Judgment and Decision Making in the Workplace

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Abstract

The cross-fertilization of JDM and I-O has increased since the earlier version of this chapter, but there remains considerable opportunity for the areas to contribute to one another. Like the previous chapter, this chapter was written with the objective of presenting an accessible treatment of modern judgment and decision making research, and stimulating ideas for future 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 decisions under risk and uncertainty, how preferences are formed, and ways to improve decision outcomes. The chapter also presents a brief discussion of individual differences in decision making, new methods for studying judgments and decision, and present tools for improving real life decision making outcomes.

Keywords: judgment, decision making, risk, uncertainty, preferences, heuristics, biases, individual differences, choice architecture, emotions

Please cite as:

Zhang, D.C. & Highhouse, S. (in press) Judgment and Decision Making Research: Relevance to Industrial and Organizational Psychology. To appear in Anderson, Ones, Sinangil, & Viswesvaran (Eds.), *Handbook of Industrial, Work, and Organizational Psychology 2nd Edition*.

An earlier version of this chapter appeared in the 2001 *Handbook* (Highhouse, 2001). In it, one of us observed that judgment and decision making (JDM) research had “exploded” as a unique area of inquiry within psychology. Although one might discount the violent metaphor as excited hyperbole, it is notable that this was published *before* prominent JDM researcher Daniel Kahneman won the Nobel Prize, before new JDM journals were introduced by the Society for Judgment and Decision Making (i.e., *Judgment and Decision Making*) and the American Psychological Association (i.e., Decision), and before a number of scholars and writers across disciplines successfully introduced JDM to the lay public (Ariely, 2008, 2010; Gigerenzer, 2007; Gladwell, 2007; Heath & Heath, 2010, 2013; Iyengar, 2011; Kahneman, 2011; Tetlock, 2006; Thaler & Sunstein, 2008).

Although we can not use the term “explosion” to describe the impact of JDM on I-O since the earlier chapter was published, we have witnessed a minor flare-up. A number of prominent I-O researchers have emphatically encouraged more JDM research in the field (Dalal, Bonaccio, Highhouse, Ilgen, Mohammed & Slaughter, 2010), a SIOP Frontiers Series book on JDM was published in 2013 (i.e., *Judgment and Decision Making at Work*), and the number of symposia and poster presentations on JDM topics in the SIOP Conference program has grown exponentially in the last decade or so. Although I-O had historically relied on the idea of the “rational man” to develop utility and expectancy maximization models of behavior such as expectancy theory (Vroom, 1964) and image theory (Beach & Mitchell, 1990), a new breed of I-O scholars have happily embraced the heuristics and biases approach in JDM to explore behaviors that deviate from standard normative models of rationality. This has proven to be fruitful in areas such as personnel selection (e.g. Kuncel, Klieger, Connelly & Ones, 2013; Slaughter, 2007), performance evaluation (Reb & Greguras, 2010; Wong & Kwong, 2005), compensation (Kuhn & Yockey, 2003), workplace justice (e.g. Hausknecht, Sturman & Roberson, 2011) team decision making (Bonaccio & Dalal, 2006), and many more (Highhouse, Dalal & Salas, 2013). Indeed, even JDM researchers have gotten into the act (e.g. Ariely, Kamenica & Prelec, 2008; Dana, Dawes & Peterson, 2013; Ordóñez, Schweitzer, Galinsky & Bazerman, 2009). It seems the workplace is a fruitful place to study judgment and decision making!

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; Meehl, 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. Meehl, 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 (see Kuncel et al., 2013, for an application of lens theory to personnel selection). 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)

Table 1 presents a timeline of important milestones in the history of judgment and decision making.

Table 1 to appear here

Compared with I-O psychology, JDM is relatively young. With the normative model as a standard against which decision making behavior can be compared, the field has enjoyed an enormously fruitful youth. Researchers have drawn from economics, psychophysics, social psychology, and elsewhere to identify a wealth of shortcomings associated with everyday judgment and decision making.

