality

Consider a man who is afraid of elevators. His isolated decision to trudge up the stairs is rational, in a sense, because it keeps him from experiencing the intense fear that would accompany any involvement with the elevator. However, it is strange to take this man's fear as a given and to proceed from that assumption with narrow, means–ends reasoning. The rational thing for this man to do, either from a therapeutic point of view or from a broader consequentialist perspective, is to overcome his fear. Similarly, for a student with three essay assignments and the option of setting deadlines, it would probably be better to learn to stop procrastinating rather than to depend on official punishment dates for motivation. For a person who would regret stopping in the middle of a movie, a better solution than sitting through the rest of the boring movie would be to learn not to feel regret about an otherwise good decision. The sunk-cost fallacy can be thought of as a case of derivative irrationality that results from inappropriate feelings of regret. For students reluctant to change multiple-choice answers, it would be better to learn not to worry about the cases in which they had mistakenly abandoned their first instinct than to give in to that intuition.

A broad, substantive perspective on rationality thus permits an alternative to either formal principles or experienced utility. The rationality of a decision can be assessed, at least in part, on the basis of the appropriateness of emotional reactions like regret and fear. If it is irrational to feel different amounts of regret in response to the two different choices in the sunk-cost movie

example, then the formal rule that asserts the equivalence of the version of this example with a prior payment and the version without one can be revived. Defining the rationality of emotions and related phenomena is on shakier, less commonly treaded ground than are definitions of the rationality of decisions, although many philosophers have taken positions on this issue (e.g., Nussbaum, 2001). But it is plausible, at least, that it is sometimes irrational for framing effects to leak into experience.

However, even if leakage into experience is irrational in a particular case, ignoring this leakage when making decisions is not the path to rationality. As Kahneman (2003) observes, “a theory of choice that completely ignores feelings such as the pain of losses and the regret of mistakes is not just descriptively unrealistic. It also leads to prescriptions that do not maximize the utility of outcomes as they are actually experienced” (p. 706). It is hardly rational for a man who fears elevators to choose to ride them in terror because he judges his fear to be irrational. To be rational, he must eliminate his fear of elevators. If the irrational feelings and related phenomena are the problem, then the solution must be for people to learn how to have the correct feelings. Irrational leakage into experience must be corrected with a systematic campaign of leak plugging. If people are costing themselves money by underinvesting in the stock market as a result of their tendency to evaluate their investments too frequently (Benartzi & Thaler, 1995), then the goal is to help people make money by teaching them not to be so concerned about the week-to-week or year-to-year performance of their investments. On this global view of rationality, which tries to integrate over multiple decisions and experiences, the emphasis is on making people more rational, which may sometimes be accomplished by altering substantive characteristics of the person as decision maker and experiencer or by altering formal procedures for evaluating options and making decisions.

There may be some cases where simply recognizing that a formal principle of rationality could apply will reduce a leak. When people recognize that Option B is the dominant alternative for the monetary outcomes in Example 5, for instance, that may preclude any doubt or regret about choosing Option B no matter which colored marble is drawn. Similarly, in some invariance problems, people who engage in active open-minded thinking and reframe the problem may be relatively resistant to framing effects (Baron, 2000). A person who learns cost–benefit reasoning, economic thinking, and the theory behind the sunk-cost fallacy may become less likely to experience regret after making the otherwise correct decision, as in the movie example (see Keys, 2005; Larrick et al., 1990).

However, leak plugging can often be more difficult and complicated than these examples suggest. Wilson, Centerbar, and Brekke (2002; see also Wilson, 2002) have delineated the difficulties of forming accurate beliefs about oneself once an irrelevant factor has contaminated one's thoughts. Correcting for a factor that contaminates one's experiences seems likely to be no less difficult. Self-control problems like procrastination seem

extremely difficult to overcome, and mental accounting practices seem hard to do without. Thaler (1980) suggests that learning to be “more rational” often will not be worth the trouble. His focus is more on learning how to choose than on learning how to feel and react, but his message is still relevant. If the typical consumer does not behave in accordance with the normative model, Thaler writes:

[t]his is not because the average consumer is dumb, but rather that he does not spend all of his time thinking about how to make decisions. A grocery shopper . . . spends a couple of hours a week shopping and devotes a rational amount of (scarce) mental energy to that task. Sensible rules-of-thumb, such as don’t waste, may lead to occasional deviations from the expert model, such as the failure to ignore sunk costs, but these shoppers are doing the best they can. (p. 57)

In addition to the difficulties involved in correcting problems with decisions, correcting one problem can also create a different one. For example, Larrick and colleagues (1990) argue that many people without economics training waste time on tasks that they could hire others to do because they do not recognize that time and money can be treated as commensurable goods. However, research by Soman (2001) suggests that people who have learned about the commensurability of time and money are much more likely to commit the sunk-cost fallacy when their prior investment consists of time. Thus teaching people about time–money commensurability seems to improve people’s understanding of tradeoffs and opportunity costs at the price of enhancing sensitivity to temporal sunk costs. As another example, people’s “irrational” tendency not to act on disjunctive reasons (Tversky & Shafir, 1992) sometimes has a positive effect. In the prisoner’s dilemma, some people who would defect if they knew that their opponent was defecting (to keep from being exploited) and would defect if they knew that their opponent was cooperating (to take advantage of the opportunity) choose to cooperate when they do not know what the other person is doing (Baron, 2000). These kinds of phenomena may be widespread. As Thaler (1999) wonders, “[I]f we teach people to ignore sunk costs, do they stop abiding by the principle: ‘waste not, want not’? If we stop being lured by good deals, do we stop paying attention to price altogether? There are no easy answers” (p. 203).

There is, in short, a real possibility that solving one problem will create another. The trick may be to find the Aristotelian mean: to value formal principles of rationality, but not take them too seriously. Leak plugging can be costly because it requires time and effort and can create new problems or exacerbate other existing problems. Moreover, it is not always clear when apparent leakage is bad. Although it is relatively easy to make an argument for why regret in the boring movie scenario would be inappropriate, in many cases it is less straightforward to judge when emotions are appropriate. Is the subjective utility curve of prospect theory indicative of improper reactions or is it ac-

ceptable? If what Thaler (1999) calls *hedonic editing* can increase a person’s utility by reframing gains and losses, is this still irrational?

