

Chapter 20

Judgment and Decision Making

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People's lives are saturated by judgments and decisions. You make a judgment when you see an object and think that it is good or bad or likely to happen. You make a decision when you take a course of action while not taking other actions that were possible. People make hundreds, perhaps thousands of decisions each day. Yet people are unaware of the number of choices they make each day: they think that they only make 15 food-related decisions each day. But a recent count found that people make 200 decisions each day about food alone (e.g., "At the table or on the couch?" "Eat it all or save half?") (Wansink & Sobal, 2007).

Decision making is important to study not only because it is frequent; making good decisions is essential to living the good life. In fact, good decision making may save your life. In the United States, approximately 60,000 people die each year from an incorrect diagnosis by a hospital employee (Newman-Toker & Pronovost, 2009). This ranks medical decision errors as the sixth most common cause of death in the United States—more likely to cause death than Alzheimer's disease, breast cancer, suicide, or homicide. According to autopsy reports, 5% of deaths were directly due to a misdiagnosis that, if corrected and treated, would not have led to death. Death from an incorrect diagnosis is more common than death from medication errors, yet the possibility of medication error is discussed more often. These statistics are particularly shocking in light of the fact that these mistakes are made by trained experts in medical decision making. Yet they too make decision errors that cost lives. The science of decision making is what the field of *judgment and decision making* studies.

Judgments and Decisions: How Are They Defined, Explained, and Evaluated?

Definitions

What Is a Judgment? Judgment is a broad term. Making a judgment involves perceiving objects or events and coming to a conclusion about whether they are good or bad (*valence judgments*) or likely to occur (*likelihood judgments*). A *decision* is a commitment (to oneself or publically) to an option or course of action selected from among a set of options. Decisions have outcomes, which are the circumstances or states that follow from the decision.

Decision outcomes are judged along two dimensions. Decision theorists often talk about a decision's *utility*, which is the joy, pleasure, or satisfaction that is derived from the outcome of the decision. (The study of decision making has roots in economics, which is a field dominated by mathematical models. When economists take their numbers and turn them into prose it does not typically go well; consequently there are many heavy, clunky terms in the field of judgment and decision making.) Decision outcomes that would bring about the most utility (read: satisfaction) are called *normative*, a term meaning best or right. One dominant viewpoint, shared by many economists, states that people are utility maximizers and that the normative option under any circumstance is the one that people ought to be taking. In plainer terms, people should be rational and choose what will make them most satisfied in the future. Another viewpoint, shared by many psychologists, is that people are not rational and often do not appreciate what will make them satisfied in the future. The reality is that human behavior is somewhere in between rational and irrational. In the words of Daniel Kahnemann (2003), Nobel laureate in economics, people are incompletely rational. This brings us to the question of how decision scientists explain how people make decisions.

Two Explanations of How People Make Decisions: One from Economics and One from Psychology

The predominant theory of decision making derived from economics is *subjective expected utility theory* (von Neumann & Morgenstern, 1944). Expected utility theory states that people make a decision by determining the likelihood that each option's outcome will occur and the value of the outcome in question. Then they multiply the likelihood and value for each option and compare these

across options. Whichever option has the highest score (i.e., the best combination of being likely to occur and highly desirable) is the option that people should choose because it will bring them the most utility. Expected utility models make assumptions about people's preferences, which means the value they place on each decision outcomes. Expected utility theory assumes, for instance, that people value money and so the option that is expected to yield the most money is assumed to be the normative (correct) choice.

We can see expected utility theory in action when people play game shows, such as *Who Wants to be a Millionaire?* Take the situation in which a player answers enough questions correctly to achieve the \$32,000 level. Reaching this level means that he or she is guaranteed to leave with at least \$32,000—this amount cannot be taken away from them. Then the player faces a choice: end the game or continue. The player who ends the game will walk away with \$32,000. Hence the option of “ending the game now” has a value of \$32,000 associated with it. A player who chooses to continue, however, has a 25% chance of winning because there are four multiple choice answers from which to choose. The question's worth is \$64,000. But there is a 75% chance that the player will lose, which is associated with \$32,000 because of the guarantee associated with having reached this level. Faced with this choice, players always (there are no recorded accounts of this not happening, as far as we know) choose to answer the next question, even if it means arbitrarily guessing at one of the multiple choice options. This is an example of rational behavior. Can you see why?

The expected value of answering the question is \$40,000 $[(\$64,000 \times 0.25) + (\$32,000 \times 0.75)]$, which is more than the \$32,000 expected value $(\$32,000 \times 1.0)$ from ending the game. Hence the additional likelihood that the player will answer correctly and win more money tips the scales toward the option of attempting the next question because it is associated with more money to be won and hence higher utility.

An alternate decision theory, which came out of psychology, is *prospect theory*. The title word refers to the options (prospects) that decision makers face. Prospect theory is probably the most important theory in the field of judgment and decision making.

Prospect theory created two major advances in the field of judgment and decision making (JDM). One, it used psychology to help explain when and why humans make irrational choices. Until that point, economists treated people's irrational decisions as noisy and bothersome disturbances in their elegant mathematical equations and were unconvinced that these deviations were anything meaningful. Prospect theory's use of psychology revealed that those irrational decisions are meaningful because they reveal key aspects about how the mind works. Two, prospect theory also used mathematics, which made it a

vehicle to speak to economists and therefore bring to their attention the importance of psychological processes.

Prospect theory uses likelihood judgments and outcome values, as does standard expected utility theory. But prospect theory states that the values associated with outcomes are not the same for everyone or across all situations, but rather they reflect people's current standing. That is, people make judgments about the values of outcomes from a *reference point*, which is akin to a personal point of view. To predict how people will value a certain outcome, we first have to know where they stand when evaluating it. This tenet flies in the face of expected utility theory because it states that people do not perceive outcomes as having absolute values but rather think of them as worse or better (often referred to as losses or gains, respectively) from their current perspective. This aspect of prospect theory can be summarized as "everything is relative."