# Themes of JDM research

Two themes have guided much of the research and theoretical frameworks in modern JDM. The first is the *normative* versus *descriptive* distinction; and the second is the *automatic* versus *deliberative* distinction.

*Normative vs. Descriptive*

The normative versus descriptive distinction is as old as the field itself. Normative models describe how rational decisions ought to be made. The normative model of rationality derives from economic models. As such, the normative perspective focuses on exploring when and how people deviate from that standard. On the other hand, descriptive theories are concerned with creating models that describe how people actually make decisions (Bell, Raiffa & Tversky, 1988). The normative and descriptive distinction has led to a large body of research demonstrating how people deviate from normative models such as the subjective expected utility (SEU). Scholars developed descriptive theories such as prospect theory, decision field theory, and support theory to model how people’s actual decisions deviate from the normative standard of rationality (Busemeyer & Townsend, 1993; Kahneman & Tversky, 1979; Tversky & Koehler, 1994).

*Automatic versus Deliberative*

A second theme that has emerged in the field is the automatic versus deliberate systems of decision making (Kahneman, 2011; Stanovich, 1999). The dichotomy between automatic and deliberate psychological systems has a long history in psychology. This framework can be found in perception, reasoning, and learning (James, 1890/1950; Johnson-Laird, 1983; Sloman, 1996), as well as attitudes and persuasion (Chaiken, 1987; Petty & Caccioppo, 1986). This dual-system approach proposes that decisions can either be quick, automatic, and effortless (System 1); or they can be slow, deliberate, and effortful (System 2) (Kahneman, 2002, 2011). This dichotomy has led to a large body of research examining the different decision processes and outcomes of these two systems.

In the following pages, we review some of the major topics that have occupied JDM researchers in recent years and along the way, we will discuss how these topics relate to the workplace. We encourage readers to ask these questions: 1) what is the proper way to make a decision in the workplace and how do people actually make these decisions? and 2) when should decision makers be decisive (System 1) and when should they be more purposeful (System 2)?

# Heuristics and biases

Herbert Simon (1955) first proposed the theory of bounded rationality in response to the fallibility of human reasoning. He challenged the conventional normative models that theorized rational choice based on an exhaustive analysis of all the options. Simon suggested that decisions makers, on the contrary, do not typically optimize their decisions; instead, they will often seek a satisfactory choice because they are bounded by their cognitive capacities. The term “satisfice” was coined by Simon to describe a decision-making strategy that strives for adequacy, rather than optimality. People generally satisfice, according to Simon (1955), “because they have not the wits to maximize” (p. 62). Simon’s ideas about bounded rationality had a profound impact on how psychologists think about decisions to this day (Katsikpoulos & Lan, 2011).

The heuristics and biases research program is one of the most influential to have come out of the bounded rationality paradigm (Kahneman, Slovic & Tversky, 1982). A heuristic is a mental shortcut that is intended to make decisions under limited information and cognitive resources (Gilovich, Griffin & Kahneman, 2002). Heuristics are used to make decisions quickly and effortlessly. They are, however, error-prone and can lead to various systematic errors known as biases. Heuristics fall in the camp of System 1 reasoning, as they require little cognitive effort and thought. For example, the *representativeness* heuristic involves making judgments about likelihood based on the degree to which a situation resembles other situations (“all the best job candidates in the past had a great handshake, therefore a great handshake must be an indicator of a great job candidate”). Another heuristic, called *availability*, involves making estimates based on instances easily available in memory (“the employment prospect must be poor because a lot of my close friends are still unemployed”). Finally, *anchoring and adjustment*, is used when making various predictions about uncertain values. For example, when asked to predict the mean salary of the employees, one would first have to identify a plausible or comparable value as an anchor, and then adjust upward or downward from that anchor based on other relevant information (“My friend Tim makes $40,000, and he is an entry-level employee, so the mean salary of all employees must be a little higher than $40,000).