A COMPLETE, SUBSTANTIVE LIFE

Our discussion of self-control and fear of elevators was meant to exemplify how a broad, substantive perspective on rationality can change our assessment of the rationality of decision processes. However, we have been insufficiently thorough in applying the broader perspective. Our focus was still on making as many rational decisions as possible. We have not yet considered the decision-making process itself and its place as a part of one’s life as a whole. Decision making does not occur during a timeout from life. Are there more and less rational stances to take toward decision making in general? One viewpoint is that there can never be too many alternatives, because rational choosers are always free to ignore many or most of the options if they are not interested in examining them. Said another way, a choice set with Options A–E plus F may be said to dominate a choice set with only Options A–E, as the larger set is at least as good as the smaller one and is better whenever F is the best alternative. However, this dominance argument has the same flaw as the dominance argument against setting deadlines.

One problem is that the decision-making process itself is often unpleasant. Luce (1998; see also Luce, Bettman, & Payne, 1997; Luce et al., 1999) has shown that even hypothetical decisions can arouse significant negative affect, often with decision avoidance as the result. Even standing in line at the grocery store thinking about the possibility of changing lines could be enough to make a person feel nervous or stressed. Making the decision could require going through some anticipatory regret, and someone who has already switched lines might dread the possibility that the original line will end up going faster (Loewenstein et al., 2001). The person might have been better off never even considering switching lines.² Someone who has a policy of choosing a line at the grocery store and then acting as if the other lines did not exist need not go through the potentially undesirable experience of considering switching lines. Someone who thinks that paying for a movie represents a commitment to stay put until the closing credits can become immersed in the movie without the distraction of evaluating whether the movie is bad enough to deserve an early exit. In cases like these, the kind of thinking required for “rational” decision making may interfere with the mental activity involved in living well. Similarly, someone who follows the principle of never engaging in sexual activity without a condom does not need to stop and weigh the risks of unprotected sex, a thought process that may not be

²Similarly, someone who has a lottery ticket with a tiny chance of winning might be wise to refuse to sell it (except at a hefty markup), not because of the regret that might result in the unlikely event that the ticket ends up winning but because of the apprehensiveness and anticipatory regret that he or she could feel while the outcome of the lottery is still in doubt (see Miller & Taylor, 2002).

conducive to the ideal mood for the situation. In cases such as this one, following a general principle (e.g., always wear a condom) could also help people make objectively better decisions on a case-by-case-basis. Sometimes, the rational thing to do may be to abdicate responsibility for the decision altogether by insisting that the professor set the deadlines and then following the policy of meeting them (see Hare, 1981).

There is now substantial evidence that increasing the number of options available can make the decision-making process even more unpleasant, increasing the time and stress involved in making a choice and even inducing decision-avoiding paralysis (Iyengar & Lepper, 2000; see Schwartz, 2004, for a review). The negative effects of a larger choice set can continue after the decision is made, altering the way that people interpret and evaluate the outcome of their decision. Because the decision maker, predecision, is continuous with the decision maker, postdecision, the comparisons of options during the deliberation process may continue to influence the decision maker's expectations and evaluations after the decision is made. Comparisons tend to make every alternative seem worse, as loss aversion gives more impact to the ways in which a particular item is worse than the alternatives than to the ways in which it is better (Brenner et al., 1999). Considerations that may be rational for the narrow task of selecting the best option can leak out of the deliberation context and interfere with the satisfaction one gets from the decision. A person can use appropriately rational methods of evaluation and deliberation, choose the option that is superior to all the others on objective grounds, and end up dissatisfied with the experience of the result because of the processes that went into the deliberation (Schwartz, 2004). Adding options increases the number of comparisons that are made. It can also raise a person's expectations, even without direct comparisons among the alternatives. And it can increase the chances that the decision maker will feel personally responsible if things do not work out as well as expected, as the correct option must have been out there somewhere. An excellent example of leakage from the decision-making process is when a "rational" deliberator does better, but feels worse, than a person who decided more impulsively (Schwartz, 2004). In short, the relation between choice and well being appears to be nonmonotonic. It is clearly better for well-being to have some choice rather than none, but as options increase, the relation between choice and well-being may turn negative (Schwartz, 2000b, 2004).

It is worth reiterating that the apparent negative effects of very large choice sets is itself an example of irrationality or at least bounded rationality (Simon, 1956, 1957), as excessive options can always be ignored. But the negative effects of excessive options seem to indicate that people have difficulty ignoring options, so a more rational person with a broader view would understand this irrationality and act to keep the number of options manageably small.

A person who wants to keep the individual decision in perspective may be better off engaging in a relatively shallow

form of deliberation and looking only for an option that meets some minimum standard—deploying some rational tools for evaluation but in moderation (echoes, again, of the Aristotelian mean)—rather than taking a more systematic approach to the decision-making process. Considering subtle opportunity costs, which will help a person more accurately understand the costs and benefits of a decision, can lead a person to make more regret-inducing and expectation-raising comparisons. Gilbert and Ebert (2002) have found evidence that people are happier with the result of a decision if they finalize their decision and move on to living with what they've chosen than if they extend the decision-making and comparison process by retaining an option to reverse their decision. Research by Schwartz and colleagues (2002) confirms that people who look for the best possible option ("maximizers") are less happy with the results of decisions, and are less happy in general, than are people who settle for a good enough option ("satisficers"), an effect that is mediated by regret. Maximizers may choose options that are objectively better but with subjectively worse results. For example, Iyengar, Wells, and Schwartz (2006) have shown in a study of college seniors looking for jobs that maximizing is positively correlated with starting salary and negatively correlated with a dozen different measures of satisfaction with both the job search process and the outcome.

It may even be possible for satisficing to be a better approach when it leads to an objectively and subjectively worse decision, as the leakage from a person's decision-making process can extend beyond the evaluation of that individual decision. The frame of mind required to think systematically about a decision might not be a good frame of mind to have. As Williams (1973) suggests, "Imagine that the greatest utility was in fact produced by people displaying and witnessing spontaneous and zestful activity. Many particular acts would be wrong, in the sense that if these acts were replaced there could be an increase in utility; but there is no way of replacing them without destroying the spontaneity and zest" (p. 129).

