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Judgment and Decision Making

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People often find themselves in situations in which they must judge what is likely to be true versus false, probable versus improbable, and desirable versus undesirable. Then, based on these assessments, they must decide on a course of action to take. They must calculate whether to go on a diet, invest in that trendy new stock, or to sell their car to this particular customer. In a sense, this type of thinking sounds much like social cognition itself, in that people weigh the information in front of them and then come to some sort of conclusion that ultimately leads to action – and scholars have argued, forcefully, that the type of thinking associated with social cognition is ultimately for doing (Fiske, 1992).

If scholars are to build a model of a human being as a decision maker, what should that model look like? What information is the decision maker most interested in? What calculations does that decision maker make? Is the process of decision making the same for all decisions, or does the decision maker approach different types of decisions in unique ways? Scholarly disciplines other than psychology have certainly committed to specific models of the human decision maker in their own theorizing. For example, at the core of economics and related fields stands the *rational actor model*. This model assumes that people are impartial and unflawed thinkers who have an unlimited capacity for analysis and calculation. This actor has firm preferences about what he or she wants and complete information about the surrounding world. First and foremost, this actor is concerned with his or her material self-interest; the interests of other actors do not matter and are given little if any weight. This rational actor, further, is a cold calculator, unmoved by incidental passions, who takes the evidence given and deliberates his or her way toward a decision. Thus, rational actors make accurate and beneficial judgments about the world, and always choose the most optimal behavior possible. To be sure, under this type of model, errors are allowed, but only random errors that occasionally distract the rational actor from the right judgment and the correct choice. Beyond that, the thinking of the rational actor is flawless (e.g., Becker, 1976; Hicks & Allen, 1934; Pareto, 1971).

Economists, building theories based on the rational actor model, have met with over a century of success in the analysis of human behavior (e.g., Becker, 1976). To the reader, this might seem something of a surprise, in that this model of the human decision maker sounds not much like any flesh-and-blood human being that he or she has met in everyday life. Instead, this completely rational actor sounds a little more like it comes from the realm of science fiction, like Spock for older *Star Trek* fans or Data for newer ones, or like the Cybermen from *Doctor Who*. Thus, might there be revisions or even wholesale changes to this model that might make it more realistic – that better approximate how people approach judgments and decisions in their everyday world?

THE PROJECT OF JUDGMENT AND DECISION-MAKING RESEARCH

Within psychology, research on judgment and decision making (JDM) can be construed as a reaction against the rational actor model, taking as its central goal an attempt to build a description of the human decision maker that better approximates how people go about the business of their

daily lives. JDM starts with a different premise from the rational actor model. It assumes that people show systematic flaws and biases about how they weigh evidence and reach decisions. These flaws can be quite fundamental and far-reaching in their consequences.

This alternative model of the human decision maker begins to appear in the psychological literature roughly in the mid-20th century (see Edwards, 1954, 1961). It can found in the thinking of Simon (1957), who noted that people often do not have the cognitive capacity or sufficient time to do all the calculation that the rational actor model often demanded. Instead, he proposed that people frequently fail to conduct an exhaustive analysis of any decision, but instead often stop well before they had completely considered all the evidence before them, a tendency he described as *satisficing*. In roughly the same era, Edwards (1968) discovered that people differed, systematically, in the ways they revised their beliefs in the face of new evidence. He found that people revised their beliefs too little relative to what basic statistical principles said they should, a pattern that became known as *judgmental conservatism.*

But it was with the "heuristics and biases" work of Daniel Kahneman and Amos Tversky (for reviews of early work, see Kahneman, Slovic, & Tverksy, 1982; Nisbett & Ross, 1980) that JDM research took off, and in the 1970s a project began, one which continues to this day, in which the rational actor was placed under close scrutiny to explore the ways in which people differed from that idealized portrait. Commonly, it is from this work on heuristics and biases that JDM traces its lineage. This work has had an impact not only on cognitive, social, personality, developmental, and organizational psychology but also on such diverse fields as medicine, artificial intelligence, sociology, political science, law, accounting, and marketing – and, of course – has a growing impact on economics.

In this chapter, I review research that has flowed from this JDM tradition, and focus on five central insights that this research has thematically revealed. I discuss the implications of these fundamental insights for both basic theory and, where appropriate, applied policy. I also discuss more current and emerging work in JDM, discussing six specific areas in which the discipline seems poised to make central discoveries about human decision making.

Relation to behavioral economics

Two notes should be made about the area of psychology known as JDM. The first note is that it is natural for such an active and increasingly diverse field to have many names – and JDM does, such as decision theory, or behavioral decision theory. When affixed to a specific applied area, it is likely to have the pre-fix "behavioral" attached to it, such as in behavioral law or behavioral accounting.

One name that should not be taken as a synonym, however, is *behavioral economics*, which refers to a related but distinct area of scholarship within economics itself. Behavioral economics is quite active – each year even more so – and shares many of the same concerns as JDM. It asks, for example, how people make risky decisions, or when people will act altruistically rather than in their own selfish interest. Behavioral economics has been informed by many of the insights gained in JDM work. JDM, in return, has gained many insights and inspirations from research in behavioral economics.

But the two fields differ in many fundamental ways. JDM is a psychological field, and as such is interested in *experimentation*: i.e., in empirically identifying the circumstances and dynamics that influence the judgments and decisions that people ultimately reach. Do people, for example, react to potential gains differently from the way they react to potential losses? The scholarship of behavioral economics follows from a fundamentally different method of exploration. Typically, it will take the insights of JDM, as well as insights from elsewhere, and use them to construct *models*. In these models, economists create a hypothetical world in which they identify a set of variables, specify some logical or quantitative relationships between those variables, and then allow the variables to interact to see what outcomes arise (Holcombe, 1989). Economists may explore how their models behave over time, or when many people, not just one individual, are allowed to interact with one another. To be sure, economists at times collect empirical data (there is, after all, a field named *experimental economics*), and psychologists sometimes construct models, but the two fields differ greatly in the central method they use to make their discoveries: psychologists use data to examine how one or a few causal agents influence some outcome, whereas economists construct hypothetical worlds in which a system of variables interact with one another.

The importance of normative benchmarks

The second note is that work in JDM distinguishes itself from other research in social cognition in another central emphasis. Instead of just

examining how people reach their decisions, JDM research compares how people do so with how they *should* do so. That is, people's judgments or decisions are compared against some *normative* benchmark from economics, statistical science, or logic describing how a flawless and impartial agent – that rational actor – would have reached a decision.

There is no single normative standard that covers all of JDM work. At times, researchers may just compare judgments and decisions to the truth, to see if people's conclusions comport with reality. People may be asked, for example, how many libraries there are in the United States, and then be asked to place an upper and lower bound on that estimate such that there is a 90% likelihood that the true answer lays within those bounds. Then, people's estimates are compared to the truth: Do their bounds actually contain the true answer 90% of the time? (Usually not: in such exercises their bounds typically contain the true answer less than 50% of the time; see Alpert & Raiffa, 1982; Klayman, Soll, Gonzalez-Vallejo, & Barlas, 1999.)

Alternatively, researchers may examine how well participants' estimates replicate the conclusions reached via some normative technique. One common technique is Bayesian inference, which suggests how people should revise their judgments when combining new evidence with previous suspicions. For example, suppose one is a detective investigating a murder and has a suspect in mind, but rates the chance of this suspect being guilty as only 10%. However, the detective runs a very accurate blood test, and finds that the suspect's blood matches a sample left by the culprit – and, once more, that the blood type matched is very rare, being shared by only 1% of the population. How sure should the detective be of the suspect's guilt now? According to Bayes' theorem, and assuming an accurate test, the detective should move to being 92% sure that the suspect is guilty.[1] Usually, however, people do not revise their suspicions in legal cases as much as they should (Smith, Penrod, Otto, & Park, 1996).

Finally, if truth is difficult to determine, or no precise normative technique exists to guide judgment, researchers can examine whether people's judgments at least follow constraints suggested by mathematics or logic. For example, the logic of transitivity suggests that if someone would prefer object A over B, and object B over C, then he or she must prefer object A over C. There are times, however, when this logic is violated. Tversky (1969) found that most people, most of the time, preferred a 7 out of 24 chance to win $5 over a 9 out of 24 chance to win $4.50, and that this second gamble was preferred a majority of the time over a 11 out of 24 chance to win $4. However, ask people to choose between the first gamble (7/24 chance to win $5) and the third (11/24 to win $4), most people most of the time opted for the latter.

