Judgment and decision making is a highly interdisciplinary field that has flourished in recent years. This chapter was written with the objective of presenting an accessible treatment of modern judgment and decision making research, and stimulating ideas for decision research and application in the workplace. Special attention is given to topics that have historically been underrepresented in industrial and organizational psychology, including how people make risky decisions, when judgments and decisions are context-dependent, how feelings and emotions affect decisions, and how people make tradeoffs for tough choices. The chapter also presents a brief discussion of new methods for studying judgments and decision, and contrasts the behavioral decision making school with others schools such as naturalistic decision making and strategic decision making.

INTRODUCTION

I'm writing this manifesto to show that you can perform contrary actions at the same time, in one single, fresh breath. (Tristan Tzara, Dada Manifesto of 1918)

The last quarter of a century has witnessed an explosion of research on how people make decisions, and the study of Judgment and decision making (JDM) has emerged as a unique area of inquiry within psychology (Dawes, 1998). Modern JDM research has become well integrated into applied areas of psychology such as consumer, clinical, and forensic psychology, as well as other fields such as medicine, law, accounting, finance, and marketing. Industrial–organizational (I/O) psychology, however, has not been quick to embrace the findings from mainstream JDM. For example, even though one of the leading I/O psychology journals, Organizational Behavior and Human Decision Processes, is also one of the leading JDM journals, the founding editor's hopes for cross-fertilization have never been fully realized (Naylor, 1984; Weber, 1998). Naylor commented,

I have been of the philosophial position that both constituencies (if I could get either to read the papers of the other) might indeed benefit! They have much to say to each other. I have even hoped that some sort of osmotic process of information exchange might take place, even if there was no intention to be exposed by either party. (1984: 2)

Indeed, a look at the directories for the Society for Judgment and Decision Making and the Society for Industrial and Organizational Psychologists reveals very little overlap in the memberships of the two organizations. This is despite the fact that there are a large number of topics in I/O that have strong judgment and decision-making components. For instance, I/O has been preoccupied throughout its history with the question of how best to assess and select employees who will be successful in the
Judgment and Decision-Making Research

BACKGROUND

Many scholars of the history of decision-making research point to two papers published in the mid-1950s as marking the beginning of JDM as a field within psychology. The first was a review published in Psychological Bulletin by Edwards (1954) that exposed psychologists to important work on individual choice in economics and statistics (e.g., von Neumann & Morgenstern, 1944), showing its relevance to the psychology of choice. The second paper by Hammond (1955) was published in Psychological Review and showed how principles of perception (see Brunswick, 1956) were applicable to the study of judgment. Although one could point to other works at this time as being equally important and influential in the development of JDM (e.g., Luce & Raiffa, 1957; Mehl, 1954; Simon, 1955), the papers by Edwards (1954) and Hammond (1955) are notable for setting course two independent programs of research within JDM: choice and judgment.

Following the lead of Edwards (1954) and others working at the time on psychological perspectives on economic and statistical problems (see Thrall, Coombs & Davis, 1954), psychologists concerned with the choice program of research began studying how people make decisions involving uncertain probabilities. The gambling metaphor guided the thinking of these choice researchers, and behavior in the laboratory was compared to axioms of expected utility or models derived from psychophysics. Normative theories served as foils against which actual behavior could be compared. This provided choice researchers with a rich source of null hypotheses, and stimulated a lively program of research aimed at modeling decision-making behavior and cataloguing heuristics and biases (see Kahneman, 1991, for a review).

A second course was set by Hammond (1955) and others (e.g., Mehl, 1954) interested in how people transform information from the environment into judgments about the future. The gold standard for these researchers was not behavior prescribed by a normative theory, but the relationship between prediction and actual outcomes. Hammond (1955) showed how Brunswikian theory was relevant to the task of making inferences from incomplete and fallible cues in the environment. Whereas the gambling metaphor guided the thinking of choice researchers, the perception or "lens" metaphor guided thinking in the judgment arena. According to this view, people are intuitive statisticians forced to make probabilistic judgments based on their perceptions of how environmental cues relate to one another. Studying judgment, therefore, required observing behavior in its natural environment, or in a laboratory situation that faithfully represents relevant aspects of the natural environment (Hammond, 1996).
Although ambitious attempts have been made to integrate choice and judgment research (e.g., Hammond, McClelland & Mumpower, 1980; Slovic & Lichtenstein, 1971), investigators in the two areas worked in relative isolation from one another for many years. This isolation probably stemmed partly from differences in methods of research, and also from fundamental differences in assumptions about human rationality (Jungermann, 1983). Whereas choice researchers have generally focused on deviations from rationality, judgment researchers have focused more on successful adaptation to the environment. This division is much less apparent in recent years, however, as many decision researchers have moved freely back and forth between choice and judgment. Goldstein and Hogarth commented on this present state of JDM research:

JDM research is not 'paradigmatic.' There is no single, universally endorsed, overarching theoretical framework that researchers use to organize and guide their efforts. Rather, there are a number of schools of thought that identify different issues as interesting and deem different methods as appropriate. In addition, the situation is complicated by the fact that these schools overlap and interact. In fact, many researchers participate in several. (1997: 3)

In the following paragraphs, I review some of the major topics that have occupied JDM researchers in recent years. Along the way, I have also attempted to show how these topics relate to issues of concern for I/O psychologists. I begin by discussing one of the earliest concerns of JDM researchers – risky decision making.

**DECISION MAKING UNDER RISK**

Examining recent sales figures showing steady decreases in market share, the CEO of an historically dominant corporation believes the company has been relying on past successes for too long. Furthermore, he believes that the company needs to break out of old habits and start doing things differently, but wonders, ‘Why won’t people in this company take more risks?’