Decisions are especially likely to leak into the rest of the decision maker's life when they have implications for one's values and character. Consider a worker who is offered a well-paid job as a scab during a strike. If the worker takes the job, then the worker may think of him or herself as a traitor, a sell-out, or a person who has abandoned core values and fellow workers. However, if the worker refuses the job, the worker may regret not having the job and the money, doubt his or her ambition, wonder about possibly having passed up his or her one big opportunity, or at least use "what might have been" as a standard of comparison when assessing his or her life in the future. No matter what the choice, the worker would have been better off never having been offered the job (Prelec & Herrnstein, 1991).

The problems posed by choice overload may help explain what Kahneman (2003) has described as *narrow framing*. Kahneman (2003) points out that people tend to frame the options they face and the possible consequences of their choices

narrowly—sometimes too narrowly. They trudge up the hill, looking down at their feet, and fail to adequately appreciate either long-term consequences or far-flung possibilities. This can lead to decisions that are incoherent when examined against a broader canvas (Sunstein, Kahneman, Schkade, & Ritov, 2002) as well as decisions that poorly serve people’s long-term interests.

This narrow focus is perfectly comprehensible psychologically. As Kahneman (2003) says:

It is worth noting that an exclusive concern with the broad view and the long term may be prescriptively sterile because the long term is not where life is lived. Utility cannot be divorced from emotion, and emotion is triggered by changes. A theory of choice that completely ignores feelings such as the pain of losses and the regret of mistakes is not just descriptively unrealistic. It also leads to prescriptions that do not maximize the utility of outcomes as they are actually experienced. (p.706)

If one takes a global perspective on rationality, how does one respond to the problem of narrow framing? How broadly should decisions be framed? What should one do with a \$1,000 year-end bonus? We can, perhaps, easily see the foolishness of running out and spending it on an item of clothing you happened to see on display just yesterday in an elegant neighborhood shop. But what is the sensible alternative to this impulsiveness? Should one sit down and think about all the ways that money can be spent? If so, that \$1,000 won’t be worth much by the time the exhaustive (and exhausting) examination of possibilities is over. For most people, framing decisions more broadly may be a good strategy most of the time, but one of the benefits of narrow framing is that it gives people the opportunity to do less considering and more deciding.

The same issue arises when people are considering the potential consequences of their decisions. How many consequences should be considered? How far into the future will the consequences affect them? How many people should be considered? Narrow framing leads to incoherent judgments when people are asked to make punitive damage awards in hypothetical civil cases (Sunstein et al., 2002). But extremely broad framing can induce paralysis. A striking example of this difficulty is described by Pollan (2002), in an article that asks us to consider the “true” cost of a pound of beef. We know what we pay for it in the market, but what about other costs—what economists call *externalities*—that are not reflected in the market price? Beef costs what it does because the growth of corn is subsidized, so we pay for beef with our taxes. Cows eat corn rather than grass because it’s cheaper. But their digestive systems can’t handle corn, so they must be dosed with antibiotics to keep them healthy long enough to get them to market. We pay for this in drug-resistant strains of bacteria that make human illnesses harder and more costly to treat. Corn feed also changes the acidity of the cows’ digestive environment, making it com-

patible with the human digestive system, so that microbes—some of them potentially lethal—can survive the trip from cow to person intact to cause illness in people. Corn-fed beef is fatter than grass-fed beef and is worse for human health. Finally, the corn that feeds the cows itself depends on heavy doses of fertilizer, which depend on petrochemicals. Thus, if one framed the price of a pound of beef more broadly so as to include all these externalities, the cost of a pound of beef would have to include some fraction of the cost of bacterial infection and cardiovascular disease. That, in turn, would have to include the costs of treatment, the costs in mortality and morbidity, work days lost, and quality of life decreases. And it would have to include some fraction of the cost—in money and in lives—of a foreign policy that is partly driven by the need for reliable access to petrochemicals. Where does this accounting for the price of a pound of beef stop? Narrow framing may lead to bad decisions, but the solution to this problem is not to frame decisions as broadly as possible. Clearly, a measure of moderation is called for, guided in large part by an assessment of what breadth of framing allows people to live satisfactory and satisfying lives as a whole.

We are suggesting a modulated approach to individual decisions: Don’t be too “rational,” don’t consider too many options, don’t have standards that are too high, don’t consider too many remote consequences. This approach may seem to be directly opposed to a rigorous, leak-plugging approach to rationality. But the two approaches share an important commonality. By taking a broader perspective on rationality, they shift emphasis from the question of which option is the rational one to pick in a particular situation to the question of how the person can become more rational overall. Both these approaches and positive psychology share a concern with improving people’s lives (Peterson & Seligman, 2004; Seligman, 2002). Excluding the example of a fear of elevators, the goal is not to overcome some pathological deficit but rather to promote a combination of rationality and perspective, in light of the imperfect cognitive and affective processes that everyone shares. Cataloguing irrationalities and the psychological processes that cause them is not the only goal or the main goal that researchers should have. More attention should be paid to developing recommendations, and perhaps even interventions, that can change the way that people live (Schwartz, 2000b). Some interventions might involve teaching people to be able to behave in closer accordance with principles like dominance. Others might teach them cost-benefit thinking. Still other interventions could help people learn to satisfice (Schwartz, 2004).

These interventions would not be justified merely by theories of what reactions and approaches are rational. Instead, different ways of life would be assessed in part on substantive grounds (in line with weak consequentialism), with room to bring in further considerations that seem relevant. As an example, this broader perspective suggests that it could be beneficial to learn not to feel regret about deciding to stop watching in the middle of

the movie. How could people learn not to feel regret in this situation? Research by Larrick and colleagues (1990) and Keys (2005) suggests that training in economists' theories of cost-benefit reasoning is one way to make people more likely to ignore sunk costs like the \$7 and to feel less regret about it. However, what other effects would this intervention have? Would people who had received this training be able to maintain the beneficial functions of regret, such as its roles in avoiding wasteful decisions and in broadcasting one's beliefs and values to others and to oneself? Would the training inhibit people's ability to use principles effectively as constraints on their cost-benefit reasoning (Prelec & Herrnstein, 1991). Overall, would the training help people lead better, happier lives? Would it help them become better citizens, and better people (cf. Frank, Gilovich, & Regan, 1993)?