Reference point effects can be illustrated with the notion that people are *loss averse*. The psychological impact of losses is far greater than that of gains, even if the value of the losses and gains is exactly the same. There has been so much work on loss aversion that we can say with some certainty that people are impacted twice as much by losses as they are by gains. In the realm of money, this means that people will experience an equivalent degree of emotional intensity from losing \$500 in the stock market as they will from gaining \$1000 the same way. Loss aversion is part of a more general process called *bad is stronger than good* (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). In health, learning, interpersonal interactions, sexuality, and major life decisions, those events that yield negative outcomes have a significantly greater psychological impact than equivalent events that yield positive outcomes. In the realm of interpersonal relations, for instance, one marriage scientist found that couples must say five positive comments to neutralize one negative comment they make to their partners (Gottman, 1994).

A classic finding named the endowment effect also illustrates loss aversion. Typically in these studies (e.g., Kahneman, Knetsch, & Thaler, 1990), participants come to the laboratory individually and half are given a small gift, such as a coffee mug with the university's logo on it. Other participants see the same product but are not told that it is theirs. Those who own the mug are now asked how much they would charge to sell it; those who do not own the mug are asked how much they would offer to buy it. Because random assignment to condition means that both groups overall ought to value the mug equally, it is remarkable (and in contrast to expected utility theory) that owners ask for considerably more money to sell the mug than buyers are willing to offer. We may think that it may be because buyers and owners have different motives about saving money and earning money. Yet this explanation does not explain the finding that when the same people switch roles in a 20 minute span from being owners to buyers

or vice versa, they show the same pattern: people want more money to sell the mug than they themselves would offer to buy it. Endowment effect findings are interpreted in different ways with one predominant explanation being loss aversion. People feel a stronger psychological impact in losing the mug when they already own it than they do in gaining the mug when they do not own it, which demonstrates the broader theme of reference points.

What Influences Decisions?

It is generally agreed that decisions are made by considering how likely each option is to occur combined with how valuable the outcome of that option seems. Expected utility theory states that decision makers rationally judge the likelihood of an event in terms of its *base rate* (the objective tendency for any event to occur in a given circumstance) and possess stable preferences for outcomes (meaning that they value the outcome the same across time and circumstance).

In contrast, prospect theory conceptualizes decisions as resulting from decision weights and constructed preferences. The concept of decision weights states that people do not judge the likelihood or importance (these two terms encompass the notion of weight) of all outcomes similarly. For instance, some people value the style of a car they are thinking of purchasing more than its safety. But when they start to think about having children, then they might come to value safety more than style. On the likelihood front, for instance, it is well-known that people overestimate the likelihood of events that are in reality highly improbable (such as flash flooding, terrorist attacks, and winning the jackpot). This tells us that people do not think about events in terms of their objective base rates but rather overestimate the likelihood of some events happening. *Constructed preferences* means that values that people associate with different outcomes are not stable but rather can be altered by the situation. This idea led the field of judgment and decision making to study situational features that change people's preferences and, hence, their choices.

It was a shock for decision scientists 50 years ago to think that people's preferences for outcomes could change as a result of small differences in the situation—but they do. One concept that follows from constructed preferences and reference points is the idea of *sunk costs*. Standard economic theory states that no matter how much time, effort, money, energy, or emotion you have put into a cause, if it becomes clear that the outcome is no longer desirable we should no longer attempt to achieve it. People actually do otherwise. For instance, people sit through a movie they detest because they already spent money to see it. People stay in relationships that make them very unhappy because they have been in the relationship for a long period of time.

One analysis of why women stay with abusive partners concluded that sunk costs play a significant role (Rusbult & Martz, 1995). One hundred battered women were interviewed about their satisfaction and commitment to their abusive partner. These women had come to a women's shelter with fairly serious injuries (75% of them needed medical treatment on arrival). Yet some of these women would return to their abusive partners. Could the researchers predict who? The researchers asked about the resources the women had put into their relationship, namely whether the couple had children together, were married, or had been together for a long time. As predicted, having the resources that had been put into the relationship was a key factor in predicting which women would return. Women who had devoted time to raising children with the man, were married, or had been partnered with him for a longer period of time were likelier to return to the abusive man than were women who had sunk fewer resources into the relationship.

Sunk costs alter people's preferences for an outcome, making it more attractive than it would be if the decision maker had not already put resources into achieving it. Sunk cost effects are considered irrational because the money or time that was spent is gone and cannot be retrieved. Therefore, the decision maker should ignore those spent resources and decide whether to continue with the experience from that point forth as if the experience was just starting and no money, time, or effort had already been put into it.

Preferences can change because of the way that the options are described. *Framing* is an important construct in the field of judgment and decision making because it sways decision makers' preferences without changing the objective information given to the decision maker. For instance, ground beef described as 75% lean is preferred to ground beef described as 25% fat, even though those descriptions convey the same information about the meat (Levin & Gaeth, 1988).

The classic example of framing effects is Kahneman and Tversky's (1979) Asian disease problem. Participants are asked to imagine that they are policy-makers deciding how to respond to a disease that threatens the health of 600 people. Some participants are told to choose between two options: one that will save 200 people for certain and the other that offers a one-third probability that all 600 people will be saved and a two-thirds probability that nobody will be saved. Other participants face two options with the same information that are framed quite differently: one that will guarantee that 400 people die versus another that offers a one-third probability that nobody will die and a two-thirds probability that all 600 people will die. If you work out the math, all of the options predict that the same number of lives are expected to be saved and lost. In principle, then, decision makers should choose the options at equal rates.

That is not what happens. The two options with certainty sway people's decisions because they bring to mind a different reference point. That is, the

condition in which 200 lives are definitely going to be saved (versus a one-third chance that everyone will be saved and a two-thirds chance that everyone will die) gets people to think about an outcome that is good and certain to occur. This is called a gain frame, and people react to gain frames in general by being risk averse, meaning that they go for the certain option of 200 lives saved. However, the opposite occurs when an option promises that 400 people will definitely die (versus a one-third probability that nobody will die and a two-thirds probability that 600 people will die). This gets people to think about a bad outcome that is certain to occur. This is a loss frame, and people tend to be risk seeking in loss frames. Hence they choose the option that avoids 400 certain deaths. As this example demonstrates—and politicians have known for centuries—decisions are heavily influenced by descriptions of the options.