FIVE CENTRAL INSIGHTS OF JDM RESEARCH

If one traces JDM work back to the early research of Simon and Edwards, then psychological researchers have been closely scrutinizing the rational actor model for over a half-century. Thus, it is not a surprise that researchers have discovered many ways in which flesh-and-blood decision makers differ from the ideal embodied in the rational actor model. Although any review of JDM word may differ in its details, there are at least five central ways in which human decision makers appear to differ from the rational ideal. That is, surveying the theorizing and empirical evidence that JDM researchers have developed, one finds five major insights about human decision making. Let us consider each in turn.

Insight #1: Judgments and decisions are often the product of quick and crude heuristics

The primary insight identified with research on judgment and decision making is that judgments of truth, likelihood, and benefit are often not the product of intense, exhaustive, and analytical calculation, but rather the product of quick and crude *heuristics*, or rules of thumb, that potentially get people close to the right answer but which can sometimes lead to dramatic and systematic error. Two specific heuristics, *availability* and *representativeness*, are the ones most featured in JDM work.

Availability

Suppose one were asked whether there are more 7-letter words in the English language that have the form - - - - - n – or - - - - i n g? Most people "know" the answer within seconds, and know it without a comprehensive review of the closest *Webster's Dictionary*. They merely sit back and see if they can generate words with an "- n –" ending or an "-ing" one. For most people, it's the latter that are more easily generated (the author can't help but think of *Dunning* if proper names count) than the former – and so they conclude that "-ing" words are more numerous (Tversky & Kahneman, 1973). But they are necessarily wrong.

Stare at the "- n –" form a little more, and one would realize that all "ing" words fit the "- n –" form. Also, there are many words (*present*, *benzene*) that fit –n-, and so –n- words must be more common than -ing ones.

The quick-and-crude rule of thumb that produces this error was termed by Kahneman and Tversky (1973) as the *availability heuristic*, which suggests that people think of something as more likely or true to the extent that it (or examples of it) can be easily brought to mind. The heuristic might be a good rule of thumb, but it can lead to systematic mistakes in belief. For example, people believe that homicides are more frequent than suicides, which stands to reason given how often the former is in the news relative to the latter, but the truth is actually the opposite is true. People also overestimate the prevalence of lethal risks such as car accidents, fire, and drowning, in part because these risks are made available in the news, but not more invisible risks such as hepatitis, diabetes, and breast cancer (Lichtenstein, Slovic, Fischhoff, Layman, & Combs, 1978).

The availability heuristic is such a powerful determinant of judgment that it can even defeat the quality and quantity of information people have at their disposal. Schwarz and colleagues asked college students to generate lists of behaviors suggesting that they were emotional people. Some were asked to generate only four examples – a task that was easily completed and, thus, scored high on a feeling of availability. Others were asked to generate 12 examples, an arduous task that left students with a feeling that their emotional behaviors were not that available at all. Thus, it was not surprising that students asked to list a mere four behaviors rated themselves as more emotional than those asked to provide 12, even though the latter group had generated more information indicating they were emotional people (Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka, & Simons, 1991). What mattered was the feeling of availability associated with the task, not the actual content of information generated.

Representativeness

People tend to believe that an outcome is likely to occur to the extent that it resembles its inputs, a heuristic that Kahneman and Tversky (1972, 1973; see also Tversky & Kahneman, 1983) termed the *representativeness* heuristic. For example, they gave participants the following profile of a college student:

> Tom W. is of high intelligence, although lacking in true creativity. He has a need for order and clarity, and for neat and tidy systems in which every detail finds its appropriate place. His writing is rather dull and mechanical, occasionally enlivened by somewhat corny puns and by flashes of imagination of the sci-fi type. He has a strong drive for competence. He seems to feel little sympathy for other people and does not enjoy interacting with others. Self-centered, he nonetheless has a deep moral sense.

Participants were then asked to rank nine college majors (business administration, law, engineering) in terms of how likely Tom was to be pursuing them. Not surprisingly, most participants thought it much more likely that Tom was an engineer rather than in social science/social work. Consistent with the representativeness heuristic, Tom's personality matched the type of personality participants associated with engineers than it did the character associated with social work – a quite reasonable conclusion.

But, Kahneman and Tversky (1973) cogently argued that this conclusion was much more likely to be an error that participants had not anticipated. Consider the following proposition, which I hope is not too controversial: the probability that an outcome will occur depends on its sheer frequency. Common events happen commonly; rare events only seldomly. Thus, when predicting whether an event will occur, we should consult simply how frequent or probable it is. If this is the case, then one should bend one's prediction in the direction toward Tom being a social science or a social worker major rather than an engineer. The first type of major is quite common among college students; engineering students are much rarer. That is, when making judgments of an uncertain event, one should consult an outcome's *base rate*: namely, the raw likelihood or frequency with which it occurs. Statistical tools such as Bayes' theorem can even be exploited to formally incorporate base rate information into predictive judgments (Howson & Urbach, 2005).

Kahneman and Tversky (1973) discovered that in relying on the representativeness heuristic, people gave short shrift to base rate information, even though it is a prime indicator of whether an event will occur. Convincing people to set aside this *base rate neglect* is often a central tenet of training in many professions. For example, medical students are often exhorted to consider the base rates of the diseases they are considering for a diagnosis, and instructed to pay attention to the obvious – but important – point that a diagnosis of a disease that tends to be frequent is much more likely to be right than a diagnosis of a disease that appears only rarely (Sotos, 2006). To be sure, mistakes will be made, but not as many as there would have been if students had neglected base rates in their diagnostic conclusions.

Reliance on the representativeness heuristic also leads people to disregard other types of valuable information. For example, let me show you two coins, one of which I claim is biased towards heads and away from tails when I flip it. I flip Coin A 4 times, and get heads 3 of those times. I then flip Coin B 13 times, and get heads 8 times. Which coin, A or B, is most likely to be the biased one? Most people, because of the representativeness heuristic, choose A because a 75% "heads" rate looks more like a biased coin than the 61.5% figure produced by B. This conclusion, however, is wrong. Statistically, an unbiased coin will produce 3 heads out of 4 flips 31% of the time, but it will produce 8 heads out of 13 times only 29% of the time. It is close, but my money is on Coin B being the biased one.

Griffin and Tversky (1992) discovered, however, that people, relying so heavily on the representativeness heuristic, failed to consider the quality of the information they had in hand. Using their terminology, they claimed that people were too influenced by the *strength* of the information they were given (e.g., but it's a 75% heads rate!) much more than the *weight* they should give the information (e.g., but its only 4 flips): i.e., people looked at what the information suggested, but failed to consider the credibility they should assign that information.

Insight #2: Reference points matter

According to the traditional treatments of expected utility theory in economics, we can make two assumptions about the preferences of rational actors: first, their preferences are well-formed before they ever encounter a situation in which they must make a choice; second, those preferences are based on the totality of what a person owns – that is, his or her total wealth (e.g., Friedman & Savage, 1948). For example, a poor student with total net worth of near zero should jump at a chance to win $100,000 in a lottery, but a rich business executive whose financial portfolio is already stuffed with assets would be less enthusiastic. A rise in total of wealth of $100,000 would not appear to be as great to the executive, and thus the gamble not worth the time to reach for a wallet.

Work in JDM, in many different ways, has shown that these two assumptions are false. First, people's preferences are often not well-formed prior to making an economic decision. Instead, people often "bootstrap" their preferences on the spot, based on features of the choice presented to them (Hsee & Zhang, 2004). For example, when presented with a sure gain of $2 versus a gamble in which they have a 7 out of 36 (19%) chance of winning $9, only a third of respondents choose the gamble over the sure $2. The reason for this is obvious – $9 is certainly more than $2, but a mere 19% chance of winning is disappointingly low. However, if the bet is revised a little, such that participants now have a 7 out of 36 chance of winning $9 but a 29/36 chance of losing 5¢, the proportion taking the bet for $9 rises to nearly 61% (Slovic, Finucane, Peters, & MacGregor, 2002). But this enhanced enthusiasm for the revised bet is somewhat paradoxical. The revised bet presents worse terms – after all, the original bet presented no chance for a loss – so how can it be that people find it more attractive?