FORMAL RULES OF THUMB

We have argued that substantive considerations point out significant limits to the scope of formal principles of rationality as normative. Turning to a broader perspective that considers the quality of a life as a whole seems to make formal principles even less relevant, as richer theories of rationality are necessary to compare different ways of life. However, arguments about rationality based on the formal structure of decisions have had an important role in research on judgment and decision making. Although it may not be possible strictly to apply formal principles to determine what is rational, it is our contention that formal principles can continue to play an important role in decision-making research.

One such role, which we saw when considering the possibility of leak plugging, is that apparent violations of formal principles often indicate that there is some kind of problem or inefficiency in the decision-making "neighborhood." Following the view of rationality that formed the basis for leak plugging, one could see these problems or inefficiencies as derivative forms of irrationality or as symptoms of other cases of irrationality, such as procrastination and inappropriate regret. A researcher could look for apparent violations of formal principles to help discover these other areas where people have room for improvement.

When people apply formal principles, they target certain aspects of the situation. Often, the target factors are "hard" goods or activities with economic value, such as the money in the marble example or the time spent watching the boring movie in the sunk-cost example (see Hsee, Zhang, Yu, & Xi, 2003). The target factors may fit perfectly into the structure of the formal principle so that, when one considers only the target factors, the normatively compelling principle does strictly apply. However, the target factors are rarely the whole story. What we might call "peripheral factors," which are those factors that are not targeted, typically do not fit into the structure of the formal principle. Leakage into experience represents a peripheral causal

stream that prevents the formal principle from strictly applying, as relevant psychological consequences like regret are not targeted in the formal analysis. In the punishment date example, the factor that was targeted was the direct impact that a grading method has on the grade on a paper. If one considers only this target factor, choosing not to receive punishment grading is the rational choice. However, the grading method also had peripheral consequences, as punishment grading was able to lead students to write their essays under conditions that promoted higher quality work. After incorporating these peripheral factors into our assessment of the situation, the claim of irrationality dissolves.

It is important to appreciate that it is our representation of the situation, not the situation itself, that causes some factors to be targeted, whereas others are left as peripheral factors, though there may be regularities in what factors people tend to target. A formal principle is a good approximation to substantive rationality if it can incorporate the most important factors involved in the situation. Applying a formal principle as a rule of thumb involves targeting certain factors that fit the structure of the principle and determining that the factors that are left out—the peripheral factors—are relatively unimportant. Indeed, Kahneman's (2003) defense of the application of the principle of invariance to the Asian-disease problem is consistent with this two-step process. "Observers agree," he wrote, "that it would be frivolous to let a superficial detail of formulation determine a choice that has life-and-death consequences" (p. 702).

Researchers have a clear role in determining whether a formal principle has a good enough fit with the situation for the principle to be treated as applicable. The question is: What are the peripheral factors, and how important are they? Researchers need to be aware of the hidden psychological consequences—the leakage—of a decision process. They need to know the consequences of the color of a marble. If the peripheral consequences are negligible, then the approximate formal principle is just about as useful as a strict one. It can allow researchers to draw normative conclusions based on relatively uncontroversial and limited claims about rationality, without making an extensive normative commitment. However, if peripheral factors have a sizeable influence, then researchers have a good reason for denying the application of the formal principle.

Ordinary people may apply formal principles as heuristics. They may do so not in the sense behind the research of Kahneman and Tversky (see Gilovich, Griffin, Kahneman, 2002), which develops a model of heuristics as automatic and nonconscious, but more in the sense of Gigerenzer's (2004) deliberate and conscious rules of thumb that are ecologically valid (i.e., tend to achieve good results). When a cost seems sunk, ignore it. When an option seems dominant, choose it. Because people are not usually aware of all of the relevant peripheral factors, these heuristics may have systematic errors. But they will often lead to good results or at least to starting the

process of deliberation, perhaps as the beginning of an anchoring and adjustment process.³

It is worth pointing out here that despite the fact that the general thrust of our argument has been that normative, formal principles do less work in establishing what is rational than one might hope, they have a very important role to play. Because of psychological processes like framing effects, leakage, and regret, normative principles may only rarely be strictly applied to a situation. But they often do have something important to say about the cases in which they don't fully apply. It is the task of the researcher, first, not to apply formal principles recklessly or carelessly where they don't really belong and, second, to figure out what the principles do have to say (and what they don't) in the cases in which they don't fit perfectly. This is both a theoretical and a methodological issue.

When Do Formal Principles Most Apply?

Is there anything to be said in a general way about when formal principles are most likely to be powerfully relevant (or at least when they come closest to applying)? In some cases, formal principles seem to apply well because the peripheral factors are so weak, as in the marble example (Example 5). When peripheral factors are not negligible, a formal principle can be made to apply well to a situation by scaling up the importance of the target factors. In the Asian-disease example, letting the frame influence a decision seems frivolous because there are lives at stake. Similarly, when deciding between radiation and surgery as a treatment for cancer, the obvious target factor—the influence of the treatment on survival rates—is so important that it seems wrong for decisions to change when the survival rates are reframed as mortality rates (McNeil, Pauker, Sox, & Tversky, 1982).

Sometimes, however, the importance of the peripheral factors scales up with the importance of target factors. Important life choices, such as those regarding a job or a spouse, are something that a person lives with for years, and the subjective (and objective) consequences of living with a particular job or a particular spouse can be highly dependent on expectations and comparisons (e.g., Frank, 1985; Solnick & Hemenway, 1998). A person's approach to these decisions does matter. It is not frivolous when compared with the problem of choosing the “objectively” best option.

Repeated Decisions and Expertise

We think that individual decisions in which the factor targeted by a formal principle is so consequential that it overwhelms all

peripheral factors are relatively rare in most people's lives. More commonly, target factors can grow imposing through accumulation, as people repeatedly receive suboptimal objective outcomes when they repeatedly make the same type of decision. In an individual case, the distortions to financial decisions caused by the dynamics of prospect theory may seem like a relatively small price to pay for the psychological benefits of avoiding aversive situations involving loss, risk, or uncertainty, but they are more difficult to disregard if, over the course of a lifetime, they add up to cost a person tens of thousands of dollars or more. However, peripheral factors also tend to accumulate over repeated decisions, even if they cannot be conveniently summed into an impressive quantitative figure. Thus, repetition alone does not make target factors overwhelm peripheral factors.