The *attraction effect* and *compromise effect* are also notable because they lead decision makers to choose irrationally. The attraction effect (Huber, Payne, & Puto, 1982) describes choices when people are faced with two options that are closely matched in how preferable they are. Imagine offering a group of people either donuts or chocolate ice cream. The group is indifferent overall, which means that half the people in the group will choose donuts and the other half will choose chocolate ice cream. Now imagine that a third option is introduced and in this case it is fish-flavored ice cream. The introduction of this option, which is less preferred than the other two options (even imagine that no one ever chooses this option—and that is not difficult to imagine), can shift people's choices between donuts and chocolate ice cream. The attraction effect occurs when an unwanted option—which is the fish-flavored ice cream—makes the option to which it compares most closely seem more attractive, and leads people to choose the comparably better option. In this case, it is chocolate ice cream. The key to why this is such an interesting effect is that the third option is undesirable and therefore irrelevant. Because no one would ever choose fish-flavored ice cream, all the people should still be undecided about whether they want chocolate ice cream or donuts. But all of a sudden, because of the fish-flavored ice cream (an irrelevant option), the chocolate ice cream seems more appealing.

The *compromise effect* (Simonson, 1989) arises when people are faced with options that trade off one feature for another, the most common being quality and price. In these cases, people tend to choose the option in the middle. Here is an example: a consumer choosing among hard disks with 100 GB, 150 GB, and 200 GB of space that are priced at \$80, \$120, and \$160 would be likely to choose the 150 GB option because it gives up only some speed but also does not cost as much money. You can see the compromise effect in action when new options are added at the extremes (for instance, adding a 250 GB option priced at \$200 and removing the 100 GB option) because people again tend to choose the middle option, which in this case is the 200 GB option.

You can easily see how sellers can use the compromise effect to move decision makers toward the particular products they want them to buy. In fact, restaurateurs take advantage of this effect. Where do they tend to put the wines that will make the most profit? Not at the extremes in terms of menu price but more toward the middle. Restaurateurs are known to price the wines such that the wine with the biggest markup is the second cheapest. They realize that diners want to save money but do not want to appear cheap by ordering the most inexpensive wine—diners will tend to order the second cheapest wine, and hence that is where there is a great deal of money to be made.

This next effect can change people's behavior without requiring that they actually do anything special. It involves *defaults*, which are preexisting or already-chosen options. The preexisting option may be someone else's choice (e.g., auto manufacturers' base model) or the most recent choice that the decision maker made (e.g., the station to which you left the radio turned in the car). Policymakers have determined that the default effect can be a huge help in terms of getting people to make choices that benefit society. Take, for instance, the dilemma of how to get people to donate their organs after death. One study found that changing the laws in a country such that organ donation at death was the default dramatically increased the number of organs donated, even though citizens still retained the option not to donate their organs if they so choose (Johnson & Goldstein, 2003). Other examples are more mundane but still common. When people first started using email and getting Internet accounts for services that required data protection, such as banking, the word *password* was often used as the default password. Guess what? Consumers failed to change the default password (*password*) and you can bet that thieves took advantage of it. Banks and other firms now assign unique and difficult-to-decipher passwords on the chance that the password first given to consumers remains the password for the life of that account. Establishing the basic or default option means establishing the option with which many people are likely to end up.

Decisions Evaluated: What Makes a Decision Good?

Judgment and decision-making scholars think it is important to evaluate the quality of decisions. (If you are following closely, you know that these are judgments about decisions.) Scholars separate the process by which the decision was made from its outcomes for the decision maker when judging what makes a decision good.

The Process by Which a Decision Is Made One measure of whether a decision is good is to ask whether it was a reasonably sound decision made in a

reasonable amount of time. One early insight in decision science came from Herb Simon, who convinced the field of economics that people are not machines with limitless time or cognitive skills. Simon (1955) corrected the long-standing assumption in economics that people can and do devote considerable energy and time to decision making. Simon said that humans' information-processing capacities were limited even in the best of circumstances and therefore people take shortcuts when complex decisions or judgments must be made. This notion of *bounded rationality* explained when and why people make irrational decisions and it earned Simon the 1978 Nobel prize in economics. Bounded rationality leads to the judgment that (for the most part; there are exceptions) humans are good at making a "good enough" decision rather quickly, a strategy called *satisficing*, and that this probably offers a decent trade-off in terms of effort and outcomes.

Much research has demonstrated the advantages of using such decision shortcuts, called *heuristics* (e.g., Payne, Bettman, & Johnson 1993; Gigerenzer & Goldstein, 1996). Heuristics are often used when the information people are wading through is complex. The main advantage of using heuristics is that they save decision makers time. But they may be prone to decision errors. The research on heuristics is meant to show how heuristics work, but unfortunately researchers do this primarily to show how they lead people to incorrect judgments. Taking a broader view, though, it is clear that heuristics tend to result in good decisions most of the time.

If decision makers wanted to avoid using heuristics to ensure that they achieve good decision outcomes, they would instead perform thorough searches of information to come up with base rate information and objective criteria for evaluating each option's outcomes. People sometimes do this, for instance, with high-stakes choices such as deciding on a car or whether to have surgery. But as you may guess, most judgments (including many high-stakes decisions) are not made after intense information processing. Hence it is important to know the heuristics that people commonly use.

One heuristic is the tendency to diversify by not putting "all your eggs in one basket" as the colloquial saying goes. Imagine that researchers offered participants two funds into which they could invest their money (Benartzi & Thaler, 2001). One fund is made up of stocks, which are risky, and the other fund is made up of bonds, which are safe. People in this experiment generally split their money equally between the two funds, putting 50% in stocks and 50% in bonds. This behavior may suggest that these people had a goal in mind, that of having a set of funds that are, in total, moderate in risk. The researchers tested whether this was the case by offering a different group of people another two funds from which to choose: one made up of stocks and one made up of a mix of stocks and bonds (which is called a balanced fund). If the behavior of the

people in the other condition reflected a moderate-risk goal, then the researchers should have seen that most of the people in this new condition put their money in the balanced fund. Instead, people again split the money 50/50 between the two funds, seemingly without having a specific investing goal. Rather, people were dividing their money equally across the options.