Although heuristic makes judgments easy, they are prone to errors of probability and logic. Representativeness can be problematic when individuals fail to account for base rate information. This error is commonly known as base rate neglect (Bar-Hillel, 1980). For example, while successful job candidates in the past may have had great handshakes, it does not necessarily mean that a handshake is diagnostic of a great candidate. The failure to account for this information when making the judgment is explained by the availability heuristic. The availability heuristic takes advantage of memories and experiences that are emotionally salient. In the previous example, information about a poor candidate who had a great handshake is difficult to retrieve; therefore, it is ignored in the judgment process. Anchoring effects can arbitrarily influence decisions. Simonson and Drolet (2004) asked a group of students to think of a random numerical anchor: their social security number. Next, the researchers asked the students to indicate their willingness to pay (WTP) on various items presented. Results showed the students’ WTP for the item was significantly related to their social security number such that individuals with a higher SSN indicated a higher WTP than individuals with a lower SSN.

Heuristics and biases is one area of JDM that has received modest interest from the I-O community. For example, Marlowe, Schneider and Nelson (1996) suggest the use of representativeness heuristic may be responsible for the infamous ‘glass ceiling’ between women and the executive suite. Hinsz, Kalnbach and Lorentz (1997) showed how the anchoring effect could be used to establish challenging self-set goals. Thorsteinson, Breier, Atwell, Hamilton and Privette (2008) found when irrelevant anchors were added to a rating scale, it had a significant impact on the final performance ratings. Heuristics are necessary to make decisions quickly and efficiently. However, as demonstrated here, they are prone to errors and I-O psychologists need to be aware of these errors in work place decisions.

# Risk and uncertainty

# *Cognitive Perspectives*

Definitions of risk may vary from a focus on personal harm, found in medical and hazard research, to emphasis on possible opportunities, found in economic and business literatures. 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 x $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 suggested people use subjective utilities in place of dollars for these kinds of decisions. Bernoulli’s (1738, 1954) hypothetical utility function proposes that subjective utilities are nonlinearly related to dollar amounts. For example, this decelerating utility function suggests there is more psychological difference between $1,000 and $2,000 than between $10,000 and $11,000. This explains risk aversion such that Susan will be willing to forego 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!

 Despite the general tendency to be risk averse, there are situational factors that promote the opposite. 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* $7,000 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 x -$10,000 = -$8,000) than the sure option (- $7,000). Kahneman and 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 1 shows the hypothetical utility function proposed by Kahneman and Tversky’s (1979) prospect theory.

Figure 1, To Appear Here

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 forego 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).

*Sunk Cost Effect*

The observed tendency to take unwarranted risks in order to recoup or avoid losses is related to the well-known sunk cost effect (Staw, 1997). The sunk cost effect is a tendency to persist in an activity because of previously invested effort, time, or money. This tendency 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. For example, 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 recommended abandoning the sunk cost in material development when told the material could be sold to a roofer for $5,000 but not when the material was to be sold as scrap for the same price. In the latter instance, people preferred to honor the sunk cost rather than engage in a ‘wasteful’ act. The sunk cost fallacy also leads to escalation of commitment, which is associated with the colloquialism: “throwing good money after bad.” Slaughter and Greguras (2009), for example, found that judges who were initially involved in hiring someone were more inclined to later give a positive performance evaluation to that person.

*Endowment Effect*

Another product of loss aversion is the endowment effect. The endowment effect describes one’s tendency to view objects as more valuable when it is in their possession (Kahneman, Knetch & Thaler, 1991; Brenner, Rottenstreich, Sood & Bilgin, 2007). The reference point in the value function refers to the current state of affairs, which is what you already own (Figure 1). As circumstances change, the reference point of the value function changes as well. One can invoke the endowment effect in predicting how people react to different performance-contingent bonuses. For example, a $5000 bonus for meeting a quota is different from taking away $5000 for NOT meeting the quota. When the $5000 is already in possession of the employee, taking that away will cause a lot of distress because taking away something from one’s possession leads to a loss while adding asset of the same value ($5000) is considered a gain from the referent point.