Repeated decisions, though, often involve changes beyond mere repetition. Repetition tends to facilitate learning, adaptation, and the formation of habits. Peripheral factors can become less important if habituation leads to diminished leakage or if experience makes the subjective consequences of a decision become more closely aligned with the objective consequences. An expert poker player is probably more likely than a novice to have a better subjective experience when she is playing in a way that will maximize her expected returns, as flaws in strategy are more salient to her, luck is more easily recognized as short-term randomness, and gains and losses are more likely to be combined into a broader mental account. Formal principles may be particularly appropriate as prescriptive guides for people who make repeated decisions or who are experts in some area.

Even if formal rules are consistent with experts' decisions, though, that does not mean that the experienced decision makers' behavior should be the normative standard for those who face such decisions much less frequently. Peripheral factors remain large when the domain in which the decision takes place is a relatively small component of the decision maker's life. Thaler (1980) drew on Friedman and Savage's (1948) analogy between decision makers and billiards players and observed that it is rational for a novice or intermediate player to take different shots than an expert, as the expert is able to identify and succeed at more difficult and valuable shots. We add that, in addition to differing in their control of the means of producing successful billiard shots, the expert and the casual player also differ in their ends, with the expert's ends more closely aligned with the purpose of the game of billiards. Both psychologically and in a less subjective way, the person who dedicates a larger portion of his or her life to billiards is more invested in succeeding at billiards according to standards that define a good billiards game. Similarly, someone who dedicates a larger portion of life to decision making in a specific area, like financial investments, is more closely tied to the formal and substantive rules that define objective success in that domain (see Keren & Wagenaar, 1985, for evidence on this point among blackjack players).

³It is important to note here, as an aside, that the arguments in this article do not speak to the heart of the long-running dispute between Kahneman and Tversky, on the one hand, and Gigerenzer and his collaborators, on the other hand, about whether heuristics like representativeness are rational or not (see Gilovich & Griffin, 2002). Our argument addresses the question of whether it's always rational to be rational, in the sense of following formal, normative rules for evaluation and decision.

Decisions for Others

Another context in which formal rules are more likely to apply is when people make decisions for others. Many peripheral consequences result from the continuity between the person who deliberates and the person who experiences the consequences of the decision. Making decisions for others creates a separation that can limit the interaction between the decision-making process and later experiences. There may still be some pathways for leakage into the decision maker's other experiences or into the other person's experience of the outcome of the decision, but delegation can close a main pathway for leakage. In keeping with this speculation that leakage should be less of an issue when one is making decisions for others, researchers have found evidence that people are sometimes more resistant to framing effects when they are making decisions for other people (Krishnamurthy & Kumar, 2002; see also Hsee & Weber, 1997, who attribute a similar result to the role of emotions in decision making).

A judge who is deciding which parent should be granted custody of a child may make a different choice if the question is framed as which parent should be denied custody (Shafir, Simonson, & Tversky, 1993). But the important consequences here are for the child and the parents, so the effects of the decision frame on the judge's subjective experience should be irrelevant. For the judge, the "which" question really is, by far, the most important thing, so the formal principle of invariance should apply very well here as a normative standard. Indeed, the judge's job demands that his or her subjective experience of the decision be irrelevant to the making of the decision, just as a doctor guiding a patient through the choice of surgery or chemotherapy should be sensitive to the patient's experienced utility but insensitive to his or her own. These examples combine highly important target factors with a separation between the decision maker and the people who experience the consequence of the decision, as does the Asian-disease scenario, which also multiplies the importance of the target factor by putting hundreds of people's lives at stake.

There may often be advantages to separating the principal from the agent in decision contexts, even when the agent knows little more about the domain in question than the principal. By blocking leakage from the decision to the experience, principal-agent separation can escape the tradeoff between objectively good decisions and subjectively good decisions, freeing the experiencer—the principal—from negative leakage and allowing the decision maker—the agent—to investigate the merits of the options without worrying about many potential peripheral consequences of that investigation. However, principal-agent separation can also have disadvantages, such as blocking beneficial leakage, which includes the benefits that come from having a perception of control over one's life (e.g., Seligman, 2002).

Social Decisions

In real life, decisions about the Asian-disease problem and other circumstances with important consequences for many different

people are usually made by public-policy institutions rather than an individual decision maker. Although government decisions may seem like paradigmatic examples of decisions for others in which formal rules provide an excellent fit, the public nature of these decisions often makes purely formal approaches inadequate. Because the public, including all of the relatives of the people who would die from the Asian disease, would react to the decision depending on how they construe it, it does matter how they frame the situation. To take a real-world example, government policies about spending money to reduce different risks cannot be based merely on calculations of objective consequences, like death rates, that ignore many messy subjective details of the situation. Reducing the public's fears and preventing public outrage are important aims of public policy (Sunstein, 2002). On the other hand, when billions and billions of dollars are sometimes spent protecting people against the last 1/10,000 of 1% of one health risk while neglecting another for which intervention could have a much bigger impact, the target factor is too important to let peripheral factors (what makes people afraid, what the weighting function of prospect theory does to people's assessments of very low probabilities) completely dominate formal decision processes (Sunstein, 2002).

Changes to public policy are subject to the same kind of broad consequentialist evaluations as interventions to make individual decisions more rational. There are real negative consequences to not having a market for kidneys, for example (Gottlieb, 2000), just as there are real negative consequences for an individual who sits through a boring movie. However, changing policies to allow the sale of kidneys could also have negative consequences, like widespread outrage, that are akin to regret over wasting money on a movie without finishing it. In the same way that studying cost-benefit reasoning might make it easier for individuals to learn to stop a movie in the middle without feeling much regret, if society came to emphasize cost-benefit analysis, it could become more feasible for markets for kidneys to have wider public support. Then the question would be to identify the positive and negative consequences of what people had learned. Is the erosion of the distinction between market goods and nonmarket goods a serious problem? Would it be possible to maintain nonconsequentialist principles alongside the consequentialist logic of the market (Schwartz, 1988, 2000a)? Overall, would the promotion of cost-benefit thinking and a market for kidneys help people to lead better, happier lives and to become better citizens?⁴

⁴Sunstein (2002, 2005a) has convincingly argued that research on heuristics, biases, and framing effects has great potential to inform our approach to issues in public policy and morality that are both controversial and vital to our society (e.g., environmental policy, public safety, genetic engineering, disaster relief). But Sunstein (2005b) has also suggested that reliance on participants' own reflections may be an especially limited methodology for understanding judgments in these heated domains, in which rationalization is prevalent and people's judgments may even persist after all available reasons for their position have been refuted—a state that Haidt (2001) terms "moral dumbfounding."