The diversification urge is not something that happens only when investing money. One study found that kids take Halloween treats this way (Read & Loewenstein, 1995). Trick-or-treaters arrived at a house at which the owners said that the kids could each take two candy bars, and then offered them two different types. Every trick-or-treater took one of each kind. Other ways of presenting the candy bars showed that this occurred only because the two different brands of candy bars were offered at the same time and the children were allowed to take two—"I can have two candy bars and there are two types of candy bars therefore I'll take one of each type," goes the mental shortcut. Think of shopping for groceries for the week. People tend to buy, for instance, different flavors of yogurts for breakfast, perhaps as many flavors are there are days of the work week. But there can be costs to using this rule. In the words of Eli Finkel, one of the editors of this book, at the end of the week you can find yourself stuck with that peach yogurt that you never really liked.

The Outcomes That Follow from the Decision Another way to determine what makes a decision good is whether the decision yields satisfactory outcomes. The idea is that people should make decisions about what will make them happiest. Which begs another question: Do people know what will bring them the most happiness or the least pain in the future? Unfortunately, they do not.

People are not very good at predicting what options will make them happy or the feelings they will have if certain experiences arise. *Affective forecasting* research concerns people's (in)ability to judge how they will feel in the future. People do seem to be good at predicting the valence of their feelings, that is whether they will have positive or negative experiences. They correctly predict that they will be anxious when they take their drivers' license test and happy when they get married. Where people go wrong is in predicting how intensely or long they will feel that way (Wilson & Gilbert, 2003). Although it may be nice in some circumstances to predict precisely how we will feel, there may be advantages to mispredicting our feelings. It seems that overestimating how intensely or how long we will feel a certain way has the beneficial effect of motivating people to perform behaviors that they think will bring desirable emotional states—even if they are wrong about the quality of those feelings when they reach that point (Baumeister, Vohs, DeWall, & Zhang, 2007). People who think that they will feel miserable for days if they fail an examination (or even score a B) are people who are motivated to work extra hard to avoid that

outcome. Yet affective forecasting research has shown that even if those people did fail (or get a disappointing B), they would probably feel moderately sad for only a little while and not completely devastated for their rest of their lives as they might predict.

A topic related to how people make decisions about their future selves is self-control. Choices with a self-control dimension have one option typically easier in the present pitted against another option that is more difficult but better for us in the future. Self-control choices ask people to decide whether they want a better life later for some sacrifice now versus some fun in the moment. Eating healthy, not smoking (or quitting smoking), exercising, and saving money are all examples of self-control choices. It is more enjoyable to eat French fries, smoke, lie on the couch, and gamble than it is not to do these things. Yet our life satisfaction will probably be higher if people avoided the easy, indulgent option and instead opted for the option that is more challenging now but more rewarding in the future (Vohs & Baumeister, 2004).

How Do Cognitive Processes Lead to Decision Errors?

An important theme in judgment and decision making is how different types of cognitive processing might lead to different types of errors. Remember that judgment and decision-making research often compares people's decisions with what would have been the logical choice or with the option that would make people better off in the long run (i.e., normative decisions). In this section, we review some of the classic phenomena in judgment and decision making, organized into three themes to describe how cognitive processes cause decision errors.

Theme 1: Decisions Errors Follow from Not Enough Effortful Thought

The first theme is arguably the most pervasive theme in the field of judgment and decision making, namely that decision makers are unable or unwilling to put enough thought into their decisions to reach the best answers. Decision makers use a variety of cognitive strategies that range from simplistic (sometimes called intuitive) to effortful (sometimes called analytical). An influential framework is Kahneman's (Kahneman & Frederick, 2002) System 1/System 2 distinction (Table 20.1). Using System 1 means arriving at a judgment or decision relatively quickly, with little effort expended, while experiencing twinges of

feelings, and using the gist of the situation. Using System 2 means arriving at a judgment or decision more slowly, after much conscious effort, perhaps while having a fully experienced emotion, and by making a detailed analysis. This section details how many of the errors in decision making come from an over-reliance on System 1 when decision makers should have been relying more on System 2.

One of the earliest demonstrations of flaws in the ability of decision makers relates to arriving at likelihood judgments. The *availability bias* occurs when decision makers judge something to be highly likely just because it is associated with information that was easy to remember. For instance, people believe that words with *r* as the first letter are more common in English than are words with *r* as the third letter (Tversky & Kahneman, 1973). Words with *r* in the third position are actually more probable. Nonetheless, it is much easier to search our

TABLE 20.1 System 1 versus System 2: What They Are and What They Do

<i>System 1</i>	<i>System 2</i>
<i>Defining Features</i>	
Automatic	Time-intensive
Effortless	Effortful
Parallel	Serial
Reasons by association	Reasons by application of logic and rules
Intuitive	Analytical
Experiential	Rational
Holistic	Piecemeal
<i>Contributions to Decision Errors</i>	
Perceptual errors: The psychological impact of losses is greater than that of gains.	Cognitive errors: Devoting much effort to deciding can hamper prediction of our own preferences.
People confuse how easy it is for information to come to mind for trying to find base rates.	At times it is better to devote less effort even if it means sacrificing decision accuracy.
People confuse the representativeness of an instance for logic.	
<i>Feelings</i>	
Preferences need no inferences: Feelings of good and bad arise very quickly.	Full blown emotions contain cognition and emotion and are distinguishable from one another.
Affect can automatically carry over to related decisions such as when fearful individuals make pessimistic judgments.	Negative emotions such as regret are explicitly anticipated and avoided.

memory for words marked by their first letter (the game Scattergories makes use of is) than by their third letter. The availability bias is a System 1 error, in that the feeling of how easy it was to think of that information gives decision makers the sense that the outcome is very common and they stop there and make a judgment without further cognitive work.