The endowment effect is a powerful phenomenon that has real life consequences. When a company is designing a performance-based bonus system for their salesperson, it could take advantage of principles of loss-aversion to affect behavior. Instead of giving the salesperson cash bonuses in exchange for units sold, the company can set up a scenario of loss aversion where a bonus is paid up front, and for every unsold unit, the company would then deduct the bonus from the employee. The act of taking money away from an employee after it is already in their possession triggers a strong sense of loss aversion. Therefore, the salesperson may be more motivated to prevent any loss of their current salary due to the endowment effect. However, in practice, one must also consider the reactions of the employees. The pain of loss can work both ways. While taking money away can be highly motivating for performance, it may also lead to negative employee reactions and lower job satisfaction (Meza & Webb, 2007).

*Dimensions of Uncertainty*

Researchers in JDM have long been interested in different modes of uncertainty (Fox & Ulkumen, 2011; Kahneman & Tversky, 1982). Consider this recent statement by President of the United States:

*“*As outstanding a job as our intelligence team did…at the end of the day, this was still a 55/45 situation…We could not say definitively that bin Laden was there*.”*

*-* Barrack Obama(2011)

President Obama’s judgment of the situation in capturing Osama bin Laden involved two types of uncertainties. The first is whether or not bin Laden was in the compound. This type of uncertainty is associated with the lack of information and intelligence regarding the whereabouts of bin Laden. The second type of uncertainty is associated with the stochastic nature of our world. There is an unpredictable, random process that influences whether or not the extraction of bin Laden would be successful if it was carried out multiple times1.

 Uncertainty is prevalent in many work-related judgments. Personnel selection is still an issue laden with uncertainty and unpredictability. Highhouse (2008) argued that the business of personnel selection involves considerable irreducible complexity and there is a limit to what we can predict about a person at the time of hire. The combination of our best predictors can only predict up to about 30% of the variance in job performance (Schmidt & Hunter, 1998). The uncertainty in personnel selection is whether an incumbent will perform effectively on the job in the future. Similar to the uncertainty in the success of the mission to capture bin Laden, uncertainty in future job performance can also take on two forms. The first type of uncertainty is the insider’s perspective of uncertainty. For example, the hiring manager may have some internal judgment that represents his personal belief based on his knowledge and information. The information and expertise – be it expert intuition or score on a cognitive ability test – allows the manager to reduce some uncertainty about the future prospect of the applicant. The uncertainty regarding the future performance of his applicant reflects the hiring manager’s lack of confidence. This type of uncertainty is called *epistemic uncertainty*. The confidence judgment may be capped by the amount of knowledge and experience the manager has, but it is also capped by the amount of variance that is knowable. The unknowable variance is the second type of uncertainty. This uncertainty is related to the stochastic nature of the world, and in this instance, human performance. If the hiring manager were to hire 50 employees on the job, all of whom share the same attributes; some of these employees will become successful while some others will fail by random chance. This is the type of uncertainty involved in predicting the outcome of a coin toss; outcomes can be random under the same starting conditions. This type of uncertainty is called *aleatory uncertainty*.

 The two variants of uncertainty are associated with different mental processes. For instance, Howell and Brunett (1978) found that people perceive that they have some control when the events are internal, but they have no control when they are external. Different attribution of the source of uncertainty can also lead to different strategies to reduce that uncertainty. For example, epistemic uncertainty can be reduced by increasing expertise and search for more information, while aleatory uncertainty can be managed by determining the relative frequencies of the events (Fox & Ulkumen, 2011). Our natural language has different ways of describing the two types of uncertainty. Epistemic uncertainty is often expressed by describing one’s confidence (e.g. “I’m 50% sure”); while aleatory uncertainty is expressed with phrases referring to some element of randomness (e.g. “There is a 50% chance”) (Hacking 1975). Traditionally, I-O psychologists have viewed uncertainty as a unitary statistical concept. However, research in JDM has demonstrated that uncertainty takes on different forms and can lead to different mental processes. And as a result, can lead to different judgments of uncertainty, probability, and confidence.