There is one important way in which public-policy decisions differ from individual decisions. As we indicated above, for individual decisions, intensive deliberation is often counterproductive because of its likely psychological consequences, which include higher expectations, increased regret, and interference with subordinating specific decisions to the broader goal of living well. These costs of deliberation can make it beneficial to decide before thoroughly investigating one's options—satisficing rather than maximizing—despite the objective costs of not knowing as much as you could about what you are getting into and what options you are passing up. This analysis does not apply nearly as strongly to public-policy decisions. Experts inside or outside of the government can thoroughly study policy options with minimal subjective consequences for the vast majority of people who will be affected by the public policy. These technocrats should not make policy on their own, as their research needs to be integrated with enduring government norms and institutions, the partisan political process, interested groups that care about the values expressed by policy, the reactions of the wider public, and the rest of the complex “sausage making” of governance; however, they can have a central role in developing policies. Public-policy decision making allows for a pluralism and a division of labor that is not possible within a single individual decision maker, which could lead to a kind of bounded rationality that is marked more by compromise than by satisficing.

CONCLUSION

Although formal principles of decision making like invariance, dominance, and the sunk-cost principle often seem compelling, there is only a narrow set of cases in which they apply in their strictest form. In most cases of individual and social decision making for which it seems like they might apply, there is too much going on psychologically—too much leakage from decision to experience—for these principles to capture all the relevant features of the situation. It is possible to apply a formal principle in those cases in which the abstract structure of the principle does not strictly or fully apply, but it is only normatively appropriate to do so if the substantive claim is correct that the amount of leakage is negligible. A substantive, consequentialist approach can help assess whether leakage effects—on regret, self-control, and fear, for example—are minor enough to neglect or important enough to override the formal principle. Formal principles may also be useful as prescriptive rules that help people act rationally rather than as normative rules that define rationality (Baron, 1986). But a broader approach is necessary to evaluate the effects of adopting normative principles as prescriptive rules as well as to evaluate more explicit advocacy, training, or intervention designed to promote the normative principles. The world and its human inhabitants are too complex for us to be able to arrive at satisfying comprehensive answers to many of our most significant questions. But

because the stakes are so high, it is important to try to address these big normative questions and to work to develop normative frameworks for decision making alongside of our descriptive theories.

In his elegant summary of 30 years of research with Amos Tversky on heuristics, biases, and decision making, Kahneman (2003) describes many of the phenomena they uncovered as examples of *attribute substitution*. “Respondents offer a reasonable answer to a question they have not been asked” (Kahneman, 2003, p. 709). People do this for several reasons: The answer to the unasked question may be very accessible and come immediately to mind, or the asked question may be too hard to answer with the information and analytic tools that respondents have available to them. But “respondents who substitute one attribute for another are not confused about the question they are trying to answer—they simply fail to notice that they are answering a different one” (Kahneman, 2003, p. 709).

The essence of our argument is that the entire field of judgment and decision making has been engaged in attribute substitution. It has, to a large degree, answered questions about how well our decisions conform to formal principles of rationality instead of questions about how well our decisions serve substantive rationality. As many citations in this article indicate, the field is not confused about the question it has been trying to answer. However, it has, at least sometimes, failed to notice that it is not answering the question that the rest of us want answered. The main reason for this substitution, we suspect, is that the “real” question is too hard. But we hope that the field will maintain a focus on refining its analytic tools and gathering the information that is necessary to address the “hard” question as best it can.

Acknowledgments—Daniel J. Keys is now at the Department of Psychology, Cornell University. We thank Jonathan Baron, Daniel Kahneman, and an anonymous reviewer for many critical but sympathetic suggestions that improved the article enormously.

REFERENCES

- Ainslie, G., & Monterosso, J. (2003). Will as intertemporal bargaining: Implications for rationality. *University of Pennsylvania Law Review*, *151*, 825–862.
- Ariely, D., & Wertenbroch, K. (2002). Procrastination, deadlines, and performance: Self-control and precommitment. *Psychological Science*, *13*, 219–224.
- Baron, J. (1986). Tradeoffs among reasons for action. *Journal for the Theory of Social Behavior*, *16*, 173–195.
- Baron, J. (1992). The effect of normative beliefs on anticipated emotions. *Journal of Personality and Social Psychology*, *63*, 320–330.
- Baron, J. (2000). *Thinking and deciding* (3rd ed.). New York: Cambridge University Press.
- Bell, D.E. (1982). Regret in decision making under uncertainty. *Operations Research*, *30*, 961–981.