Another example involves asking people to estimate the number of murders per year either across a whole state or a particular city in that state. The city and state are Detroit and Michigan, and in this experiment (described in Kahneman & Frederick, 2002) some participants were asked to write down how many murders happen per year in Michigan, whereas others were asked to estimate the number of murders per year in the city of Detroit. Guess which group offered a higher number? Logically, the number of murders a year must be higher (or exactly the same) for the entire state of Michigan than for the city of Detroit because Detroit is a city in Michigan. Yet participants estimated that the median number of murders a year in Michigan was 100 compared to 200 in Detroit. (In case you are wondering about the base rates, in 2007 the actual number of murders in Michigan was 676 with 396 of those occurring in Detroit.) Participants' logically inconsistent judgments presumably arose because they drew on different information when they made their estimates. The stereotype of Detroit is of a rough, violent city with deeply poor areas, whereas the stereotype of Michigan is of a hearty Midwestern state with cold winters. Hence conjuring up different types of information about Michigan versus Detroit presumably made it seem that more murders would happen in Detroit than in Michigan. Opposing findings are found when people find it difficult to think of information. Winkielman et al. (1998) asked some participants to recall 12 events from their childhood and others to recall four childhood events. Ironically, the group that thought of 12 events later rated themselves as less capable of remembering their childhood than the participants asked to recall only four events, despite having recalled three times as many memories. Retrieving 12 events from childhood is rather difficult to do and participants let those feelings of difficulty color their self-assessments.

The *representativeness heuristic* is another shortcut that people use when making judgments about probability. It occurs when people judge an event to be probable because its appearance seems to fit the context. For instance, think about people who are asked to judge which sequence of five flips of a coin is likelier to occur: HTHHT or HHHHH (where H = heads; T = tails). The majority of people will say that the former is more likely to occur than the latter. But, statistically, both are equally probable because each flip of the coin offers a 50/50 chance of heads or tails. In decision makers' minds, though, a series of coin flips showing both heads and tails seem more representative of a random pattern than when the series shows only heads.

Another classic example of the representativeness heuristic involves information about a woman named Linda (Tversky & Kahneman, 1983). Participants read this description of Linda: “Linda is 31 years old, single, outspoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice and also participated in anti-nuclear demonstrations.” Participants were asked whether it is more likely that Linda was a bank teller or that Linda was a bank teller who is active in feminist causes. Participants overwhelmingly (85%) believed that Linda was likelier to be a bank teller who is active in feminist causes than only a bank teller. But, logically, an event cannot be more probable than the combination of that event and another event. Participants made a logical mistake because they were swayed by the description of Linda and were not attending to rules of logic. The idea that she was a bank teller and a feminist seemed to better represent the earlier description of Linda. If participants had not stopped their judgments after System 1 had kicked in but instead activated their System 2, they may have realized that two events cannot be more likely to occur together than one event alone.

One well-established mechanism giving rise to errors in decision making is *anchoring and adjustment*. Here, people do engage in System 2 but in insufficient amounts. A standard way to test anchoring and adjustment is to ask decision makers to first think about an arbitrary number (e.g., the last two digits of their social security number). Then they are presented with an object, for instance a bottle of wine (Ariely, Loewenstein, & Prelec, 2003). They think back to the arbitrary number and then state whether the wine is worth more or less than this number. Last, they are asked to state a specific dollar amount they are willing to pay for the object. Even though decision makers know that the number they first considered had nothing to do with the wine’s worth, that initial, irrelevant number influences how much people are willing to pay. People with higher social security number endings are willing to pay more money for the wine than people with lower social security number endings. We say that decision makers do not devote enough effortful cognitive energy to this task because they “anchor” on the initial number but fail to “adjust” sufficiently. This means that they think that they have moved away from the starting point enough but they are still being swayed by it.

Anchoring and adjustment is at work in many phenomena. For instance, can you remember seeing grocery store signs near discounted items that say “Limit X”? The number that is listed is likely to become an anchor on which consumers seize when deciding how many of that item they want. The higher the number on that sign, the more items consumers are likely to buy (Wansink, Kent, & Hoch, 1998). So too are interpersonal relations affected by anchoring and adjustment. Failing to take the perspective of someone else has been said to

result from people anchoring on their own viewpoint and failing to adjust enough for the perspective of others (Epley et al., 2004).

Summary

Heuristic decision strategies often sacrifice some decision accuracy but offer the benefit of reduced effort. However, putting much effort into thinking does not guarantee error-free decision outcomes, as our second theme illustrates.

Theme 2: Increased Cognitive Processing Can Cause Error

The previous section discusses research showing that decision error can result from not enough cognitive processing. This research suggests simple advice for decision makers: think more! Unfortunately for decision makers, but perhaps fortunately for judgment and decision-making scholars who need interesting questions to research, eliminating decision errors is not that easy.

This brings us to the second theme: thinking can itself cause errors. There are at least two explanations for why cognitive analysis can lead to decision error. First, some decision tasks may be inherently intuitive—meaning that the best decisions come from relying on our “gut feelings” (Hammond et al., 1987). Second, people may use cognitive processing to achieve goals that prevent them from making an accurate decision.

An influential stream of research revealed that generating reasons for why a person made his or her choice can reduce the quality of that choice. In these experiments, a decision was judged as good if it later brought the decision maker enjoyment or happiness. Wilson and Schooler (1991) told undergraduates that they were allowed to choose a poster to take home with them out of an array of posters. However, some students were first asked how they would go about choosing a poster—that is, to state the reasons for choosing a poster. Other students were simply allowed to choose. Researchers later went to the dorm rooms of the students to see whether the posters were hung on the students’ walls. They saw that students who talked about how they would choose their poster were less likely to hang the poster on their walls. Wilson and colleagues argued that that this decision task relies more on feelings than cognitions and that the cognitive activity needed to express reasons for their choice made people’s decisions worse.

In these types of decisions it seems that better decisions are made when the context in which people are placed when they make decisions is very similar to the context in which they will be experiencing those preferences

(Payne, Bettman, & Schkade, 1999). Coming up with reasons is not something that is typically present during later experience and therefore harms decision quality.

Analytical thought can impair decision quality when people are held accountable to others for their decisions. Simonson (1989) argued that having to justify why you made a certain choice creates “choice based on reasons,” in which too much thought is placed on justifying their decisions and not enough thought is available to make the right choice. Using the attraction effect design (i.e., choosing among three options, one of which is irrelevant but closely related to one of the other two options), he told some people that they would have to tell others why they chose as they did. Other people saw the same attraction effect design and made a choice among the same three options but believed that they would not have to justify their choice. Those who were ready to justify their choice were more swayed by the irrelevant option than people who chose believing that they would not have to justify their choice. This suggests that justifying our choices can lead people to irrational decisions because they choose based on what is defensible rather than on what is logical.