It is more attractive because the meaning that participants assign the $9 is not crystallized before they hear about the bet. Instead, it is constructed once the other features of the gamble are described. In this case, the attractiveness of the $9 depends importantly on how it compares to the other features of the gamble. It compares favorably, for example, to a gain of $2, but not enough to prompt people to take the gamble. However, in the revised gamble, the possible gain of $9 is certainly much more impressive looking when compared to a possible loss of a mere 5¢. Gaining this added attractiveness in the comparison, bootstrapped from a comparison to a small possible loss, participants are moved to take the gamble to try to gain that appealing $9.

Framing

Kahneman and Tversky (1984; see also Tversky & Kahneman, 1981, 1986) provided further demonstrations that local reference points mattered by introducing the notion of *framing* to the JDM literature. Framing meant that choice options could often be presented in different formats that implicitly changed the reference points involved. For example, in a classic example of framing, participants were told that an Asian disease was about to break out which was expected to kill 600 people. There were two possible medical responses that policymakers could adopt: one that would save 200 for sure and one that presented a one-third chance of saving all 600 and a two-thirds chance of saving no one. Given this "frame," close to 75% of participants chose the sure thing of saving 200. However, if the response options were described differently, with one policy meaning that 400 people would die for sure and the other policy meaning there was a 1/3 chance that no one would die but a 2/3 chance that all 600 would, only 20% of people choose the sure thing of 400. Note, however, that the 200 saved under the first frame, a choice most people favored, was

exactly the same as the 400 dying under the second. Shifting the reference point, however, had shifted how people evaluated the two options – sure thing versus taking a risk – that they evaluated.

Attraction and compromise effects

Other reference point effects can be introduced by adding irrelevant options among the choices people are deliberating over. In the *attraction effect*, people's choices between two objects are swayed by a third option that no one would choose but which makes one of the original two objects more attractive by comparison. For example, suppose one were deciding between two different apartments to rent. Apartment A is only 10 minutes by car to one's office, and so it presents a short commute, but the rent is $800 per month. Apartment B presents a 30-minute commute, but also a cheaper rent of $550 per month. Which one a person will choose depends on other inferior choices that might also be in the choice set. For example, suppose one also considered Apartment C, which is 12 minutes by car away from the office and which costs $900 to rent. By comparison, Apartment A now looks very good, and so is more likely to be chosen. However, if Apartment C instead presents a 35-minute commute and costs $600 per month, Apartment B now looks attractive by comparison and is more likely to be chosen. Note here that Apartment C is irrelevant in that it is never chosen, but it has its impact by how it shapes people's evaluations of the choices worth considering (Huber, Payne, & Puto, 1982; Simonson, 1989).

Inferior choice options also sway decisions via *compromise effects*, in which a third option makes a particular choice appear to be an appropriate compromise between competing needs. For example, suppose one was thirsty after eating a large bucket of popcorn at a movie, and so go back to the concession counter to buy some soda pop. But what size to buy? A larger-size drink will definitely quench any thirst, but can also be quite expensive and contain too many indulgent calories. A smaller-size soda is more virtuous, but may not be enough to quench one's thirst. Movie theaters often assist customers in solving this dilemma – in the theater's favor, of course – by offering a super-size set of drinks that are so big that very few people buy them. The worth of those drinks for the movie theater, however, is that they make moderately large drinks look like a defensible compromise between the small and super-large sizes, causing people to buy the medium drink over the small (Benartzi & Thaler, 2002; Dhar & Simonson, 2003; Simonson, 1989).

Anchoring

Other work has shown that considering a reference point, even an arbitrary one, influences judgments in systematic and significant ways. Once people consider a reference point, they appear to *anchor* their judgments on it, adjusting their response away from the reference point but still being biased by it. In an initial demonstration, Tversky and Kahneman (1974) asked participants to estimate the percentage of countries in the United Nations that came from Africa. But, before they gave their estimates, the researchers spun a lottery wheel in order to present participants with an initial anchor. For some participants, the lottery wheel stopped at the number 10, and they were asked if the percentage of countries from Africa was more or less than 10%. For the others, the lottery wheel stopped at 65, and participants were asked if the percentage was greater or lesser than 65%. These initial anchors biased participants' subsequent estimates. Those exposed to the 10 ultimately claimed, on average, that 25% of UN countries were from Africa; those exposed to the 65 thought, on average, that the actual percentage was 45%.

Hundreds of studies have demonstrated the power of anchors to distort people's judgments – and even how they behave in situations (for a review, see Chapman & Johnson, 2002). College students estimating how many word puzzles they can complete in a laboratory session provide higher estimates if they have first been exposed to high anchors rather than low anchors – and then persist longer as the puzzles become unsolvable (Cervone & Peake, 1986). How much people are willing to pay for such items as wine and chocolates can also be shaped by patently arbitrary anchors. In one demonstration, students were asked to write down the last two digits of their Social Security number – and then asked if they would pay that amount for a bottle of wine and Belgian chocolates, among other items. They then reported how much they were willing to pay for each item. Even though students knew they might have to buy any product at the price they wrote down, those whose Social Security numbers fell in the highest 20% were willing to pay more than three times for the wine and twice for the chocolates than those whose numbers fell in the lowest 20% (Ariely, Loewenstein, & Prelec, 2003).

Insight #3: People take into account the information handed to them, but not all information that is relevant

People often reach judgments easily by constructing a mental model in their head of the question

being posed, based on the information they have been handed. What people fail to appreciate is that building an adequate mental model often means considering information well beyond that which is being supplied. This leads to several problems in judgments and decisions.

Failures to unpack

For example, suppose that I asked someone the probability that an individual died of "natural causes" in the past year. The likelihood this someone will respond with is likely to be much smaller than the estimate of another person who is asked to consider the likelihood that an individual will die of some specific causes such as cancer, heart disease, infectious disease, and so on. A similar pattern holds, for example, if people are asked the chance someone died of homicide in the past year. People provide a lower estimate than they do if the experimenter instead lists all the possible perpetrators one could be a victim of, such as an acquaintance, a lover, or a stranger (Rottenstreich & Tversky, 1997; Tversky and Koehler, 1994). Similarly, doctors discount the likelihood of diagnoses that have not been explicitly specified (Redelmeier, Koehler, Liberman, & Tversky, 1995): i.e., when asked about some class of event, people tend to respond without first "unpacking" that event into its more concrete instantiations. However, if the experimenter does the unpacking for them, people are quite willing to concede that there is a larger possibility that the overall event will occur. They will not do it on their own accord – sticking to only the information given by the experimenter – but if the experimenter provides more guidance, they will easily follow it to a different answer.

Other biases in judgment arise because people fail to "unpack" events into their constituent components. People, for example, commonly underestimate the time they need to complete many projects, like their holiday shopping, their tax returns, or a school assignment (Buehler, Griffin, & MacDonald, 1997; Buehler, Griffin, & Ross, 1994, 2002). Indeed, college seniors, on average, tend to complete their senior theses a week after the date they swore previously would be their "worst case" scenario (Buehler et al., 1994). This overoptimism about getting things done is referred to as the *planning fallacy*, and arises even though people concede quite readily that they have rarely completed projects before some deadline in their past (Buehler et al., 1994).

The planning fallacy, in part, arises because people fail to "unpack" all the concrete steps they have to take in order to get some task done. Led explicitly to consider those steps, however, makes them much more accurate. As a demonstration of this, Kruger and Evans (2004) across many experiments, asked participants to estimate how long it would take them to complete their holiday shopping, prepare for a date, and cook a meal. Relative to a control condition, those asked first to list out all the concrete steps they would have to take to complete the task before providing an estimate were more pessimistic – and less biased – in their predictions. In a more real-world context, Jorgenson (2004) has found that software developers gave more accurate estimates of when they will complete projects if they use a "bottom up" strategy of listing all the concrete sub-tasks they must tackle for the project to be finished, relative to developers, who focus only on the project as a whole.

Partitioning

People also use the form of questions they are posed to suggest the number of possible outcomes they should consider for their answer – not realizing there are often many different ways to partition possibilities into distinct events. For example, if people are asked whether "Sunday will be hotter than any other day next week," people partition possible outcomes into *Sunday is the hottest* or *Some other day will be the hottest*. They then start from their reasoning from a 50% chance – one out of two – that Sunday will be the hottest. However, if asked instead whether "The hottest day of the week will be Sunday," people partition all possible events into seven, one for each day of the week. They will then start their reasoning from 14% – a one in seven chance. Not surprisingly, respondents presented the first frame of the question end up believing the chance that Sunday will be the hottest day to be greater than those presented the second frame – 30% versus 15%, respectively (Fox & Rottenstreich, 2003).