preferences

The study of preferences is central to human judgments and decisions. Hiring managers must decide whether to hire Candidate A or Candidate B. Job candidates must decide whether to accept a job with lower pay and short commute or a job with higher pay but a long commute. The normative model of rationality assumes that preferences follow a set of probabilistic and logical axioms. These axioms derive from traditional economics and are still used to model consumer preferences and economic behaviors (Richter, 1966). The first axiom, invariance, states that individual preferences are stable and not depend on the description of the options (descriptive invariance) or the method of elicitation (procedure invariance). This assumption leads to a series of logical deductions about human preference. For example, if John is preferred over Sue, and Sue is preferred over Dan, then John is necessarily preferred over Dan. This order of preference should hold in all contexts and scenarios such that no method describing the scenario should change one’s order of preferences. Although this may seem trivial, research in preferences has shown that this normative law of preference does not hold up under scrutiny. Rather than assuming a stable preference, a large body of research has shown that preferences are actually constructed at the time of eliciting that preference (Slovic 1995).

# *Context Effects*

If John is preferred over Sue, and Sue is preferred over Dan, then one should expect that the presence of Dan to have no bearing on the preference toward John or Sue. In other words, since Dan is the least preferred options out of the three, whether or not it is a viable option should not affect people’s preference toward Dan or Sue. Violation of this basic principle would indicate a major flaw in human rationality because people’s preferences are being affected by irrelevant options. One of the most robust context effects in JDM is the (non-dominating) decoy effect.

The decoy effect occurs when an inferior option makes one of the similar alternatives appear more attractive (Dhar & Simonson, 2003; Mishra, Umesh, Stem & Donald, 1993). For example, John and Sue may both be highly qualified but differ on some traits. John is highly motivated but lacks the quantitative abilities; Sue is high in her quantitative abilities but does not have the same level of motivation as John. When these two candidates are compared side by side, the preference for the two may be similar. However, if we introduce a third option: Tom, who is similar to Sue on quantitative ability but slightly lower in motivation; the attractiveness of Sue is raised because the presence of a similar but inferior option (Tom) makes Sue appear more attractive. Attraction has also been called the decoy effect, where the inferior option acts as the “decoy” to make another similar option appear better. This effect has been explored extensively in I-O psychology (see Slaughter & Kausel, 2013; Reb, Greguras, Luan & Daniels, 2013). Consider Table 2, from Highhouse (1996), using a simulated employee-selection scenario.

Table 2 to appear here

Participants in this study were presented with two comparable job finalists and one decoy candidate, along with work samples and promotability ratings. Participants receiving Decoy Candidatea, 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 Candidateb 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. Furthermore, Slaughter, Bagger and Li (2006) found that the decoy effect is robust even in group decision-making contexts.