**Cognitive Perspectives**

Definitions of risk vary all the way from a focus on personal harm, found in medical and hazard research, to emphasis on possible opportunities, found in economic and business literatures. In JDM, the term ‘risk’ has often been used interchangeably with the term ‘uncertainty.’ Decision makers are said to be risk averse if they prefer a sure thing to an option whose outcome is uncertain (i.e., a risky option). Consider a newly hired sales employee, named Susan; Susan is fresh out of college and is faced with a choice between a sure salary of $75,000 per year or a commission having 80% chance of earning $100,000 per year. If she is like most new college graduates, she will likely choose the sure salary. Susan would be considered risk averse with this choice, however, because the uncertain commission has a higher expected value (.80 × $100,000 = $80,000) than the sure salary of $75,000.

It has long been known that people do not operate on pure expected value. In fact, as early as 1738, Bernoulli noted that people use subjective utilities in place of dollars for these kinds of decision. Bernoulli’s (1738/1954) hypothetical utility function proposes that subjective utilities are nonlinearly related to dollar amounts. For example, this decelerating utility function suggests that there is more psychological difference between $1000 and $2000 than between $10,000 and $11,000. This explains risk aversion such that, for instance, Susan will be willing to forgo the additional $25k offered with the commission in order to have the sure $75k salary. The incremental utility of going from $75k to $100k is no match for the excitement of going from $0 to $75k!

That people are generally risk averse is useful to know, but what may appear to present a problem for decision researchers is that people will occasionally exhibit risk-seeking behavior. People faced with options having negative consequences, for example, will often choose the riskiest option. Consider that irregularities were found in our friend Susan’s tax statements. Her tax advisor gave her a choice between paying $7000 in taxes now, or trying a risky (albeit legal) alternative having an 80% chance of losing $10,000 and 20% chance of losing $0. In this situation, Susan chooses the risky option. Note, however, that this option has a more negative expected value (.80 × $10,000 = $8000) than the sure option ($7000). Kahneman & Tversky (1979) would explain Susan’s transformation from cautiousness to risk seeking as resulting from a tendency to evaluate outcomes differently whether one is looking to avert losses or add to gains. Figure 16.1 shows the hypothetical utility function proposed by Kahneman and Tversky’s (1979) prospect theory.

Note that the upper right-hand (gain) quadrant is no different from the Bernoullian function, but that the lower-left (loss) quadrant reveals an accelerating utility function. People who have experienced gains are expected to view additional gains as having less incremental utility than people who have experienced losses. Thus, risk aversion is expected for gains, but risk seeking is expected for losses.

What does all of this have to do with decision making in organizations? For one, it suggests that organizational decision makers may take great risks to recoup real or perceived losses. Shefrin and Statman (1985) noted, for example, that financial
investors have a tendency to 'sell winners too early and ride losers too long.' In other words, when an investment has gained in value, investors often forgo future possible gains by getting out too quickly. Also, when an investment has fallen in value, investors will often hope for an upturn and risk further loss rather than accepting the certain loss (Moore, Kurtzberg, Fox & Bazerman, 1999). Returning to our example of the CEO who wonders why his employees avoid risk-taking behavior, prospect theory would suggest that employees of a company that has historically enjoyed a dominant market position would view risks from the perspective of a decision maker in the gain quadrant. Thus, these people would not be expected to view a change from the status quo as desirable.

The observed tendency to take unwarranted risks in order to recoup or avoid losses is related to the well-known sunk cost effect (Staw, Barsade & Koput, 1997). The sunk cost effect is a tendency to persist in an activity because of previously invested effort, time, or money. This violates the economically rational principle that people should ignore sunk costs and focus only on incremental costs when making future investment decisions. Staw (1981) argued that people fall prey to sunk costs in order to justify past decisions. Arkes (1996) suggested that another reason people fail to ignore sunk costs is that they overuse a 'don't waste' heuristic that serves them well in other life contexts. Arkes presented people with a vignette describing a company developing a material to be used in camping tents, only to find out that a competitor began marketing a superior product. People reported being willing to recommend abandoning the sunk cost in material development when they were told that the material could be sold to a roofer for $5000. People were not willing to recommend abandoning the project, however, when the material was to be sold as scrap for $5000. In the latter instance, people preferred to honor the sunk cost rather than engage in a 'wasteful' act.

Whereas the sunk cost effect represents a tendency to persist in a state of action, a similar effect has been found to operate in cases of inaction. This phenomenon, labeled 'inaction inertia' (Tykocinski, Pittman & Tuttle, 1995), occurs when individuals fail to act on an opportunity after foregoing a more attractive opportunity earlier. For example, imagine decision makers in a corporation, considering acquiring a company when its stock price is low, deciding instead to wait. The next time the opportunity arises the company's stock price is higher, but the acquisition still makes economic sense. The decision makers decide, however, not to make the purchase. A series of studies have demonstrated this kind of behavior in a number of contexts (Butler & Highhouse, 2000; Hutzel & Arkes, 1997; Tykocinski et al., 1995). This research suggests that people view these (second) opportunities as losses, and forgo them in order to avoid experiencing regret.

Considerations of Motivation and Emotion

One notable feature of research on sunk costs and inaction inertia is the attention to the needs and desires of decision makers faced with risk. Lopes (1987) criticized traditional decision theoretic approaches to risk taking as being bereft of motivational and emotional concerns. According to Lopes:

So it is with risky choice; after all the study and all the clever theorizing, we are left with a theory of risk taking that fails to mention risk. It also fails to consider (much less explain) the motivational and emotional factors that give risky choice its experiential texture: the hopes and fears that give us in due measure both purpose and pause. (1987: 263)