Such partitioning also influences not only judgments but also actual decisions. Respondents asked to distribute their charitable contributions among an international charity and four local ones tend to give 21% to the international one. However, if asked first to split their money between international and local charities first, and then are shown the collection of charities they can contribute to, they choose to donate 55% to the international choice (Fox, Ratner, & Lieb, 2005).

Focalism

If asked about some focal event, people base their answer on some consideration of that event without taking into account that other events matter, as well. *Focalism*, as it is termed, arises in two different guises.

One guise of focalism is that people fail to consider alternative comparison points. If students are asked, for example, if studying for three hours (relative to no studying) will have an impact on their exam grade, they state that studying will have a substantial impact. However, if asked whether not studying those three hours (relative to studying) would have an impact, they state that it will not have much impact (Dunning & Parpal, 1989). Coming to two different assessments depending on which act (studying vs not studying) is highlighted is nonsensical. Both questions are mirror images of one another, and thus the answer under one frame should be the same as it is under the other.

However, people give different answers because of focalism. They focus on the state of the world that is featured (studying vs not studying), and base their answer mostly on what will occur in that state of world, neglecting the other state. Thus, if asked about studying, they will generate reasons why studying will help, and see a large impact. However, if asked about not studying, they think of many compensatory reasons why they would achieve a good grade anyway, thus seeing less impact (Dunning & Madey, 1995).

A similar focalism effect is seen if poker players are asked whether introducing wild cards into a game would help their chances at winning. They typically think it does (Windshitl, Kruger, & Simms, 2003). At some level, this is true. With wild cards, a poker player has more ways to construct a highly imposing hand. But here is the rub: so does every other poker player, and to roughly an equal degree. In reality, each poker player's better chance of constructing an impressive hand is countered by the better chance his or her opponents also have of drawing a better hand – but, via focalism, people tend to neglect this insight. Thus, a poker player is in error in thinking he or she has a better chance of winning when wild cards are introduced.

Another guise of focalism involves disregarding the humdrum of background events that occur in everyday life – but which have an impact on some focal outcome. College students, for example, over-believe how their university's football team winning or losing will impact their mood and well-being (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). Part of this overestimation arises because people focus almost exclusively on the central event they are being asked about (i.e., the football team winning or losing) and fail to take into account that life will provide many other events that will also influence mood. For the college students, papers will be due, this week's episode of *Big Bang Theory* might be especially funny, or an old friend might call out of the blue. However, if the presence of all this background "noise" is explicitly pointed out to them, people recognize that the impact of any focal event will be diminished, and thus they avoid the overestimation they are prone toward otherwise.

Insight #4: Confirmatory information is privileged over disconfirmatory information

When striving to determine whether some conclusion is true, people are biased in their search for information. They tend to favor information that confirms that conclusion over information that would disconfirm or contradict it. For example, if someone asks me if people are likely to get taller over the next few centuries, I am likely to grope around for facts and theories that suggest that, yes, people will get taller. However, if someone asks me if people are likely to get shorter, my search for information and argument shifts in the opposite direction.

Confirmation bias

One way to describe this *confirmation bias* is that people look for positive matches between the conclusion they are considering and the information they search for (Wason, 1960). The conclusion can come from many different sources. People seem biased to consider, and then confirm, conclusions that they favor over those they dislike (Hoch, 1985; Pyszczynski & Greenberg, 1987; Tabor & Lodge, 2006). People tend to confirm conclusions that fit their expectations (e.g., the sun will rise in the east tomorrow) than those they consider less plausible (Nickerson, 1998). Even the way a question is posed will suggest a conclusion, and thus the direction in which people will seek out information (Snyder & Swann, 1978). For example, participants who were asked to judge whether they were happy with their social life tended to bring to mind positive social experiences, and ended up being much more bullish on their social life than those asked whether they were *un*happy with their social life (Kunda, Fong, Sanitioso, & Reber, 1993).

Confirmation bias can lead to perverse conclusions, with people coming to different decisions based on the way they frame the question in front of them. Suppose that the decision being considered is to which parent a child should be granted custody, with Parent A unremarkable in a remarkable number of ways, but Parent B being an individual with some real strengths and obvious weaknesses as a parent. When participants were asked in one study which parent should be

given custody of the child, they tended to go with Parent B. But when asked, instead, which parent should be denied custody, they chose to deny Parent B custody. Apparently, the strengths that suggested good parenting skills under the first frame of the question were ignored under the second frame in favor of those shortcomings and weakened Parent B's case (Shafir, 1983).

The timing when people encounter information can also influence what gets chosen. Across several studies, Russo and colleagues have discovered that people form tentative conclusions about the options they favor when making a choice. And once one option nudges ahead in favoritism, confirmatory bias seals its ultimate selection (Russo, Medvec, & Meloy, 1996; Russo, Meloy, & Medvec, 1998) – a tendency observed among professional auditors, for example, deciding which firm should receive an on-site review (Russo, Meloy, & Wilks, 2000). This tendency for one option to nose ahead in the horse race can also lead to perverse decisions. People will choose an inferior option over a superior one if the first piece of information they receive about the two options just happens to favor the inferior choice. Now ahead in the horse race, confirmation bias speeds its selection, even though it is not the optimal selection to make (Russo, Carlson, & Meloy, 2006).

"Cell A" bias

People show favoritism toward confirmatory information – as a positive match between evidence and outcome – in other ways. Suppose one were a scientist–doctor in the Middle Ages, and wanted to test the idea that bleeding sick people with leeches (in order to remove excess ill-humored blood) tended to improve their health. There is a simple way to test this idea – bleed ill people with leeches and see whether their health improves. Let us say that one does this and finds 10 instances in which patients improve after bloodletting. Is that positive or negative evidence about this treatment?

Readers might be tempted to say "yes" or "no," and others may instead have a sense that more information is needed. That all said, in everyday life, people often take these instances of positive–positive matches between evidence and outcome to decide that some notion is true. They have a flickering thought of a long-lost relative on one day, and the next day that relative calls – perhaps evidence of ESP? Or, they privately wish a curse on an annoying co-worker, only to have that co-worker suffer a severe car accident – tentative evidence of the power of our own thoughts?

Perhaps, but researchers in JDM would not suggest that counting up positive–positive matches provides enough evidence for any conclusions in the above cases (Beyth-Marom, 1982; Ward & Jenkins, 1965). Essentially, if one considers the presence and absence of an outcome (e.g., the patient improving or not), as well as the presence or absence of an intervention (e.g., bloodletting using leeches), one sees that there are four possible states of the world, depicted in Table 13.1. Our medieval doctor has looked at only those instances in which one of those states attained – those 10 times in which bloodletting was followed by patient improvement, the positive–positive cell, marked as "Cell A" in Table 13.1.

But determining whether bloodletting works clearly means examining the number of times two other states of the world arise – those states which produce a positive–negative instance. Let us imagine that the doctor has noticed the 5 times that he bloodlet the patient and the patient's health did not improve (Cell B), and also that there were 10 times in which the patient refused the bloodletting, but still improved anyway (Cell C). What does this mean for the medical technique? The comparison to Cell B causes bloodletting to look effective, but the comparison to Cell C makes it look less so. Which comparison provides the most accurate answer?

The answer, of course, is that neither does. To determine whether bloodletting actually improves the chances of patients regaining their health, one must look not only at Cells A, B, and C – but Cell D as well. This cell represents the instances in which negative–negative intervention to outcome matches occur, and it is a crucial cell in determining whether the data in Cell A is cause for hope or evidence of folly. Suppose that the doctor observes 20 Cell D instances in which he withholds bloodletting and the patient fails to improve. That would mean that of all 25 times bloodletting was withheld, the patient improved only 5 of those times – but improved 50% of the time when bloodletting was tried. That would be cause for hope. But if the doctor observed no Cell D instances, that means that patients always improve without bloodletting (5 out of 5 times), and that chance is reduced to 50% with bloodletting. That would be cause to seek new forms of treatment.

Table 13.1 Hypothetical counts of experiences with bloodletting and patient cures

	Patient cured	
Bloodletting	*Yes*	*No*
	Cell A	*Cell B*
Yes	10	5
	Cell C	Cell D
No	10	??