Summary Although conscious thought is generally considered an important aspect of good decision making, it can go astray—and often in predictable ways. Reasons can disrupt decision making and accountability can introduce unhelpful goals.

Theme 3: Emotion versus Cognition

Although there are numerous ways to define and classify thought processes during decision making, one theme that has made inroads to judgment and decision making is whether those thoughts are emotional or cognitive. Therefore, the third theme we address is whether and how emotional decision making causes decision error.

Historically, judgment and decision-making approaches have depicted decision making as a cold, cognitive process. Yet it would be remiss to ignore the fact that many decisions are made with—if not because of—emotional input. The question of when and how emotion plays a role in decision making also implicates the intuitive versus analytical reasoning divide mentioned in Themes 1 and 2. A classic debate in the 1980s pitted two theories of emotion against each other: Robert Zajonc (1980) claimed that “preferences need no inferences” (which speaks to System 1 being active) whereas Richard Lazarus (1981) retorted with a “cognitivist’s reply” (which speaks to System 2 being active). The debate can be resolved by agreeing that both routes coexist. Baumeister, Vohs, DeWall, and Zhang (2007) suggested the term *affect* for

low-level, nonconscious, positive versus negative twinges and the term *emotion* for full-blown feeling states, and we use these labels in this chapter. We now discuss how each can produce decision error.

Intuitive, Affective Processes One influential model argued that decision makers' judgments about risky decisions are driven by the affect associated with the options. For instance, if positive affect arises when a decision maker thinks about skiing then this will likely increase judgments of its benefits but curtail an analysis of its riskiness. On the other hand, the negative affect connected to the idea of a nuclear power plant increases judgments of its riskiness (Slovic et al., 2007).

Sometimes getting people in an emotional mindset leads them to make erroneous decisions. One set of researchers asked some people to state how much money they wanted to donate to save one panda, whereas others were asked how much money they wanted to donate to save four. For some participants, the panda bears in question were portrayed by black dots (either one or four), whereas other participants saw adorable pictures of pandas (again, one or four). The participants who saw the pandas as black dots said that they would donate more money to save four than save one, which is a logical response. But the participants who saw the pandas as pictures pledged to donate the same amount to save one of them as they would donate to save four. The researchers, Hsee and Rottenstreich (2004), argued that portraying pandas as cute and lovable brought people into an affective mode that made them ignore quantity and treat all the pandas the same. When those same pandas were described in plain, cold, nonemotional terms, participants' decisions about how much money would be needed to save them became sensitive to quantity and they pledged more money to save more bears.

Other evidence supports the idea that being in an affective mindset changes decisions that are completely independent of the affect being felt. This is called a *misattribution* effect because people mistakenly carry over their current state (e.g., their feelings) to an unrelated judgment they are asked to make. The classic misattribution finding for emotions and decisions involved asking people to judge how happy they are with their lives. Schwarz and Clore (1983) demonstrated that people judge their lives to be happier when asked about their overall life happiness on sunny days than when they were asked the same question on rainy days. This difference presumably occurs because people use their feelings about the day's weather to make judgments about their life overall. Other research (Simonsohn, 2010) extended this weather effect to university admissions officers' judgments. On sunny days, admission officers give more weight to whether the applicant has social or extracurricular activities on his or her application whereas on overcast days they more heavily consider the applicant's academic record.

Carryover findings suggest that low-level affective states subtly alter decision makers' perceptions and goals. Work on the other route, conscious or analytical emotionality, has focused on emotion influencing decision making through how it changes decision makers' goals.

Analytical Processes Although psychological processes are often broken down into "emotional versus rational," anyone familiar with the lay concept of rumination can attest that more conscious cognitive activity does not necessarily mean less emotional experience. In fact, some emotions may be fueled by analytical processes.

Perhaps the emotion with the most sustained interest to judgment and decision-making scholars is regret. Strategies to avoiding regret are said to be analytical (not intuitive) because people engage in counterfactuals, which are mental simulations of what might happen in the future. Simonson (1992) found that asking people to think about whether they would regret a decision made them choose safer options. For instance, thinking about whether they may regret their choice led participants to prefer buying a product on sale now rather than waiting for a potentially better sale, which carries the associated risk of losing out on the discount altogether. Shoppers also chose a highly regarded brand of VCR over an unknown brand that was cheaper when reminded that they may regret their choice later. People can imagine that they will feel more regret if they made a risky decision as opposed to a safer one, so they avoid risky options so as to attenuate regret that they might feel about the decision in the future.

People put a lot of thought into the regret they feel about past behaviors too. Gilovich and Medvec (1995) asked people about what kinds of decisions they have regretted. They found that people regret mistakes that involved actions (e.g., saying the wrong thing) soon after they performed the action but regretted mistakes involving inaction (e.g., not earning a graduate degree) much later. This means that as you approach the end of life, you might regret the goals that you never pursued; but right now most of your regret revolves around acts such as getting drunk and behaving foolishly at a party last weekend.

People also need to manage the emotions that arise while making decisions and this can be a problem when the decision brings up negative emotions. Luce (1998) showed that people were more likely to choose the default option or be swayed by an irrelevant choice in the attraction effect when the decision situation itself elicited bad feelings. People seemed to be ruminating about the negative aspects of the decision situation, which led them to use features of the situation, such as whichever option was preselected, to make the choice easier.

Summary Both conscious emotion and low-level affect can cause decision errors. Low-level affect can substitute for cognitive analysis during decision making. Conscious emotions can give rise to emotion goals (e.g., avoid regret

or diminish negative emotions). One final note is that emotion does not always lead to decision errors. Emotion can act as a signal of what is important to the decision maker and in that sense it can steer behaviors toward worthy goals (e.g., Baumeister et al., 2007).

Judgment and Decision Making Today: Improving Decision Quality

One major thrust emerging from the field of judgment and decision making today is to not only identify decision errors but to find corrections for them. The study of judgment and decision making has been interdisciplinary from the start, including policy-oriented practitioners as well as basic social scientists. The policy-oriented arm of judgment and decision making is what prompts scholars to find processes that will help decision makers avoid decisions errors. In judgment and decision making today, basic science and policy intersect better than ever before, applying judgment and decision-making principles to explain and aid decision problems outside the laboratory.