Drawing from work in achievement motivation, Lopes (1987) called for an understanding of risk taking that focuses on the approach/avoidance conflict inherent in risky decisions. She believed that risk taking could best be understood by considering the degree to which decision makers focus on the positive outcomes associated with risk (i.e., their hopes) versus the negative outcomes (i.e., their fears). Similar approaches to decision under risk have gained increasing attention in recent years (e.g., Dutton & Jackson, 1987; Higgins, 1997; Highhouse & Yüce, 1996; Kluger, Yaniv & Küblerger, 2000; March & Shapira, 1987, 1992), and have important implications for decision making in organizations. For example, March and Shapira (1987) interviewed executives about their approaches to risk taking for business decisions and found that the executives' decisions were influenced by the way their attention is focused on performance.
targets. According to the authors, 'For decision makers who are, or expect to be, below the performance target, the desire to reach the target focuses attention in a way that leads generally to risk taking. In this case, the opportunities for gain receive attention, rather than the dangers' (p. 1413). Highhouse and Yiice (1996) presented business students with a management in-basker exercise that emphasized either the opportunities or the threats associated with risk taking. The authors found significantly greater risk taking when the opportunities were emphasized than when the threats were emphasized, regardless of whether the cases involved recouping losses or adding to gains. These findings suggest that optimism and pessimism play important roles in the risk perception of organizational decision makers. Research is needed to investigate these effects on other risky decisions of interest to I/O psychologists, such as decision to leave an organization, or decision to engage in employee theft. Understanding the dispositions and organizational events that precipitate the viewing of risk taking as a threat versus an opportunity may allow us to better understand and predict risk-taking behavior.

INFORMATION PRESENTATION EFFECTS

The VP of human resources for a large corporation has instructed her staff to collect data on the impact of their training and staffing activities on organizational effectiveness. The staff collects various pieces of information intended to reflect intervention effect size (e.g., variance accounted for, bottom-line dollar estimates, subordinate perceptions, applicant pool growth, and user reactions). The VP wonders, 'How can I most effectively present this information to influence upper-management decision making?'

How information presentation influences decision making is a topic that has occupied social psychologists and human factors engineers for decades. More recently, a considerable body of research has emerged in JDM on information presentation effects on judgment and choice. One stream of research has concerned with the semantic framing of options, while another stream has focused on the display of information in decision-making contexts. These are discussed in turn.

Semantic Framing

The way in which information is worded has long been known to influence people's perceptions. For example, Harris (1973) found that people asked 'How short was the basketball player?' estimated lower heights than people asked 'How tall was the basketball player?' Similarly, Loftus (1975) found that people asked 'Do you get headaches frequently?' reported more headaches than people asked 'Do you get headaches occasionally?' More recently, researchers have identified numerous examples of how the wording of survey items can strongly impact self-reports of life satisfaction (Schwarz, 1999; Tversky & Griffin, 1991).

A special example of item-wording effects in decision making is research on framing effects. The term 'framing' has been most associated with tests of prospect theory by Tversky and Kahneman (1981). The framing of a dilemma as either a chance to recoup losses versus a chance to realize gains has been reliably demonstrated to influence people's risky choices (see Kühberger, 1998, and Levin, Schneider & Gaeth, 1998 for reviews). For example, when people are given a choice between a sure loss (e.g., eliminate 4000 of 6000 jobs) versus a small probability of no loss (e.g., 1/3 chance of keeping all 6000 jobs and 2/3 chance of eliminating all 6000), they tend to choose the long shot. However, when the same dilemma is framed as a choice between a sure partial gain (e.g., save 2000 jobs for sure) versus a small probability of a complete gain, people tend to opt for the conservative alternative (Bazerman, 1984; Zickar & Highhouse, 1998). This pattern of choice is predicted by prospect theory. In addition to business settings, risky-choice framing has been demonstrated in educational (Fagley & Miller, 1987), financial (Highhouse & Paese, 1996), and health (Tversky & Kahneman, 1981) contexts.

Levin et al. (1998) noted that much confusion has been caused by researchers indiscriminately using the term 'framing' to describe very different types of semantic manipulations. Consider, for example, a study by Dunegan (1993) finding that members of an international company gave lower evaluations to a project team when it was described as having a 40% failure rate than when it was described as having a 60% success rate. Clearly, risk taking was not an issue in this study, and prospect theory sheds little light on the processes underlying this semantic manipulation effect. Levin et al. (1998) referred to this type of manipulation as attribute framing. This type of framing occurs when a single attribute within a given context is the subject of the framing manipulation. Examples of attribute framing in I/O contexts have included a study showing that layoff survivors evaluate companies more favorably when information emphasizes the criteria used to keep rather than dismiss employees (Brocker, Wiesenfeld & Martin, 1995), and a study showing that decision makers evaluate a placement program more favorably when its success rate is emphasized than when its failure rate is emphasized (Davis & Bobko, 1986).

Another type of framing effect identified by Levin et al. (1998) is goal framing. Goal-framing studies are commonly used in the persuasion literature, and involve the semantic manipulation of
information to focus attention on obtaining a benefit or gain (positive frame) or on avoiding a harm or loss (negative frame). For example, Ganzach and Karshai (1995) found that prospective credit card customers were influenced more by a message that emphasized losses from not using a card than by a message that emphasized the gains from using one. Note that both conditions promoted the same behavior in this study (i.e., using the credit card). Thus, the question in goal-framing studies is, which frame has the most persuasive impact for achieving the same end result? Although goal-framing studies have been rare in I/O psychology, Hazer and Highhouse (1997) found that some managers were more influenced by utility analysis information when the costs from not implementing a selection program (vs. the gains from implementing a selection program) were emphasized. Certainly this work could be extended to other I/O arenas concerned with influence and persuasion, such as leadership or recruitment.