Insight #5: Events matter more when happening with certainty, now, or involve loss

Beyond certain types of information, specific types of events are also given more weight in decisions and actions. People are especially concerned with prospects that will happen with certainty than they are those that occur only at some level of probability. They are more concerned with events that will happen now or in the near future rather than in the more distant future. When weighing risky options, the losses associated with those options loom larger than potential gains.

The certainty effect

Consider two types of car insurance the gentle reader could buy. Insurance Policy A is expensive, but it pays for all expenses – car repair, medical, legal – if the policyholder gets into an accident. Insurance Policy B is only half the price, but it pays for all costs after an accident only 50% of the time on randomly selected days (however, in case it fails to pay, the cost of the insurance is refunded). Which one would the gentle reader prefer? If the reader is like participants in many JDM studies, he or she will likely be one of the 80% who prefer Policy A that pays with certainty (Kahneman & Tversky, 1979).

In effect, people give greater weight to outcomes that will take place with certainty. They favor certain gains over larger ones that are more uncertain. They strive to avoid certain losses, and often opt for gambles that present possibly larger losses (Kahneman & Tversky, 1979). We have already seen the impact of this preference in the earlier discussion about framing effects. Recall that when the choice of a medical plan was described in terms of saving lives, participants preferred the plan that would save 200 with certainty over one that presented only a one-third chance of saving 600. And when the plans were described in terms of lives lost, participants preferred the plan that presented a gruesome gamble – a two-third chance of losing all 600 lives – over the one that presented an inevitable loss of 200 lives (Kahneman & Tversky, 1984).

Future discounting

Like events that happen with certainty, events that happen in the here and now matter more to people than those that take place farther in the future. Given a choice between receiving $50 now versus $100 a year in the future, most people go for the $50. However, given a choice between receiving $50 five years from now versus $100 six years from now, most opt for the delayed $100. In a sense, these two decisions contradict each other. In the first case, people want the smaller award that is given a year earlier; in the second case, they reject that smaller award (Frederick, Loewenstein, & O'Donoghue, 2002; Green, Fry, & Meyerson, 1994).

However, such behavior is made explicable if one assumes that people discount future rewards and punishments, doing at first swiftly as events recede from the present to the near future, and then more slowly as events recede from the nearer future to a more distant time. In essence, people's discounting of future events follows a hyperbolic curve, as depicted in Figure 13.1 (Ainslie, 1992; Loewenstein & Prelec, 1992) – as well as in pigeons, who have been shown to peck a button that produces less food as long as that button produces the food right now (Ainslie & Herrnstein, 1981). In a word, both humans and pigeons are *present-biased*, in that events that occur close to the present weigh much more heavily on decision making than more temporally distant events.

Losses

Finally, losses loom larger than gains in people's decisions about risk. Ask a number of people if they want to bet $20 on a coin flip to win $40, and most will decline the offer. Many will decline the offer even if the amount to be won is $50 or $60 (Kahneman & Tversky, 1979). Essentially, the prospect of losing $20 is given greater weight than the potential prospect of gaining someone else's $20, and so the bet is not attractive enough for most people to take – even after inflating somewhat the amount that can be won. This tendency to weigh potential losses more than potential gains in decision making is referred to as *loss aversion*.

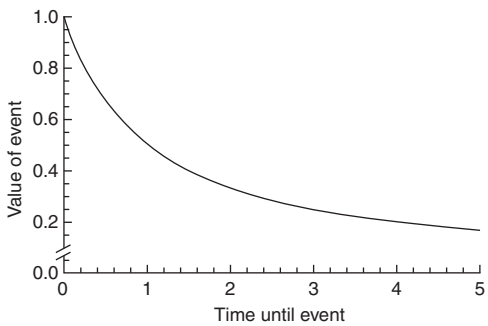

Figure 13.1 Hyperbolic discounting curve of the value of events taking place in the future.

Loss aversion is echoed in the quite similar phenomenon known as the endowment effect. People appear to value objects much more as soon as they own (i.e., are endowed with) them. For example, in one experiment, participants were handed at random either a mug or a pen and then asked if they wanted to exchange the object they had been given for the alternative. Economically, it should not matter which object, mug or pen, participants had been given – but psychologically it did. Most given a pen kept the pen; most given a mug refused to exchange it, indicating that ownership did cause people to inflate the value of what they owned (Kahneman, Knetsch, & Thaler, 1990).

CURRENT DEVELOPMENTS AND FUTURE TRENDS

Research on judgment and decision making is a robust enterprise, and the field seems poised to burst in a number of new directions with potentially important insights as it fleshes out a fuller model of decision making than the one contained in the rational actor model. If one scans the current JDM literature, one finds the following developments already in full bloom.

Experience sampling

Traditionally, JDM work has assigned the blame for judgmental errors on factors that are internal to the people who make them. The research has emphasized people's tendencies to adhere to mistaken heuristics or to neglect valuable information, such as base rate data. Newer work, however, suggests that many errors may instead be produced not by mistaken heuristics but by problems in the information that people tend to encounter. That is, people deal with information they receive just fine; the problem is that their experience with the world just furnishes them with incomplete and biased information.

Why people tend to disappoint

Consider the possibility that other people, over time, tend to disappoint. We meet a person who has exciting characteristics, but over time we find out that he or she really is just ordinary like the rest of us. Why do such initially exciting people tend to disappoint? More importantly, why do people tend not to do the reverse – look ordinary at the beginning and then amaze us as time goes on?

This tendency toward disappointment may come directly from the types of social interactions people tend to pursue versus the types they tend to avoid – and thus asymmetries in the experiences they have with other people. Meet an amazing person, and people pursue interactions with that person. Over time, they find that that first amazing experience they had with that person was a fluke. Or, they spend enough time to discover that they first encountered the very best of the person, and that the rest is simply more lackluster. However, if the person they encounter is initially lackluster, people do not pursue further social interaction, and thus never discover just how wonderful that other person might be in some other circumstances. Thus, the bias people have is ultimately to spend time and gather experience with people who will initially thrill but then disappoint. People less commonly put themselves in situations in which they could have the opposite experience (Norton, Frost, & Ariely, 2007).

Why people distrust others

The notion that our actions lead us to gain biased or incomplete feedback about the world (i.e., staying in social relationships that will ultimately disappoint) is referred to as an *experience sampling analysis* (Denrell, 2005; Smith & Collins, 2009). It suggests that there might be nothing wrong with how people think about social information once collected. Instead, the major problem is in the information they collect. As another example, consider the fact that people dramatically underestimate the likelihood that strangers will prove to be trustworthy. In studies involving an economic game in which people can choose to invest $5 in a stranger who might – but is not forced to – give $10 in return, people think that only roughly 45% of their peers will give money back when in fact 80% do (Fetchenhauer & Dunning, 2009). Why do people get their peers so wrong? Why are they so unduly cynical?

Fetchenhauer and Dunning (2010) explored an experience sampling explanation of this cynicism that pointed out that people receive biased feedback about the trustworthiness of others. Through their lives, people at times choose to trust another person. Sometimes that trust is honored, but sometimes it is violated – leading people to become more cynical. But what about those times in which people consider trusting but decide not to do it? Here, people receive no feedback. Because they withhold their trust, they never find out if the other person would have reciprocated that trust, pointing out a mistake that might lead them to become more optimistic about their peers.

In a test of this idea, Fetchenhauer and Dunning (2010) showed participants short videotapes of 56 other people. For each, participants were asked

to decide whether they would trust the other person in the $5/$10 economic game. Participants all started out overly cynical about their peers, underestimating the chance that each person would honor their trust. Some participants, however, were given feedback about the trustworthiness of others much like Fetchenhauer and Dunning (2010) presumed people received in real life: i.e., participants received feedback only after they made a decision to trust the other person. If they decided to withhold trust, no feedback was given. This type of feedback had no impact on the cynicism that participants expressed about their peers, and did not change the rate at which they trusted the other people they saw in the videotapes. Other participants, however, were given feedback, regardless of whether they decided to trust the other person. Now given complete information about the behavior of others, participants quickly learned how generous and kind their peers were. As a consequence, they were more likely to trust others, and ended up earning more money in the experiment.