The field of judgment and decision making began by focusing on the debate between economists' views of "rational man" and psychologists' views of "imperfectly rational man." For many decades, the field was largely focused on identifying decision effects (e.g., framing, misattribution) that illustrated how rational decision makers were or were not. Today, the field is firmly rooted in a rich, psychological view of judgments and decisions and is shifting toward more comprehensive views of decisions as complex and flexible psychological processes (Weber & Johnson, 2009). By moving beyond debates about whether decision makers are rational, judgment and decision making is opening up to richer process explanations of decision making. The field is ripe for scholars to address how automatic (e.g., System 1) and effortful (e.g., System 2) decision processes coexist and how emotional and cognitive processes influence each other.

Richer, more comprehensive views of decision making have lent themselves to understanding the decisions that underlie important societal problems. For instance, the medical and pharmaceutical industry laments the low rate at which people take their medications. One difficult point for patients occurs when they are low on medication and need to have their prescription refilled. Multiple small steps are involved in doing this: patients have to call to order the prescription to be refilled, go to their neighborhood pharmacy, wait in line, and pay for it. Judgment and decision-making scientists know that each step means that people are less likely to follow through in getting their medicines. A series

of small decisions (e.g., go to the pharmacy versus go grocery shopping) can mean that people lose sight of the importance of their health goal. To help with this, some medical plans have started shipping patients' medications to their home on a regular basis. (Patients who still want to visit the pharmacy have the option to not have their medications shipped to their homes.) These plans take advantage of the default effect, which removes all those small decisions that were once needed to get a prescription filled. The hope is that very few patients will actively choose not to have their medications shipped to their homes, which would result in many patients having their medications on hand when they need to take them.

An integration of judgment and decision-making principles with other disciplines is also at the forefront of research today. The organization to which judgment and decision-making scholars belong is the Society for Judgment and Decision Making (sjdm.org), which partners with the Society for Medical Decision Making (smdm.org) to study health care, wellness, and physician and patient decision making. Work in this area is aimed at improving health care outcomes by using clinical studies and judgment and decision-making ideas to sway patients, researchers, and the politico. Assessing health-related utility is important for these researchers, an example of which involves asking people to compare living a long time in an impaired state of health and living a shorter life in perfect health.

Recently the field has made a move toward emphasizing happiness as an appropriate goal that policy makers and decision makers ought to consider when making decisions (Diener, Sapyta, & Suh, 1998). In fact, there is a well-being index structured to take into account happiness levels in countries worldwide. Judgment and decision-making scholars want this well-being score to become as important as the gross domestic product score when world leaders judge how well countries are doing at satisfying the needs of their people.

Social Psychology Can Improve the Study of Judgment and Decision Making

Social psychology brings much to the study of judgment and decision making. Perhaps because social psychology never adhered to the notion of a perfectly rational mind, it emphasizes the importance of processes that do not neatly fit into mathematical models. Emotion and motivation are two areas to which this comment applies. Judgment and decision making would benefit from incorporating a host of emotions (other than regret) into their theories of decision making. The realization that people's decisions reflect their motivation to achieve personal and interpersonal goals is a concept not fully embraced by

judgment and decision-making scholars. But this idea is quite amenable to the field of judgment and decision making because it recognizes that decisions function to maximize goals. Making use of the notion of goals in decision making will also help with the problem of integrating emotion and cognitive influences into decision making.

The field of judgment and decision making also could learn from social psychology the value in gathering seemingly isolated phenomena into overarching theories. Again perhaps because judgment and decision-making scholars were fighting against the idea that decision making is rational, they failed to adopt loftier views of the psyche and the role of judgment and decision making in it. Social psychology and judgment and decision making share common challenges in terms of the struggle between approaching science by finding phenomena and by creating unifying theories. Social psychology's success in building grander theories could provide a roadmap for the field of judgment and decision making.

Social Psychology Can Be Improved by Studying Judgment and Decision Making

Judgment and decision-making scholars have approached their discipline with an emphasis on basic phenomena, from which the field of social psychology could benefit. A similar note applies to the importance placed on attempting to correct errors, which judgment and decision making does far more than social psychology. There is at times a sense from the field of judgment and decision making that social psychology does not value either testing their theories under rich, naturalistic conditions or improving people's welfare with their science. The field of social psychology would almost surely have a greater impact on policy and people's everyday lives if it got out of the laboratory and tried to make life better for folks.

The study of social psychology could also be improved by studying judgment and decision making. Social psychology for the most part fails to grasp the importance of the act of making a decision and the impact that decision mistakes have on people's behavior. The examples of people making over 200 food-related decisions a day (but believing that they make only 15) and battered women returning to their abusive partners illustrate that decision making is exceedingly common and wildly important. Social psychological theories would be well served by tracking the decision processes that people go through and social psychologists may find new avenues for understanding their favorite topic of study.

In Closing: Big Ideas The topics and methods of study that judgment and decision-making scholars use have the potential to be applied to big ideas.

Two prominent scholars, Richard Thaler and Cass Sunstein, recently suggested a new policy of governance based in part on judgment and decision-making principles (Thaler & Sunstein, 2009). New insights on genocide came about because Paul Slovic (2007) incorporated ideas about how the emotion system reacts—actually, overreacts—to tragedy, a theory that was informed in part by social psychological ideas about emotions. Slovic found that the distress of seeing one victim is so great that adding a second victim, paradoxically, decreases the distress that people feel because the overwhelming emotion prompts them to disengage from the situation. This example highlights how social psychology and judgment and decision making can merge to provide big insights into big problems.