Information Display
Aside from the effects of option wording on choice, there has been a recent flurry of activity in JDM on the effects of various physical information displays on decision making. This research is concerned with the format (e.g., frequencies vs. percentages; by attribute vs. by dimension) in which attribute information is presented to decision makers charged with making judgements and choices (e.g., Gigerenzer & Hoffrage, 1995; Kirkpatrick & Epstein, 1992; Klaman & Brown, 1994; Schkade & Kleinmuntz, 1994; Wells, 1992). Payne, Bettman and Johnson (1992) recommended that information display be used proactively to facilitate normatively appropriate decision making. This was the theme behind Russo’s (1977) early work on consumer decision making in which he was able to induce supermarket customers to purchase products with lower prices by gathering unit price information and presenting it on a single list. Some recent work by Gigerenzer and Hoffrage (1995) suggested that people are capable of Bayesian reasoning when information is presented in frequency formats rather than probability statements. The authors asked a sample of experienced physicians to make inferences about the presence of a disease given a positive result for diagnostic tests. They found, for example, that physicians receiving mammography information in the probability format (e.g., probability of breast cancer is 1%) were much less likely to provide the estimate of cancer that is normatively appropriate than physicians receiving the information in the frequency format (e.g., 10 of every 1000 women have breast cancer).

Research along these lines may have important applications in I/O psychology. For instance, the practice of individual assessment usually involves having a third-party consultant collect and disseminate information about a job finalist. This information could include, for example, personality profiles, interview performance, and cognitive ability test results. How this information is reported back to the decision makers in the organization could have important effects on how the information is utilized by the client (see Highhouse, 1997). For example, Senter and Wedell (1999) presented information about apartments either by dimension (i.e., all apartments compared under one dimension) or by alternative (i.e., all dimensions compared under one apartment), and compared responses to a baseline of behavior under unconstrained search. Their results indicated that, when information was presented by dimension, the decision process was less effortful and closer to 'unconstrained' decisions than when information was presented by alternative. Additionally, Stone and Schkade (1991) found that presenting dimension values with words led to less compensatory processing than representing the values numerically, and Jarvenpaa (1990) found that information processing could be influenced by how graphic displays were organized (i.e., by dimension or by alternative). Research is needed to test the generalizability of these findings to organizational contexts, such as selection decision making or choosing among human-resource interventions.

Other lines of research on information display have focused on people’s intuitive preferences for certain expressions of probability. For example, people have been found to strongly prefer to draw a bean from a bowl containing 10 winning beans and 90 losing beans than from a bowl containing 1 winning bean and 9 losing beans, even though they understand that the objective probability of winning is equal for the two bowls (Kirkpatrick & Epstein, 1992). A similar phenomenon was observed by Windschitl and Wells (1998) when people were faced with problems such as a raffle with 10 tickets:

Situation A: You hold 3 tickets and seven other people each hold 1.
Situation B: You hold 3 tickets and one other person holds 7.

In this case, Situation A would be preferred because you hold more tickets than any individual competitor (3-1-1-1-1-1-1). In Situation B you hold fewer tickets than your competitor (3-7). People faced with problems like this were much more likely to choose options in which they held the greatest number of chances for favorable outcomes compared to their individual competitors (i.e., Situation A). Research such as this suggests that people sometimes allow their intuitive preferences to override coldly rational information. A classic example of this was found by Ellsberg
Imagine a person is given a choice between two lotteries, each worth $100. To win either lottery, the person must choose a color (red or black) and draw one chip. The person wins if the chip matches the chosen color:

Lottery 1: 50 Red chips + 50 Black chips = 100 chips
Lottery 2: ?? Red chips + ?? Black chips = 100 chips

Given such a choice, people overwhelmingly favor Lottery 1 and will even pay to play the less ambiguous lottery – although people are indifferent to choosing red versus black chips in Lottery 2. This preference has been termed ‘ambiguity aversion,’ and has been demonstrated in cases where a person is faced with two options that appear to be equally probable, but differ on a second-order probability dimension such as reliability, degree of certainty, or information known (see Camerer & Weber, 1992).

Einhorn and Hogarth (1985) postulated that decision makers have a general tendency to be cautious when faced with ambiguity because they overweight in their imaginations probabilities that are below some anchored value. Suppose, for example, a manager must decide between: (a) a quality management program that has been used extensively and has an error rate of 30%, and (b) a quality program that is new with an estimated error rate of 30%. According to Einhorn and Hogarth, decision makers will be more likely to imagine error rates above 30%, than below 30%, for the ambiguous program (option b). Thus, they prefer the quality management program with the known 30% error rate. The authors recognize, however, that decision makers can come to live with ambiguity when contemplating loss. For example, a manager presented with a training program having a known 60% error rate might prefer a completely unknown error rate for an experimental program. Also, Highhouse (1994) found that people can be induced to seek ambiguity simply by making explicit a range of estimates around an anchor (e.g., the unknown error rate is estimated to be between 20% and 40%). Here, the decision maker is forced to consider probabilities below 30% along with probabilities above 30%, even though ambiguity remains constant across both examples. Kuhn (1997) found that such ambiguity seeking can be strengthened by framing the probability information differently. For example, the quality program could be presented in terms of success rates (70%) rather than error rates (30%).

That people have preferences for (or aversions to) some expressions of probability information may help us to understand reactions to information in other organizational contexts. For example, managers may devalue job candidates with missing application information, even when this information is beyond the candidate’s control (see Highhouse & Hause, 1995). Job advertisements often use terms such as ‘competitive salary’ to indicate starting pay, but the ambiguity caused by this practice may lead to pessimistic inferences about starting pay (Yüce & Highhouse, 1998). Also, even though Cascio (1993) suggested that managerial decision makers will respond more favorably to utility analysis information presented in the form of confidence intervals, ambiguity research suggests that managers would prefer specific point estimates of utility. These competing predictions should be tested in the field.

**DECISION MAKER HUBRIS**

An organizational decision maker acquires a company that is on the verge of bankruptcy, believing that the company's problems were due to poor management. After successive years of investment without return, however, the decision maker decides to sell off the unfortunate acquisition. The organizational decision maker wonders 'What was I thinking?'