A general negativity bias towards others

As can be seen in the two examples above, biases in experience sampling suggest a general negativity bias in impressions about human nature. People who initially leave a favorable impression get lots of chances to disprove that impression; those who initially leave an unfavorable impression never get a chance to correct that impression. An experience sampling account of human error, however, suggests clues about when these negativity biases are more likely to last versus dissolve away. What matters is whether people must continue interactions with people who left negative impressions. In those situations in which people must continue, those others are given ample opportunity to disprove negative impressions. And what types of people are given these opportunities? Family members and co-workers are two such types. In addition, people who fall in the same social circle – i.e., who are socially similar to the person forming the impression – are given the same chance. People with whom we interact with only infrequently, or people who fall into out-groups we rarely deal with or can avoid, are given less of a chance to disprove initial unfavorable impressions (Denrell, 2005). As such, experience sampling may stand as an important explanation for in-group/out-group biases in social cognition. People continue to interact with in-group members in ways that leave them over time with accurate impressions of those individuals, whereas out-group members never get the same opportunity to correct a negative impression that they may make.

Social norms

Beyond the payoffs and probabilities that economists focus on, social norms also have an impact on the decisions that people make (Cialdini, Kallgren, & Reno, 1991; Lindenberg, 2008). People are certainly attuned to whether others are following common social norms. Researchers in the Netherlands took a pristine alleyway and covered it in graffiti, despite the presence of a "no graffiti" sign. Doing so caused people leaving their bicycles in the alley to more frequently leave litter, as shown by what people did with flyers the authors had attached to their bicycle handlebars. Rates of littering the flyers went from 33% when there was no graffiti to 69% when there was. In a follow-up study, setting off firecrackers (known to be illegal) while people picked up their bicycles from a storage shed prompted littering rates to go from 52% to 80% (Keizer, Lindenberg, & Steg, 2008).

Social norms come in two varieties. First are *injunctive* social norms, which refer to dictums about how people should behave – the behaviors people can do that are either socially acceptable or unacceptable. Practically everyone knows that one should hold the door open for an elderly person, but should not steal from his or her wallet or purse. Some social norms are more diffuse and obscure, yet no less impactful on social behavior. For example, if an employee making $9 an hour leaves a business, it is perfectly acceptable for the business owner to offer $7 to any new employee who is hired to do the same work, if that is what other businesses are paying. However, if the business owner merely finds out that other businesses are paying the lower wage, it is not acceptable to unilaterally lower an employee's wage from $9 to $7 (Kahneman, Knetsch, & Thaler, 1986). That is, people respond to rules of fairness – but what is fair depends on many nuances of a social situation, such as whether a person is establishing new ground rules for a relationship or dealing with a relationship with ground rules already established.

Many injunctive norms influence judgments and decisions. Perhaps one of the strongest is reciprocation: If someone does something beneficial for you, you should return the favor. Cialdini and colleagues have demonstrated the power of this norm in an experiment involving inducing hotel guests to reuse their towels and linens, a decision that saves the hotel money but also saves the environment a little bit of wear and tear. What would induce guests to request that their towels not be washed and replaced every day? Reminding hotel guests of their social responsibility to the environment, or even promising to donate to environmental causes does not have much of an

impact of the choices hotel guests make. However, having the hotel announce that it had already donated to environmental causes prompted the "re-use" rate among hotel guests to rise from 31% to 45% (Goldstein, Griskevicius, & Cialdini, 2007). Presumably, hotel guests feel impelled to reciprocate the actions that the hotel has already taken on their behalf.

But beyond injunctive norms lay *descriptive* norms, norms not about what people should do but rather what they actually do. Descriptive norms influence behavior to a degree that is surprising. For example, in a follow-up study on hotel guests and their towel usage, telling guests (truthfully) that 75% of their fellow guests opted to re-use their towels caused the re-use rate to leap significantly – and leap even more if guests were informed about the re-use rate of past guests who had stayed in their specific hotel room (Goldstein et al., 2007).

Curiously, although people concede that injunctive norms powerfully shape their behavior, they seem to under-appreciate just how impactful descriptive norms are. In a study of energy conservation, the biggest predictor of Californian residents' behavior was their beliefs about what most people did, but residents thought this was the least impactful consideration in their behavior. Telling residents about other people's conversation efforts had the largest impact on their own efforts, among several other interventions, but residents reported they thought this would be the least impactful intervention (Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008).

Emotional dimensions of decision making

With its central focus on decision making that is economic in nature, JDM research has tended to stick closely to the types of variables that economists presume drive people's decisions, such as the benefit of possible outcomes and the likelihood that those outcomes can be attained. The process of decision making has been thought of as "cool" in nature. The individual sits back, analyzes all the possibilities in a dispassionate manner, and then calmly calculates what decision is in his or her best interest. To be sure, the calculation might be sloppy, and it might be wrong, but it is a cold calculation nonetheless.

That said, economics has often let "hotter" processes such as emotion or visceral states such as hunger or thirst enter the picture. After all, people tend to choose those options they believe will bring them *pleasure* while allowing them to avoid *pain.* However, newer work is increasingly showing that emotions may play an even greater role in judgment and decision making, influencing people's calculations – if there are calculations at all – in a wide variety of ways.

In all, emerging theories of emotion in decision making make four different claims:

1 People, in part, base their decisions on the emotions they anticipate they will feel in the future.
2 Emotions color the interpretation of the elements people consider in their decisions, even if those elements, on the face of it, have nothing to do with the emotion.
3 Emotion can "hijack" the decision-making process away from the typically cold and deliberate analysis that economists envision.
4 People may not perfectly understand how emotions influence their preferences and decisions, leading them to make decision-making errors not anticipated by a model of the decision maker as a cold calculator.

Emotions as inputs in the decision-making calculus

Imagine someone gave you a choice between two gambles. In the first, you have a 50% chance of winning $8; otherwise, you would lose $8. In the second gamble, you have a 20% chance of winning $32, and an 80% chance of losing $8. Assume that you chose the first gamble, but both gambles were played. You win the $8, but you find out that you would have won $32 if you had chosen the second gamble. What would you feel? If you are like most people, you would feel many things, but regret is likely to be in the picture (Mellers, Schwartz, Ho, & Ritov, 1997; Mellers, Schwartz, & Ritov, 1999).

Suppose instead you were given another choice between these two gambles. This time, you choose the second gamble, but you lose. Suppose you would have lost the first gamble, too. Do you feel worse about losing the second gamble than you would about losing the first, or better? People differ, but most people look at that $32 they could have won in the second gamble (vs the mere $8 in the first gamble) and feel worse. Specifically, they feel disappointment in missing out on such a large prize (Mellers, Schwartz, Ho, & Ritov, 1997; Mellers, Schwartz, & Ritov, 1999).

Mainstream work in economics has long suggested that such emotional calculations of regret and disappointment matter (Bell, 1982, 1985; Loomes & Sugden, 1982, 1986). People project themselves into all the possible end states of their decisions, anticipate how they would feel in each end state, and then base their decisions, in part, on what those emotions will be (for a review,

see Loewenstein, Weber, Hsee, & Welch, 2001). Empirical work in psychology confirms these economic suspicions (Mellers et al., 1997, 1999), in that the attractiveness of a risky bet depends, in part, on the potential disappointment or regret that it might produce. Once more, this empirical work suggests that level of surprise matters as well. To the extent that a positive event is unexpected, it is even more pleasurable. To the extent that a negative event is a shock, the more displeasurable it is. Such surprise effects have been observed, for example, in both laboratory choices between gambles and in real-world settings such as women taking pregnancy tests (Mellers & McGraw, 2001).

Emotions color the interpretation of decision inputs

Beyond being direct inputs into decisions, emotions have an impact via the way they alter people's interpretation of other decision inputs. Work on the *affect heuristic*, for example, has shown that good moods alter how people perceive potential benefits, with people perceiving possible benefits of their actions to be greater when they are in an overall positive mood, or attach a positive mood to a stimulus they are considering (Slovic, Finucane, Peters, & MacGregor, 2002). For example, participants in one study were asked to examine Chinese ideographs that, for a time, were associated with positive (e.g., beauty) or negative (e.g., disease) meanings. The true, and rather neutral, meanings for all the ideographs (e.g., desks) were then revealed to participants, and they were asked which ideographs they preferred. Participants showed a preference for those ideographs that had been originally colored by positive meaning over those that had been tainted with negative connotations (Sherman, Kim, & Zajonc, 1998).

On the flip side, feelings like sadness or disgust make people see the status quo as worse than they would otherwise, making them more likely to exchange it for an alternative. In a demonstration of the impact of such emotions, Lerner, Small, and Loewenstein (2004) exposed participants to one of three different film clips: one clip, designed to elicit sadness, focused on the tragic death of a boy's mentor; another clip, designed to elicit disgust, depicted a man using an unsanitary toilet; the last clip was neutral in nature, and showed a few minutes of swimming fish. Half of the participants in each film clip condition were given a set of highlighters and asked the price at which they would sell them back to the experimenter. The remaining participants were asked about the price they would pay to purchase the highlighters.