References

- Ariely, D., Loewenstein, G., & Prelec, D. (2003). “Coherent arbitrariness”: Stable demand curves without stable preferences. *Quarterly Journal of Economics*, *118*, 73–105.
- Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, *5*, 323–370.
- Baumeister, R. F., Vohs, K. D., DeWall, N., & Zhang, L. (2007). How emotion shapes behavior: Feedback, anticipation, and reflection, rather than direct causation. *Personality and Social Psychology Review*, *11*, 167–203.
- Benartzi, S., & Thaler, R. H. (2001). Naive diversification strategies in defined contribution saving plans. *American Economic Review*, *91*, 79–98.
- Diener, E., Sapyta, J. J., & Suh, E. (1998). Subjective well-being is essential to well-being. *Psychological Inquiry*, *9*, 33–37.
- Epley, N., Keysar, B., Van Boven, L., & Gilovich, T. (2004). Perspective taking as egocentric anchoring and adjustment. *Journal of Personality and Social Psychology*, *87*, 327–339.
- Gigerenzer, G., & Goldstein, D. G., (1996). Reasoning the fast and frugal way: Models of bounded rationality. *Psychological Review*, *103*, 650–669.
- Gilovich, T., & Medvec, V. H. (1995). The experience of regret: What, when, and why. *Psychological Review*, *102*, 379–395.
- Gottman, J. (1994). *Why marriages succeed or fail*. New York: Simon & Schuster.
- Hammond, K. R., Hamm, R. M., Grassia, J., & Pearson, T. (1987). Direct comparison of the efficacy of intuitive and analytical cognition in expert judgment. *IEEE Transactions, Systems, Man and Cybernetics*, *17*, 753–770.
- Hsee, C. K., & Rottenstreich, Y. (2004). Music, pandas, and muggers: On the affective psychology of value. *Journal of Experimental Psychology: General*, *133*, 23–30.

- Huber, J., Payne, J. W., & Puto, C. (1982). Adding asymmetrically dominated alternatives: Violations of regularity and the similarity hypothesis. *Journal of Consumer Research*, 9, 90–98.
- Johnson, E. J., & Goldstein, D. (2003). Do defaults save lives? *Science*, 302, 1338–1339.
- Kahneman, D. (2003). Tying it all together: Rules of accessibility and a two-systems view. Keynote address at the Annual Conference of Society for Judgment and Decision Making, Vancouver, Canada.
- Kahneman, D., & Frederick, S. (2002). Representativeness revisited: Attribute substitution in intuitive judgment. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics & biases: The psychology of intuitive judgment* (pp. 49–81). New York: Cambridge University Press.
- Kahneman, D., & Frederick, S. (2004). Attribute substitution in intuitive judgment. In M. Augier & J. March (Eds.), *Models of a Man: Essays in Memory of Herbert A. Simon* (pp. 411–432). Cambridge, MA: MIT Press.
- Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase theorem. *Journal of Political Economy*, 98, 1325–1348.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decisions under risk. *Econometrica*, 47, 263–291.
- Lazarus, R. S. (1981). A cognitivist's reply to Zajonc on emotion and cognition. *American Psychologist*, 36, 222–223.
- 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, 374–386.
- Luce, M.F. (1998). Choosing to avoid: Coping with negatively emotion-laden consumer decisions. *Journal of Consumer Research*, 24, 409–433.
- McMackin, J., & Slovic, P. (2000). When does explicit justification impair decision making? *Applied Cognitive Psychology*, 14, 527–541.
- Newman-Toker, D. E., & Pronovost, P. J. (2009). Diagnostic errors: The next frontier for patient safety. *Journal of the American Medical Association*, 301, 1060–1062.
- Payne, J. W., Bettman, J. R., & Johnson, E. J. (1993). *The adaptive decision maker*. Cambridge, UK: Cambridge University Press.
- Payne, J. W., Bettman, J. R. & Schkade, D. A. (1999). Measuring constructed preferences: Towards a building code. *Journal of Risk and Uncertainty*, 19, 243.
- Read, D., & Loewenstein, G. (1995). Diversification bias: Explaining the discrepancy in variety seeking between combined and separated choices. *Journal of Experimental Psychology: Applied*, 1, 34–49.
- Rusbult, C. E., & Martz, J. M. (1995). Remaining in an abusive relationship: An investment model analysis of nonvoluntary dependence. *Personality and Social Psychology Bulletin*, 21, 558–571.
- Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, 45, 513–523.

- Simon, H. (1955). A behavioural model of rational choice. *The Quarterly Journal of Economics*, 69, 99–118.
- Simonson, I. (1989). Choice based on reasons: The case of attraction and compromise effects. *Journal of Consumer Research*, 16, 158–174.
- Simonson, I. (1992). The influence of anticipating regret and responsibility on purchase decisions. *Journal of Consumer Research*, 19, 105–118.
- Simonsohn, U. (2010). Weather to go to college. *The Economic Journal*. Published online July 17, 2009, <http://www3.interscience.wiley.com/journal/122515169/abstract?CRETRY=1&SRETRY=0>
- Slovic, P. (2007). “If I look at the mass I will never act”: Psychic numbing and genocide. *Judgment and Decision Making*, 2, 79–95.
- Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2007). The affect heuristic. *European Journal of Operational Research*, 177, 1333–1339.
- Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth, and happiness*. New Haven, CT: Yale University Press.
- Tversky, A., and Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5, 207–232.
- Tversky, A., & Kahneman, D. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review*, 90, 293–315.
- Vohs, K. D., & Baumeister, R.F. (2004). Understanding self-regulation: An introduction. In R.F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 1–9). New York: Guilford.
- Von Neumann, J., & Morgenstern, O. (1944). *Theory of games and economic behavior*. Princeton, NJ: Princeton University Press.
- Wansink, B., Kent, B. J., & Hoch, S. J. (1998). An anchoring and adjustment model of purchase quantity decisions. *Journal of Marketing Research*, 19, 71–81.
- Wansink, B., & Sobal, J. (2007). Mindless eating: The 200 daily food decisions we overlook. *Environment and Behavior*, 39, 106–123.
- Weber, E. U., & Johnson, E. J. (2009). Mindful judgment and decision making. *Annual Review of Psychology*, 60, 53–85.
- Wilson, T. D., & Gilbert, D. T. (2003). Affective forecasting. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 35, pp. 345–411). San Diego, CA: Academic Press.
- Wilson, T. D., & Schooler, J. W. (1991). Thinking too much: Introspection can reduce the quality of preferences and decisions. *Journal of Personality and Social Psychology*, 60, 181–192.
- Winkielman, P., Schwartz, N., & Belli, R. F. (1998). The role of ease of retrieval and attribution in memory judgment: Judging your memory as worse despite recalling more events. *Psychological Science*, 9, 124–126.
- Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35, 151–175.