Whereas ambiguity aversion is an example of a tendency toward pessimism in decision making, there are far more examples of a tendency toward unwarranted optimism (Taylor & Brown, 1988; Thompson, Armstrong & Thomas, 1998; Weinstein, 1980). People have been found to generally hold unrealistically positive views of themselves and their performance (Ashford, 1989; Greenwald, 1980). New entrepreneurs wildly overestimate the chances that their enterprises will succeed (Cooper, Woo & Dunkelberg, 1988), strategic planners grossly underestimate project completion times (Kahneman & Lovallo, 1993), and people generally believe that they will be happier, more confident, more hardworking, and less lonely in the future than their peers (Perloff, 1987).

Although there have been a number of explanatory mechanisms offered for decision maker hubris, including egocentric thinking and self-gratification (Perloff, 1987; Weinstein, 1980), one possible reason is that people desire personal control over their environment, and optimism implies a sense of control (Dutton, 1993; Thompson et al., 1998). Classic research by Langer (1975) showed that people act as if they can control outcomes in situations that are purely random. For example, people infer that they have greater control if they personally throw dice than if someone else does it for them. March and Shapira (1987) observed that this illusion of control may be especially strong among managers in organizations. The authors found that managers reject the notion of uncontrollable risk, preferring to view risk as a challenge to be overcome by skill and perseverance. Hayward and Hambrick (1997) suggested that this tendency is stronger for CEOs because they often receive credit...
for success even when such success could be objectively attributed to other sources. Another form of decision maker hubris is temporal discounting. Research in behavioral decision making has suggested that decision makers consistently discount or devalue the significance of outcomes which are delayed, as opposed to outcomes that are close at hand (e.g., Kirby & Herrnstein, 1995; Loewenstein, 1988; Stevenson, 1986). Experimental evidence suggests that people discount both future losses and future gains. For example, Stevenson (1986) found that credit plans that demanded payment over a longer period of time were preferred over those that required payment over a shorter period of time, and Loewenstein (1988), found that people were indifferent between receiving $3000 today or receiving $4000 in one year. Recent evidence, however, suggests that losses lose their power to intimidate faster than gains lose their power to attract (Highhouse, Mohammed & Hoffman, in press; Shelley, 1994). Shelley found that a sample of MBA students became increasingly risk tolerant for lotteries as temporal distance of the outcomes increased, suggesting that decision makers choose to ignore the uncertainty inherent in opportunities but readily acknowledge the uncertainty inherent in threats. Such a tendency could dispose one to discount future negative events and engage in bold forecasting.

Certainly, human illusions of control and well-being may reflect a healthy adaptation to an uncertain world (Taylor & Brown, 1988). Unwarranted optimism, however, may keep people from taking appropriate measures toward defending against or preparing to cope with future negative events. An important agenda for I/O research, therefore, would seem to be to identify methods for tempering organizational hubris. Some recent research has suggested that people will abandon unrealistic optimism when self-relevant feedback is close at hand (Shepperd, Ouellette & Fernandez, 1996). In contrast, Byram (1997) found the tendency to underestimate task completion times (i.e., the planning fallacy) to be highly resistant to debiasing techniques.

THINKING AND DECIDING

An organization has two finalists for a plant manager position. The candidates have different strengths and weaknesses, but are overall quite comparable. The selection committee is split over which finalist should be made an offer, so it decides to continue searching. After the two finalists accept positions elsewhere, the committee wonders ‘Why did we let them get away?’

Although thinking and deciding seem to be complementary activities, as the above situation illustrates, thinking over decisions can have its costs as well as its benefits. Below, I discuss research that has examined the sometimes paradoxical relation between thinking and deciding.

Thinking Too Little

Much of the decision-making literature over the years has focused on problems encountered by decision makers as a result of thinking too little about the problem at hand. Much of this research has been conducted under the ‘heuristics and biases’ rubric (Kahneman, Slovic & Tversky, 1982). A heuristic is a kind of cognitive shortcut that allows the decision maker to expend a small amount of effort to make otherwise taxing decisions. For example, the representativeness heuristic involves making judgments about likelihood based on the degree to which a situation resembles other situations (‘this job candidate has a similar life history to mine and I am successful – so this person will also be successful’). Another heuristic, called availability, involves making estimates based on instances easily available in memory (‘all of my friends want bigger cars, so I would estimate that most of the population would too’). Whereas heuristics typically lead to accurate judgments, along with conservation of effort, they can lead to systematic decision errors (Kahneman & Tversky, 1996).

Another area in which unsystematic thinking has been found to lead to decision errors is research on problem solving and reasoning (see Evans, 1989). A common paradigm used in this research is Wason’s (1960) 2-4-6 task. Participants are presented with three numbers and asked to discover the rule behind the number string. In discovering the rule, however, the participant must generate three numbers, in response to which the experimenter indicates whether or not the participant-generated string is an instance of the rule. The participant is to stop the task when he or she believes that the rule has been discovered. Typically, the person generates exclusively confirmatory (rather than disconfirmatory) number sets and stops the task prematurely. A related phenomenon, termed ‘pseudodiagnosticity’ (Doherty, Mynatt, Tweney & Schiavo, 1979) involves failing to compare alternative hypotheses, instead comparing a single hypothesis against the evidence. For example, an organizational decision maker might observe that past managers hired without experience have been successful in the company. This could lead to the conclusion that experience is detrimental to successful leadership in that company. The problem with this reasoning is that lack of managerial experience is diagnostic of successful leadership only if the probability of successful leadership is higher for candidates with no experience than for candidates with managerial experience.
Heuristics and biases is one area of JDM that has received considerable interest from the I/O community. For example, Marlowe, Schneider and Nelson (1996) found evidence to suggest that use of the representativeness heuristic may be responsible for the infamous ‘glass ceiling’ between women and the executive suite. Also, evidence of confirmatory information search has been commonly found in the employment interview (see Dipboye, 1994). Hinsz, Kahnbach and Lorentz (1997) showed how the anchoring effect, a tendency to allow ostensibly irrelevant numerical anchors to bias judgments, could be used to establish challenging self-set goals. A line of research that is probably less familiar to I/O psychologists, however, is work showing that thinking too much can occasionally be harmful to decision making. This research is discussed next.