Participants who had viewed the neutral clip displayed the usual endowment effect: those owning highlighters thought their value was higher than those merely considering buying the highlighters. Indeed, potential sellers asked for a dollar more to sell the highlighters back to the experimenters than what potential buyers were willing to pay to acquire them. However, no such endowment effect arose in the disgust condition. Owners asked for a price that was roughly what buyers were willing to pay. Those in the sadness condition actually showed a *reverse* endowment effect. Those given an opportunity to sell named, on average, a price (roughly $3) that was far lower than buyers on average were willing to pay (roughly $4.50).

Fear and anger each also have a unique impact on decision making. Fear makes people see potential risks as more likely to occur, thus prompting them to be more cautious in their decision making. Anger has an opposite effect, making people more certain that any action they take will have an impact on the world (Lerner, Gonzalez, Small, & Fischhoff, 2003; Lerner & Keltner, 2001; Slovic et al., 2002). These impacts toward pessimism with fear and optimism with anger have been shown with national surveys. Those, for example, who expressed more anxiety about the terrorist attacks of September 11, 2001, also believed there was a higher likelihood of a future attack. Those who expressed more desire for vengeance foresaw a lower likelihood of attack. Once more, asking people to review the events of September 11, 2001, also had an impact on risk judgments. Those asked specifically to review what about those events made them fearful were more likely to think that future attacks were likely and to take precautionary steps to protect themselves. Those directed to think about what made them angry about the attacks did the opposite (Lerner et al., 2003).

Emotion as an alternative route to decisions

But emotion can influence economic decision making in an entirely different way, by causing people to abandon the cold and deliberative mental apparatus that economists assume in favor of one that is more intuitive, rapid, and emotional. That is, among psychologists, it is customary to talk about a "two systems" or "dual process" approach to decision making (Chaiken & Trope, 1999; Sloman, 1996). One such system or approach is the economist's system – a decision-making device that consciously, effortfully, and consciously analyzes and calculates its way to a decision based on rules and algorithms. This system is oft-times labeled "System 2" (Kahneman, 2003). The other system or approach is one that

quickly conjures a decision out of automatic associations, rapid assessments of similarity, quick rules of thumb, and intuitive leaps. Most of its operation can occur outside of consciousness, and its conduct can be infused with emotion. This more crude and primitive, but fast, system is often referred to as "System 1" (Kahneman, 2003).

Introducing emotion into a decision can enhance the influence of System 1 and negate the influence of System 2. Consider, for example, the following scenario. You are at the control station managing several trolley cars out on the tracks, and one specific trolley car is rapidly approaching five workmen standing on the tracks, unaware of the speeding danger bearing down on them. There is only one chance to save their lives. You can pull a lever at the station that will switch the trolley to a different track. There is, however, a single workman on this other track, and so he would be killed as the other lives are sparred.

Given this scenario, a good number of people reluctantly and regretfully decide to pull the lever and save the five lives at the expense of this other person's life. It is, as best one can tell, the right calculus, as given to us by System 2. However, let's change the scenario in one important detail. In this detail, to save the five lives of the workmen, your only chance is to push a stocky guy onto the tracks – killing him but blocking the trolley from the other five men. Here, very few people decide to push the guy, even though the calculus of losing one life to save five is the same. Why? It appears that people consider this decision to be more rife with emotion, and with that emotion is a discarding of any deliberative calculation of lives saved versus lost (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001).

Other experiments show that calculation flies out the window when vivid emotion or visceral states are introduced into a situation. Consider students who were asked whether they wanted to take a gamble to win some cookies – which they were not shown but which were described to them. In this situation, students paid a good deal of attention to the likelihood that they could win before they decided to gamble. However, when, instead, the experimenter brought freshly baked cookies into the lab room, surrounding participants with the sight and smell of the delectable treats, participants gambled to win them regardless of the risk (Ditto, Pizarro, Epstein, Jacobson, & MacDonald, 2006). Similarly, when weighing how much to gamble to win a $500 discount on their college tuition, participants give much more weight to the chances of winning than when the $500 discount applied to a more emotional event, such as a trip to Paris. On the negative side, when considering how much to pay to avoid a negative outcome, people pay close attention to odds of losing when considering an outcome that carried little emotion with it, such as losing $20, but much less to those odds when the event induces emotion, such as receiving an electric shock (Rottenstreich & Hsee, 2001).

That all said, a few interpretational caveats might be put in place. It is true that active emotion can change how people reach the decisions they reach, but even though it is customary to talk about those changes as moving from a System 2 approach to a System 1 approach, one should not assume that there are actually two physical systems in the brain. There may be, but to what extent there are separate "systems" is something for future research to determine. People may have within them different ways they can approach problems, but whether or not that reflects something about the physiological set-up of the human organism is unknown. One aspect of System 1 versus System 2 suggests that separating these approaches into different physical structures may be difficult, in that asking a handful of researchers to describe the two systems, and one will hear many varying descriptions of what the two systems supposedly are. Does System 1 always operate under awareness? Can it be controlled? Is System 2 devoid of all emotion? Different researchers come to different conclusions, suggesting also that the core difference between the two systems is easy to grasp, but the nuances of how they differ and how they interact with one another is entirely a different matter – leading one to be cautious about whether they should be considered different "systems" at all.

People misunderstand the role played by emotions

Finally, the introduction of emotion into the decision-making mix provides many more opportunities for people to make mistakes in their decisions, and recent work suggests that some of those mistakes arise because people do not anticipate the impact that emotions will have on their preferences and actions. For example, Van Boven and colleagues asked college students in a large lecture class whether they were willing for $5 to go up to the front of the class and dance to the funk classic *Super Freak* by Rick James. When the question was merely hypothetical, over a third of respondents stated that they were willing to volunteer. However, when the request was a real one, only 8% of respondents actually volunteered. When asked how much money would induce them to dance, respondents considering the request hypothetically thought that they would have to be paid, on average, $20. For those considering a real request, the average payment required was over $50 (Van Boven, Loewenstein, & Dunning, 2005;

for similar data, see Van Boven, Loewenstein, Welch, & Dunning, in press).

Van Boven, Loewenstein, and colleagues termed these different preferences to be the result of *empathy gaps*, proposing that people in an emotionally cold state had little insight into how much being placed in a hot state would change how they viewed the situation and what their preferences would be. The reverse was also true: people in hot states would have little access to how they would construe the situation if they were in a more emotionally cold state. In support of this analysis, Van Boven and colleagues found that inducing negative emotions in respondents, such as anxiety or anger, prompted respondents considering hypothetical requests to respond more like respondents considering real requests in the *Super Freak* scenario. They, too, were reluctant to perform potentially embarrassing behaviors in front of their peers. Reducing anxiety did the opposite, leading respondents to considering hypothetical choices to reach conclusions that differed significantly from those considering actual requests (Van Boven et al., in press).

These empathy gaps between people in their cold and hot emotional states may prompt other mistakes in behavior. To the extent that people fail to anticipate the irresistible pull of temptation, they may place themselves in tempting situations that lead to unwanted behavior. Nordgren and colleagues, in their studies of *restraint bias*, found that former smokers who believed they were the able to control their impulses were the ones most likely to place themselves in tempting situations, such as spending time with other smokers. In a follow-up, he found that it was exactly those who placed themselves in those situations who were the ones most likely to have resumed smoking (Nordgren, van Harreveld, & van der Pligt, 2009). That is, a vaulted sense in "cold" situations that one could control one's appetite for cigarettes ultimately led people to approach circumstances in which that appetite would "hot up," leading to a failure to control. Those with the biggest empathy gaps with themselves when it came to smoking were the one's least likely to succeed at quitting.

The presence of empathy gaps may also have implications for social policy. Middle-school teachers were less supportive of policies aimed at curbing bullying unless they were first asked to experience a bout of social pain themselves: namely, a "Cyberball" computer game in which two other players refused to throw a ball to the respondent. After experiencing such social exclusion, teachers were more willing to endorse treatment for bullied students and greater sanctions against those who did the bullying (Nordgren, Banas, & MacDonald, 2011).