- Benartzi, S., & Thaler, R.H. (1995). Myopic loss aversion and the equity premium puzzle. *Quarterly Journal of Economics*, *110*, 73–92.
- Brenner, L., Rottenstreich, Y., & Sood, S. (1999). Comparison, grouping, and preference. *Psychological Science*, *10*, 225–229.
- Damasio, A.R. (1994). *Descartes' error: Emotion, reason, and the human brain*. New York: Putnam.
- Evans, J.S., Over, D.E., & Manktelow, K.I. (1993). Reasoning, decision making and rationality. *Cognition*, *49*, 165–187.
- Frank, R. (1985). *Choosing the right pond*. New York: Oxford University Press.
- Frank, R.H., Gilovich, T., & Regan, D.T. (1993). Does studying economics inhibit cooperation? *Journal of Economic Perspectives*, *7*, 159–171.
- Friedman, M., & Savage, L.J. (1948). The utility analysis of choice involving risks. *Journal of Political Economy*, *56*, 279–304.
- Frisch, D. (1993). Reasons for framing effects. *Organizational Behavior and Human Decision Processes*, *54*, 399–429.
- Frisch, D., & Clemen, R.T. (1994). Beyond expected utility: Rethinking behavioral decision research. *Psychological Bulletin*, *116*, 46–54.
- Frisch, D., & Jones, S.K. (1993). Assessing the accuracy of decisions. *Theory and Psychology*, *3*, 115–135.
- Gigerenzer, G. (2004). Fast and frugal heuristics: The tools of bounded rationality. In D.J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making* (pp. 62–89). New York: Blackwell.
- Gilbert, D.T. (2006). *Stumbling on happiness*. New York: Knopf.
- Gilbert, D.T., & Ebert, J.E. (2002). Decisions and revisions: The affective forecasting of changeable outcomes. *Journal of Personality and Social Psychology*, *82*, 503–514.
- Gilovich, T., & Griffin, D. (2002). Introduction—Heuristics and biases: Then and now. In T. Gilovich, D. Griffin, & D. Kahneman, (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 1–18). New York: Cambridge University Press.
- Gilovich, T., Griffin, D., & Kahneman, D. (Eds.) (2002). *Heuristics and biases: The psychology of intuitive judgment*. New York: Cambridge University Press.
- Gladwell, M. (2005). *Blink: The power of thinking without thinking*. New York: Little Brown.
- Gottlieb, B. (2000, May 22). Price is right. *The New Republic*, 16–18.
- Haidt, J. (2001). The emotional dog and its rational tale: A social intuitionist model of moral judgment. *Psychological Review*, *108*, 814–834.
- Hare, R.M. (1981). *Moral thinking: Its levels, method, and point*. Oxford: Oxford University Press.
- Hauser, M. (2006). *Moral minds*. New York: Ecco Press.
- Heath, C., Bell, C., & Sternberg, E. (2001). Emotional selection in memes: The case of urban legends. *Journal of Personality and Social Psychology*, *81*, 1028–1041.
- Hsee, C.K. (1996). Attribute evaluability: Its implications for joint-separate evaluation reversals and beyond. *Organizational Behavior and Human Decision Processes*, *67*, 247–257.
- Hsee, C.K. (1999). Value seeking and prediction-decision inconsistency: Why don't people take what they predict they'll like the most? *Psychonomic Bulletin and Review*, *6*, 555–561.
- Hsee, C.K., & Hastie, R. (2006). Decision and experience: Why don't we choose what makes us happy? *Trends in Cognitive Science*, *10*, 31–37.
- Hsee, C.K., & Weber, E.U. (1997). A fundamental prediction error: Self-other discrepancies in risk preference. *Journal of Experimental Psychology: General*, *126*, 45–53.
- Hsee, C.K., & Zhang, J. (2004). Distinction bias: Misprediction and mischoice due to joint evaluation. *Journal of Personality and Social Psychology*, *86*, 680–695.
- Hsee, C.K., Zhang, J., Yu, F., & Xi, Y. (2003). Lay rationalism and inconsistency between predicted experience and decision. *Journal of Behavioral Decision Making*, *16*, 257–272.
- Iyengar, S.S., & Lepper, M. (2000). When choice is demotivating: Can one desire too much of a good thing? *Journal of Personality and Social Psychology*, *79*, 995–1006.
- Iyengar, S.S., Wells, R.E., & Schwartz, B. (2006). Doing better but feeling worse: Looking for the “best” job undermines satisfaction. *Psychological Science*, *17*, 143–150.
- Kahneman, D. (1994). New challenges to the rationality assumption. *Journal of Institutional and Theoretical Economics*, *150*, 18–36.
- Kahneman, D. (2000). Experienced utility and objective happiness: A moment-based approach. In D. Kahneman & A. Tversky (Eds.), *Choices, values, and frames* (pp. 673–692). New York: Cambridge University Press.
- Kahneman, D. (2003). A perspective on judgment and choice. *American Psychologist*, *58*, 697–720.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under uncertainty. *Econometrica*, *47*, 263–291.
- Kahneman, D., & Tversky, A. (1982). The simulation heuristic. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 201–208). New York: Cambridge University Press.
- Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, *39*, 341–350.
- Keren, G., & Wagenaar, W.A. (1985). On the psychology of playing blackjack: Normative and descriptive considerations with implications for decision theory. *Journal of Experimental Psychology: General*, *114*, 133–158.
- Keys, D.J. (2005). *Accounting for time: Are decisions about time based on the same kind of mental accounting as decisions about money?* Unpublished manuscript.
- Krishnamurthy, P., & Kumar, P. (2002). Self-other discrepancies in waiting time decisions. *Organizational Behavior and Human Decision Processes*, *87*, 207–226.
- Kruger, J., Wirtz, D., & Miller, D.T. (2005). Counterfactual thinking and the first instinct fallacy. *Journal of Personality and Social Psychology*, *88*, 725–735.
- Larrick, R.P., Morgan, J.N., & Nisbett, R.E. (1990). Teaching the use of cost-benefit reasoning in everyday life. *Psychological Science*, *1*, 362–370.
- Levin, I.P., & Gaeth, G.J. (1988). How consumers are affected by the framing of attribute information before and after consuming the product. *Journal of Consumer Research*, *15*, 374–378.
- Loewenstein, G.G., Weber, E.U., Hsee, C.K., & Welch, N. (2001). Risks as feelings. *Psychological Bulletin*, *127*, 267–286.
- Loomes, G., & Sugden, R. (1982). Regret theory: An alternative theory of rational choice under uncertainty. *Economic Journal*, *92*, 805–824.
- Luce, M.F. (1998). Choosing to avoid: Coping with negatively emotion-laden consumer decisions. *Journal of Consumer Research*, *24*, 409–433.
- Luce, M.F., Bettman, J.R., & Payne, J.W. (1997). Choice processing in emotionally difficult decisions. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*, 384–405.
- Luce, M.F., Payne, J.W., & Bettman, J.R. (1999). Emotional tradeoff difficulty and choice. *Journal of Marketing Research*, *36*, 143–159.