**Thinking Too Much**

Conventional wisdom suggests that good decisions are a product of careful and reasoned analysis. Indeed, decision researchers have commonly prescribed deliberate, objective reasoning for avoiding decision anomalies (e.g., Janis & Mann, 1977; Slovic, 1982). There is a growing body of literature, however, that suggests that thinking too hard about a judgment or choice can actually lead to poorer decision making (e.g., Dunning & Stern, 1994; Halberstadt & Levine, 1999; Shafir, Simonson & Tversky, 1993; Tetlock & Boettger, 1989; Wilson & Schooler, 1991). Wilson and Schooler (1991) noted that, just as automatic behavior can be disrupted when a person’s attention is directed toward it, so can a decision be disrupted when a person is asked to reflect about the reasons for it. For example, Wilson and Schooler asked supermarket shoppers in one condition to analyze their reasons for liking different brands of strawberry jam. Shoppers in the other condition were simply asked to give their preferences without analyzing them. The authors found that shoppers asked to analyze their reasons expressed preferences that corresponded less well to those of experts (i.e., taste testers at *Consumer Reports*) than shoppers who did not analyze their reasons. Similarly, Halberstadt and Levine (1999) found that basketball experts asked to consider reasons why each team in a basketball tournament would do well or do poorly predicted few winners and predicted margins of victory that differed more from actual margins than experts explicitly told not to analyze their reasons. Dunning and Stern (1994) found that mock witnesses, presented with perpetrators from a photo lineup, were more accurate when judgments resulted from automatic recognition (e.g., ‘his face just “popped out” at me’) than when judgments resulted from a process of elimination strategy. It seems that overanalyzing our decisions can be harmful when the process of thinking interferes with our ability to focus on relevant information (Tordesillas & Chaiken, 1999). A natural extension of this research to the I/O area would be to investigate the effects of thinking too much on job choice. People searching for reasons to choose a job may give undue importance to job features that are unique to one job, rather than to features shared by the other job options (see, e.g., Dhar & Sherman, 1996).

Thinking too much has also been found to exacerbate errors such as dilution and decoy effects (Simonson, 1989; Tetlock & Boettger, 1989). Dilution occurs when people fail to ignore plainly nondiagnostic information in their judgments about others. For example, Nisbett, Zukier and Lemley (1981) found that decision makers, charged with making predictions about a student’s grade point average (GPA), made strong predictions based on knowledge about the number of hours the student studied per week. However, these decision makers dramatically tempered their GPA predictions upon receiving information that was clearly nondiagnostic (e.g., the number of houseplants the student kept). Tetlock and Boettger (1989) found that dilution effects were magnified for people made accountable for their decisions, compared with people who did not have to justify their decisions. The authors argued that accountability causes decision makers to form more complex impressions of evidence, integrating irrelevant information into their cognitive representations of the problem.

Like the dilution effect, Simonson (1989) found that the decoy effect was even stronger for decision makers asked to justify their choices. Decoy effects occur when an inferior option (i.e., a decoy) influences preferences among superior options. Consider Table 16.1, from Highhouse (1996), using a simulated employee-selection scenario.

Participants in this study were presented with two comparable job finalists and one decoy candidate, along with work sample and promotability ratings. Participants receiving Decoy Candidate (a) along with the choice pair of Candidate 1 versus Candidate 2, preferred Candidate 1 by nearly a 3 to 1 ratio. In contrast, participants receiving Decoy Candidate (b) with the same choice pair preferred Candidate 2 in nearly the same proportion. Slaughter, Sinar and Highhouse (1999) found that this effect could occur even when decision makers are not given explicit numerical values for attributes, but are simply provided with visual performance information. Simonson suggested that the dominating relationship of the targeted option relative to the decoy provides accountable decision makers with a reason that can be used to justify their choices.

Thinking too much about reasons for choices has also been suggested as a reason for procrastination in decision making (e.g., Langer, 1994; Svenson, 1992; Tversky & Shafir, 1992). These authors have suggested that people faced with tough choices will
avoid decision making unless they are able to make psychologically similar options look different in their minds. According to Langer (1994), decision makers faced with psychologically similar alternatives will gather information to differentiate the options until a 'reasonable' argument can be made for one of the options over the other. A proposition of this and similar models (e.g., Soelberg, 1967; Svenson, 1992) is that, failing to sufficiently differentiate options, people will avoid choice and continue to search for more options. This suggests that search may continue indefinitely, even when the choice set contains satisfactory alternatives. Some empirical support for this idea was found by Tversky and Shafrir (1992). They found that, when decision makers are faced with choice options that have significant advantages and disadvantages, they are often compelled to delay choice and seek additional options. For example, imagine a job seeker considering two vacancies that differ on only two attributes:

<table>
<thead>
<tr>
<th>Advancement opportunities</th>
<th>Autonomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job A</td>
<td>High</td>
</tr>
<tr>
<td>Job B</td>
<td>Average</td>
</tr>
</tbody>
</table>

In this example, one job is high in advancement opportunities but average in autonomy, whereas the other job is average in advancement opportunities but high in autonomy. Faced with this choice the job seeker decides to continue looking. Imagine instead that Job B was only average on both attributes. Under these circumstances, the job seeker discontinues search and chooses Job A. Thus, the hypothetical job seeker was willing to make a choice in the second hierarchy but not the first, even though the overall quality of the choice set is higher in the first circumstance. Tversky and Shafrir (1992) found repeated examples of people choosing to delay choice when conflict is high (i.e., options are psychologically similar), but not when one option clearly dominated the other. Moreover, this pattern persisted even when the search for additional options carried the risk of losing the original options. Research such as this has obvious implications for decision making in selection contexts, as shown in the hypothetical example at the beginning of this section. Most notably, continuing to search for job candidates when suitable minority candidates are available can constitute prima facie evidence for disparate treatment (McDonnell Douglas Corp. v. Green, 1973).