Embodiment

Newer work also suggests that a person's physical body may play a direct role in influencing his or her judgments and decisions: i.e., the physical experience people have of the environment shapes how they make decisions, a stance known as *embodied cognition* (Barsalou, 2008; Lakoff & Johnson, 1999; Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005). Central to the notion of embodied cognition is the assertion that physical experiences influence judgments that would seem, at first blush, to be entirely abstract and conceptual. This impact of the physical body on more conceptual judgments occurs, it is argued, because people's representations of real-world problems are distributed across a number of sensorimotor systems in the brain – some that involve more representations of the body and of the physical world as well as more conceptual knowledge (Barsalou, 2008).

A growing set of examples argues for this physical–conceptual link. For example, when people are surveyed about the importance of various social issues, they rate those issues are more important if the clipboard that holds the questionnaire is heavier rather than lighter (Jostmann, Lakens, & Schubert, 2009). People think global warming is more likely if they are in a hot room, and that drought is more likely to occur if they are thirsty (Risen & Critcher, 2011). When weighing up to take a trip between two cities, participants see the trip as more effortful and costly if the trip involves going north (i.e., up) than the reverse trip going south (i.e., down) (Nelson & Simmons, 2009).

Neuroscientific underpinnings

But, finally, there is the body itself. Clearly, a person's decisions are supported by brain activity, and many scholars are collecting neuroscientific data to see how exactly the brain operates as people strive toward their judgments and decisions. Such data can take on many forms. Through fMRI (functional magnetic resonance imaging) techniques, researchers can examine which areas of the brain are active as people reach decisions. Via single neuron measurement, researchers can examine how active a single neuron is during decision making, although this technique is so invasive it usually is constrained to non-human animals. By measuring ERPs (event-related brain potentials), researchers can record the presence and time-course of neural events associated with decisions. By examining brain-damaged patients, scientists can assess the functions of decision making that are corrupted or disappear due to

specific brain injuries (Camerer, Loewenstein, & Prelec, 2005).

Although in their infancy, neuroscientific studies of decision making have already provided key insights. Damasio and colleagues have shown, for example, how a learning history within a certain context can leave *somatic markers*, emotional reactions to potential decisions that guide people's future decisions. In one study, non-patients and patients with damage to their ventromedial prefrontal cortex (VMPFC) played a gambling game in which they could take turns betting on one of two decks of cards. One deck provided for small wins but occasional small losses. The second deck was more risk/reward, and provided for big wins but occasionally massive losses. Immediately after such a loss with this second deck, all participants avoided it, but those with VMPFC damage more quickly returned to bet on that deck than did non-patients. Presumably, VMPFC damage inhibited patients' ability to encode emotional events, such as those massive losses, that feed into a more permanent feature of a somatic marker. Without it, participants were not steered away from the high-risk deck (Bechara, Damasio, Damasio, & Anderson, 1994; Bechara, Damasio, Tranel, & Damasio, 1997).

Neuroscientific data have also been found to validate the distinction, made above, between those decisions made under cold rational analysis (e.g., System 2) versus those that involve more quick emotional reactions (e.g., System 1). Consider the two versions of the trolley problem described above. In the colder version, in which one could save five lives by sacrificing one through the flip of a railroad switch, brain imaging studies have shown that areas associated with conscious and deliberate thinking, such as the parietal lobes and middle frontal gyrus, are more active. In the hotter version, in which one had to push someone onto the tracks to save the five workers, areas more associated with emotion were more active, such as the left and right angular gyrus, bilateral posterior cingulate gyrus, and medial frontal gyrus (Greene et al., 2001).

Neuroscientific data also help to explain why people give much more weight to present events than those events taking place further out in the future. According to McClure, Laibson, Loewenstein, and Cohen (2004), immediate events are processed by the limbic system, which is sensitive to emotional stimuli and which responds to rewards that are immediately available. Events in the future, however, are processed more by frontoparietal regions that tend to be engaged more in higher-order cognitive functioning. As such, when people make a choice between an immediate versus a delayed reward, the comparison is quite different (between a choice eliciting more vivid emotions than the other) than when people compare two delayed options (which involve a decision residing more in a cool cognitive environment).

Thus, in early extant examples, neuroscientific data has provided a level of explanation for a few economic phenomena, but it also provides a great promise for theoretical development that has yet to be realized. As mentioned earlier, it is the custom of economic theorists to take some variables, postulate some relationships among those variables, construct a model in which those variables are allowed to interact, and then see what results fall out from the model they have thus created. Usually, an implicit assumption of economic models is that there is only one "person" or "system" in the model. For example, in deciding whether to buy a car, there is only one person, one "decider," who is weighing the pros and cons of making a purchase.

Neuroscientific evidence suggests, however, that this may not be the best way to model decision making in many contexts. Instead of being unitary, the decision maker may instead be many decision makers that work in concert or in conflict. For intertemporal choice, for example, there may be one "decider" in the limbic system, and another decider contained in the frontoparietal region. For other choices, there may be emotional systems pulling for one decision and a more rational decider pulling for another. That is, economic modelers in the future may more accurately base their models more on the many distinct processes going on in the brain as people make decisions, and thus may find themselves modeling multiple brain processes (multiple deciders, if you will) more than some ideal picture of an individual lost in contemplation (Loewenstein, Rick, & Cohen, 2008).

Nudging

Finally, efforts are increasing to apply judgment and decision-making principles to real-world problems. One more visible variant of this has been the book *Nudge* by Richard Thaler and Cass Sunstein (2008; see also Thaler & Sunstein, 2003), which suggests that health and well-being can be enhanced by how the *choice architecture* of an individual is constructed – without taking away any of that individual's freedom to make the choice they want.

One simple way to craft the architecture of a choice is by selecting which decision option is a default. It is well-known, via the endowment effect, that people tend to stick with the default option, and so rates of choosing any particular

action can be increased by making it a default. Worried that people fail to save enough for retirement? Then, make saving for retirement at a certain rate a default decision that people have the freedom to opt out of (Benartzi & Thaler, 2004). Concerned that too few people donate their organs after their death? Then, make donating one's organs a default decision that they, of course, can reverse (Johnson & Goldstein, 2003).

Other judgment and decision-making principles, trivial to introduce into the decision-making process, can have profound implications for the decision maker. Poorer individuals, for example, have been shown to deposit their money in banks less often than those more affluent, even though the benefits for doing so can be as great, if not greater, for those less well-off. Poorer individuals will sign up for bank accounts if they attend workshops that explain the mechanics of doing so, but individuals will sign up at a greater rate if there is a bank representative on-site to immediately complete the paperwork – thus removing some of the incidental hurdles that prevent people from following through on decisions they favor (Bertrand, Mullainathan, & Shafir, 2006). In addition, making salient important parts of an individual's identity – such as reminding women how much they have invested in their family – causes people to sign up for bank accounts or financial literacy courses (Bertrand et al., 2006).

CONCLUSION

The key to any intellectual enterprise in psychology is to construct a theoretical model of the human being that mimics what real human beings do in their everyday lives. Work in JDM has followed that project in a specific way – by taking the model of the rational actor ascendant in economics and asking how that model could be altered or improved to better mimic decision making in everyday life.

In so doing, JDM work has provided at least five central insights about human decision making and how it is not necessarily rational:

- People follow crude and quick heuristics rather than exhaustive analysis to reach their decisions.
- References points in the environment sway judgments in decisive ways.
- People use the information given to them to make a decision, but often fail to recognize that there is other information they should consult as well.
- They lean heavily on confirmatory evidence and neglect disconfirming information.
- When thinking about possible outcomes, they give disproportionate weight to outcomes that happen with certainty, in the near future, or which feature loss.

In this chapter, I have discussed how these five insights arise again and again across many different life settings and across diverse types of tasks and decisions.

But, in discussing these insights, I hasten to acknowledge that this list is not sacred, and it is likely to be added to in the next few decades of JDM research. Many types of topics, such as the role of emotion in decision making, promise to reveal further ways in which the rational actor model should be revised to create a model that better resembles what humans look like, and how they act, throughout the course of their lives.

Therein lies a pleasant irony. As Herb Simon was fit to say, anything that gives us new knowledge gives us an opportunity to be more rational. Thus, in discovering and delineating the ways in which each of us individually fails to be that perfect rational actor, we give ourselves the best shot to achieve more rational outcomes in the future.

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NOTE

1 The specifics of Bayes' theorem and how the final answer of 92% is calculated goes beyond the scope of this chapter. However, there are many books that describe the basics of Bayes' theorem and its uses, such as Howsom and Urbach (2005).

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