- McNeil, B.J., Pauker, S.G., Sox, H.C., Jr., & Tversky, A. (1982). On the elicitation of preferences for alternative therapies. *New England Journal of Medicine*, *306*, 1259–1262.
- Miller, D.T., & Taylor, B.R. (2002). Counterfactual thought, regret, and superstition: How to avoid kicking yourself. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 367–378). New York: Cambridge University Press.
- Nisbett, R.E., & Wilson, T.D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, *84*, 231–259.
- Nussbaum, M.C. (1995). *Poetic justice*. Boston: Beacon Press.
- Nussbaum, M.C. (2001). *Upheavals of thought*. New York: Cambridge University Press.
- Parfit, D. (1984). *Reasons and persons*. Oxford, United Kingdom: Clarendon Press.
- Peterson, C., & Seligman, M.E.P. (2004). *Character strengths and virtues: A handbook and classification*. New York: Oxford University Press.
- Pollan, M. (2002, March 31). Power steer. *New York Times Magazine*, 44–51, 68, 71–72, 76–77.
- Prelec, D., & Herrnstein, R.J. (1991). Preferences or principles: Alternative guidelines for choice. In R.J. Zeckhauser (Ed.), *Strategy and choice* (pp. 319–340). Cambridge, MA: MIT Press.
- Ritov, I., & Baron, J. (1995). Outcome knowledge, regret, and omission bias. *Organizational Behavior and Human Decision Processes*, *64*, 119–127.
- Sanford, A.J., Fay, N., Stewart, A., & Moxey, L. (2002). Perspective in statements of quantity, with implications for consumer psychology. *Psychological Science*, *13*, 130–134.
- Schelling, T.C. (1978). Egonomics, or art of self-management. *American Economic Review*, *68*, 290–294.
- Schelling, T.C. (1980). The intimate contest for self-command. *Public Interest*, *60*, 94–118.
- Schelling, T.C. (1984). Self-command in practice, in policy, and in a theory of rational choice. *American Economic Review*, *74*, 1–11.
- Schelling, T.C. (1992). Self-command: A new discipline. In J. Elster & G.F. Loewenstein (Eds.), *Choice over time* (pp. 167–176). New York: Russell Sage Foundation.
- Schwartz, B. (1988). Some disutilities of utility. *Journal of Thought*, *23*, 132–147.
- Schwartz, B. (2000a). *The costs of living: How market freedom erodes the best things in life*. Philadelphia: XLibris.
- Schwartz, B. (2000b). Self determination: The tyranny of freedom. *American Psychologist*, *55*, 79–88.
- Schwartz, B. (2004). *The paradox of choice: Why more is less*. New York: Ecco Press.
- Schwartz, B., Ward, A., Monterosso, J., Lyubomirsky, S., White, K., & Lehman, D.R. (2002). Maximizing versus satisficing: Happiness is a matter of choice. *Journal of Personality and Social Psychology*, *83*, 1178–1197.
- Seligman, M.E.P. (2002). *Authentic happiness*. New York: Free Press.
- Sen, A., & Williams, B. (1988). *Utilitarianism and beyond*. New York: Cambridge University Press.
- Shafir, E., Simonson, I., & Tversky, A. (1993). Reason-based choice. *Cognition*, *49*, 11–36.
- Shiv, B., Carmon, Z., & Ariely, D. (2005). Placebo effects of marketing actions: Consumers may get what they pay for. *Journal of Marketing Research*, *42*, 383–393.
- Simon, H. (1956). Rational choice and the structure of the environment. *Psychological Review*, *63*, 129–138.
- Simon, H. (1957). *Models of man, social and rational*. New York: Wiley.
- Sloman, S.S. (2002). Two systems of reasoning. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 379–396). New York: Cambridge University Press.
- Slovic, P. (2000). What does it mean to know a cumulative risk? Adolescents’ perceptions of short-term and long-term consequences of smoking. *Journal of Behavioral Decision Making*, *13*, 259–266.
- Solnick, S.J., & Hemenway, D. (1998). Is more always better? A survey of positional concerns. *Journal of Economic Behavior and Organization*, *37*, 373–383.
- Soman, D. (2001). The mental accounting of sunk time costs: Why time is not like money. *Journal of Behavioral Decision Making*, *14*, 169–185.
- Sunstein, C.R. (2002). *Risk and reason: Safety, law, and the environment*. New York: Cambridge University Press.
- Sunstein, C.R. (2005a). Moral heuristics. *Behavioral and Brain Sciences*, *28*, 531–542.
- Sunstein, C.R. (2005b). On moral intuitions and moral heuristics: A response. *Behavioral and Brain Sciences*, *28*, 565–573.
- Sunstein, C.R., Kahneman, D., Schkade, D., & Ritov, I. (2002). Predictably incoherent judgments. *Stanford Law Review*, *54*, 1153–1216.
- Sunstein, C.R., & Ullmann-Margalit, E. (2000). Second-order decisions. In C.R. Sunstein (Ed.), *Behavioral law and economics* (pp. 187–208). New York: Cambridge University Press.
- Thaler, R.H. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior and Organization*, *1*, 39–60.
- Thaler, R.H. (1985). Mental accounting and consumer choice. *Marketing Science*, *4*, 199–214.
- Thaler, R.H. (1999). Mental accounting matters. *Journal of Behavioral Decision Making*, *12*, 183–206.
- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211*, 453–458.
- Tversky, A., & Kahneman, D. (1984). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review*, *91*, 293–315.
- Tversky, A., & Kahneman, D. (1986). Rational choice and the framing of decisions. *Journal of Business*, *59*, S251–S278.
- Tversky, A., & Shafir, E. (1992). The disjunction effect in choice under uncertainty. *Psychological Science*, *3*, 305–309.
- Williams, B. (1973). “A critique of utilitarianism.” In J.C.C. Smart & B. Williams (1973). *Utilitarianism: For and against* (pp. 77–150). New York: Cambridge University Press.
- Wilson, T.D. (2002). *Strangers to ourselves*. Cambridge, MA: Harvard University Press.
- Wilson, T.D., Centerbar, D.B., & Brekke, N. (2002). Mental contamination and the debiasing problem. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 185–200). New York: Cambridge University Press.
- Zeelenberg, M. (1999). The use of crying over spilled milk: A note on the rationality and functionality of regret. *Philosophical Psychology*, *12*, 325–340.
- Zeelenberg, M., Beattie, J., van der Pligt, J., & de Vries, N.K. (1996). Consequences of regret aversion: Effects of expected feedback on risky decision making. *Organization Behavior and Human Decision Processes*, *65*, 148–158.