FEELING AND DECIDING

A CEO directs: 'We want a leader who is people-oriented, but not too much of a people person. Our leader should also be bright, but intelligence is of no use if the person doesn't also have street smarts and an aggressive temperament. The only types who can be successful here are ones who had to fight their way to be where they are now.'

The CEO described above has developed a intuitive prototype of the effective leader for the organization. Such intuitions have strong face validity and are often jealously guarded by their champions. They can also, however, sometimes lead the decision maker astray. Below, I discuss research on judgment, prediction, and the role of intuition in decision making.

The tension between thinking too much and thinking too little, discussed in the previous section, seems to relate to a long-standing distinction in cognition between analytical and intuitive decisions. Analytical decisions are characterized by step-by-step logical processes, whereas intuitive decisions often produce choices without logically defensible methodical processes behind them. In his cognitive continuum theory, Hammond (1996) proposed that decision making is conducted on a continuum anchored by intuitive cognition at one pole and by analytical cognition at the other. Hammond argued that the most common mode of decision making is quasi-rationality, which includes elements of both intuition and analysis. Doherty and Kurz (1996) suggested that the process of selecting applicants for admission into graduate school is the classic example of Hammond’s quasi-rationality. This task involves considering a number of attributes, some of which are objectively determined (e.g., standardized test scores) and some of which must be subjectively assessed (e.g., letters of recommendation); the nature of the criterion is fuzzy, no organizing principle is inherent in the task, and outcome knowledge is unavailable. Doherty and Kurz suggested that, under such conditions, the decision maker will slide between analysis and intuition. For example, a decision maker may try to intuitively balance glowing and mediocre letters, but also may try to analytically compare test scores to established norms, eventually settling on a decision about the candidate’s suitability.

Many of the phenomena discussed in this chapter can be organized on Hammond’s (1996) cognitive continuum. For example, decoy effects can be viewed as failures in analytical reasoning, whereas dilution can be viewed as a problem with intuition. Hammond, however, emphasized the adaptive
quality of quasirationality. Hammond, Hamm, Grassia & Pearson (1987) found that highway engineers asked to make judgments about highway safety could, using intuition and analysis, make judgments that were more accurate than those produced using only formulas. Blattberg and Hoch (1990) compared formula-derived marketing judgments with managerial intuition and with a method that combines 50% formula and 50% intuition. The authors found that the combined model outperformed both the formula alone and intuition alone. Blattberg and Hoch suggested that combining intuition and statistical prediction works because, whereas formulas are immune to social pressures and biases, decision makers have the ability to recognize and interpret abnormal events that are diagnostic but too rare to incorporate into formulas (see also Whitecotton, Sanders & Norris, 1998). Ganzach, Kluger & Klajman (2000) similarly showed that expert 'fine-tuning' of mechanical combinations of employment interview scores resulted in more accurate predictions than when the mechanically combined scores were used alone.

Before we get too excited about the power of intuition, however, it is necessary to keep in mind that humans have a poor track record when it comes to making judgments from the gut (Meehl, 1986). Dawes (1994) provided many examples of instances in which 'expert' judgments have been made in light of statistical information only to result in poorer predictions than when the statistical information is used alone. Dawes cautioned that combining statistical and expert judgment only works when the expert judges have access to unique information not included in the statistical model, such as when some external condition prohibits the realization of the predicted outcome (commonly referred to as a 'broken-leg' cue).

One of the primary reasons that experts often underperform simple linear models is that people have a tendency to use configurational rules in making predictions (Camerer & Johnson, 1997). With configurational rules, like interaction effects in analysis of variance, the impact of one variable depends on the values of other variables. Configural rules are appealing because they typically offer compelling scenarios on which to base predictions. The compelling nature of them, however, is often what makes them less likely to occur. Consider, for example, the following two scenarios:

A. An all-out nuclear war between United States and Russia.
B. An all-out nuclear war between the United States and Russia in which neither country intends to use nuclear weapons, but both sides are drawn into the conflict by the actions of a country such as Iraq, Libya, Israel, or Pakistan.

At first glance, B appears to be more likely to occur than A. However, B (i.e., only one way in which the countries could be led into war) is a subset of A (i.e., any of a number of ways in which the countries could be led into war, including B).

Decision researchers have found that decision makers are consistently seduced by highly detailed scenarios like this, causing them to violate simple rules of logic (e.g., Yates & Carlson, 1986). Configural rules are so attractive to decision makers, therefore, because they offer detailed and seemingly plausible causal explanations. Consider, for example, the hypothetical CEO specifying the characteristics of a successful leader. This executive has constructed from experience a profile of attributes that cannot be captured with simple linear (compensatory) models. Such 'folk theories' of performance are likely to be highly resistant to change, given the delay between prediction and feedback and the tendency to engage in confirmatory information search. Moreover, even when configurational rules are found to be incorrect, they are often refined further rather than discarded or simplified (Camerer & Johnson, 1997). An important challenge for I/O psychologists is to understand how folk theories of performance develop (e.g., Borman, 1987), and how they can be modified to fit the existing scientific evidence (see e.g., Balzer, Doherty & O’Connor, 1989).

METHODS FOR STUDYING JUDGMENTS AND DECISIONS

Decision researchers have used a variety of techniques to make inferences about decision making. Techniques have differed by the degree to which the focus is on the content of decisions or the process of decision making. The simplest content approach has been to observe choice behavior in response to manipulations of the decision environment. Observation of preference reversals in response to attribute manipulations has taught us a great deal about how attribute importance is often unreliable, and how preferences are often constructed at the time of choice (Payne et al., 1992). Another approach to studying attribute importance is to model decisions by means of multiple linear regression analyses (Brunswick, 1956), although other approaches such as analysis of variance (Anderson, 1981) and nonlinear regression (Goldberg, 1971) have also been used. These 'policy capturing' approaches involve having people provide numerical evaluations of a large number of stimuli and fitting an algebraic model to the data. An implicit assumption common to both the preference-reversal and policy-capturing literatures is that people lack insight into the factors that determine their own decisions (cf. Reilly & Doherty, 1989).

Unlike content approaches that focus on the outcomes of decision processes, process-tracing
approaches focus on the steps leading to a decision (see Ford, Schmitt, Schechtman, Hufts & Doherty, 1989). The most common process-tracing approaches have been the use of verbal protocols and information boards. The verbal-protocol approach involves having decision makers think aloud as they work on a problem. These protocols are then transcribed and coded according to themes (e.g., Svenson, 1989). The information-board approach requires decision makers to uncover information arranged in an alternative-by-attribute matrix. Search patterns are then recorded and analyzed (e.g., Payne, 1976). The major finding from both process-tracing approaches has been that people use different strategies, depending on the stage of choice and the number of alternatives available. People generally use a noncompensatory approach early in the decision process, but switch to a compensatory approach when a smaller number of finalists survive initial screening (Ford et al., 1989).

Developments in computer-based applications have allowed researchers to gather more detailed information about search and decision behavior. For example, Wedell and Senter (1997) developed a computerized method for examining decision-maker looking behavior for attributes involved in a decision task. Participants are presented with unlabeled boxes on a computer screen; When the mouse enters the box, information is revealed and stays revealed until the mouse leaves the box. The method allows the researcher to record looking time and looking frequency for each piece of information. Another new development in process tracing is Levin and Jasper’s (1995) phased-narrowing procedure. The phased-narrowing approach requires decision makers to use a series of discrete steps to narrow alternatives to a final choice. Decision makers are instructed to transition from an ‘awareness set’ to a ‘consideration set’, and finally to a ‘choice set.’ The ultimate choice is made from this final choice set. One of the advantages of this technique is its ability to track changes in the relative impact of different attributes across successive decision stages. A computerized version is now available (Levori, Kuneke & Jasper, 2000).

Kahneman (1999) has recommended that more researchers take ‘bottom-up’ approaches to analyzing people’s reactions to information used in making judgments and decisions. Kahneman used the term ‘instant utility’ to refer to the strength of dispositions to continue or to interrupt experiences as they are occurring. Measuring instant utility requires techniques that assess on-line evaluations of information. This could take the form of verbal-protocol ratings, or continuous physical manipulation of a rating device. Such techniques are commonly used by political and consumer consultants to assess on-line reactions to speeches and commercials. For decisions that occur over a longer period of time, researchers could employ techniques such as diary keeping to examine how attribute evaluations evolve or change over extended periods. This would be particularly valuable for I/O psychologists interested in policy making, job search, or termination decisions.

CONCLUDING COMMENTS

My primary objective for this chapter was to provide an accessible treatment of modern JDM, and to show how this work is relevant to behavior in the workplace. The reference list has taken up a lot of the space in this chapter, but I am hoping that the chapter can serve as a rich reference source for I/O psychologists interested in workplace decision making. Had I more space to ramble on, I might have talked about research showing how negative information can have greater psychological impact than positive information of equal valence (Ito, Larsen, Smith & Cacioppo, 1998; Taylor, 1991). Certainly this work has relevance to research on the reactions of job candidates to realistic job previews (Brett & Judge, 1998), and the selling of issues to top management (Dutton & Ashford, 1993). I might also have discussed work showing how simple context effects influence satisfaction with compensation (Bazerman, Schroth, Shah, Diekmann & Tenbrunsel, 1994; Highhouse, Luong & Sarkar-Barney, 1999; Ordóñez, Connolly & Coughlan, 2000), or how work on omission/commitment (Spranca, Minsk & Baron, 1991) and outcome biases (Tan & Lipe, 1997; Weber, 1996) relates to judgments of ethical or moral behavior in the workplace.

Another topic that did not receive coverage in this chapter is dynamic decision making, including the emergence of naturalistic decision making (NDM) as an alternative to or ‘reinvention’ of traditional decision research (Azar, 1999; Klein, 1998; Orasanu & Connolly, 1993). NDM focuses on expert or tactical decision making found in occupations such as fire fighting or tank commandeering. Decision making is not seen as an event, but as a series of events that occur under pressure and must be responded to quickly. Some researchers in NDM reject the laboratory approach, and even controlled measurement, preferring instead to qualitatively study events as they unfold in the natural environment (e.g., Orasanu & Fischer, 1997). Many I/O psychologists are already familiar with NDM, as much of the research has been conducted with workteams (e.g., Cannon-Bowers & Salas, 1998; Hollenbeck et al., 1995; Zsambok, 1997).

Also ignored in this chapter was strategic decision making (SDM). SDM is exclusively concerned with decisions made in organizations (Schwenk, 1995; Shapira, 1997) and has remained relatively independent from JDM. This is evidenced by the fact that separate chapters were devoted to JDM
NOTES

1 I have consciously ignored other topics, such as negotiation, game theory, and group decision making, that are certainly relevant to organizations, but deserve a chapter of their own.

2 Whereas this semantic framing effect is similar to the ‘Susan’ example discussed in the section on risky choice, they are qualitatively different phenomena. The hypothetical Susan was risk averse for two objective gains, and risk seeking for two objective losses (i.e., a reflection effect). Risky-choice framing, however, involves taking the same objective outcomes and presenting them in terms of gains or losses (see Fagley, 1993, for a discussion of the difference between reflection effects and framing effects).

3 This example was an adaptation of an example presented by Keynes (1921) in which a patient must decide between a treatment with a known 50% success rate, and a treatment having physician-estimated 50% success rate.

4 This example was taken from Plous (1993).

REFERENCES


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