General evaluability theory (Hsee & Zhang, 2010) was developed to explain context-dependent inconsistencies in preferences. The theory suggests that value sensitivity depends on presentation mode (isolation vs. comparison), attribute knowledge (poor vs. rich), and attribute nature (inherently inevaluable vs. inherently evaluable). For example, Bazerman, Schroth, Shah, Diekman, and Tenbrunsel (1994) presented MBA students with two jobs: the first pays $70,000 while coworkers are paid $50,000; and the second job pays $80,000 while coworkers are paid $100,000. MBA students preferred the job with the highest absolute salary when both options are presented simultaneously; but their preference is reversed when the two options are presented independently. When the two choices are presented simultaneously, the subjects compared the absolute salaries. But when the choices are presented separately, the subjects compared the absolute salary to the coworkers’ salary; therefore, $80,000 no longer appears attractive compared to the $100,000 salary that the coworkers are earning. Tenbrunsel and Diekmann (2002) explored the decoy effect further in a job choice context. They found when the choices are all similar in terms of attractiveness; the participants were more likely to pick the job that was clearly better than a decoy “choice”. Similarly, Slaughter and Highhouse (2003) examined how attribute salience affects job preferences. For example, when only one alternative the choice set has an advantage in a particular attribute (high salary), that attribute is weighed more heavily when forming preferences about jobs. Previous research on contexts effects has shown that people weigh attributes differently based on the surrounding choices. The designs of context effect studies, however, are often limited to only a few job attributes, and less emphasis is given to the nature of the attributes themselves. Job choice research has shown that applicants use a large array of cues when making judgments about the attractiveness of job prospects such as the recruiter’s behavior, perceived person-job fit, and the recruitment process itself. Stevens (2013) presents a review of the job choice literature over the last decade, and suggests many opportunities for job choice researchers to integrate decision theory..

Information Presentation Effects

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 been 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. McKenzie and Nelson (2003) suggest that semantic frames are different linguistic representation of information that are logically equivalent (25% die vs. 75% live). For example, Harris (1973) found that people who were asked ‘How short was the basketball player?’ estimated lower heights than people asked ‘How tall was the basketball player?’ Semantic framing is also used to ask similar questions differently. Loftus (1975) found when asked ‘Do you get headaches frequently?’ people reported more headaches than people asked ‘Do you get headaches occasionally? Wong and Kwong (2005) presented judges with work attendance information of employees. The judges perceived a greater difference between two workers when the performance was framed as absence rates (e.g. 2% vs. 5%) compared to when it was framed as attendance rates (98% vs. 95%).

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 4,000 of 6,000 jobs) versus a small probability of no loss (e.g. 1/3 chance of keeping all 6,000 jobs and 2/3 chance of eliminating all 6,000), they tend to choose the one with a small probability of no loss. However, when the same dilemma is framed as a choice between a sure partial gain (e.g. save 2,000 jobs for sure) versus a small probability of a complete gain, people tend to opt for the sure win (Bazerman, 1984; Zickar & Highhouse, 1998). This pattern of choice is predicted by prospect theory. 2

 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 (Brockner, 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 Karsahi (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*

In addition to the effects of semantics on choice, there has also been a recent flurry of activity in JDM on the effects of physical information displays on judgments. This research is concerned with the format (e.g. frequencies vs. percentages; by attribute vs. by dimension; numerical vs. graphical) in which attribute information is presented to decision makers charged with making judgments and choices (e.g. Gigerenzer & Hoffrage, 1995; Kirkpatrick & Epstein, 1992; Klayman & 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.

Information display choices can affect workplace practices in many ways. 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 searches. 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.

More recently, researchers have examined the advantages of visual aids in the domain of risk communication. Several studies used graphical representations of probabilistic and frequency information using a graphic generation program called Icon Array (Brewer, Richman, DeFrank, Reyna, & Carey, 2012; Galesic, Garcia-Retamero, & Gigerenzer, 2009, Garcia-Retamero & Galesic, 2009). Figure 2 shows an example of an Icon Array representation of risk. Icon Arrays have proven to be successful in communicating statistical information to a statistically naïve audience. The graphical representation of risk highlights the base rate of events, and thus compensating for the common bias of base rate neglect (Lovett & Schunn, 1999). Base rate neglect is when people only pay attention to the numerator of a fraction and ignore the denominator (base rate). For example, in the statement “50 out of 1000 people fail to improve after treatment,” people tend to focus on the 50 and disregard the 1000. In using the Icon Array, researchers were able to improve the understanding of risk information in various health scenarios to a low numeracy audience (Garcia-Retamero & Galesic, 2009).

Figure 2. to appear here

Researchers have also examined different methods of describing quantitative information related to personnel selection decisions. More often than not, managers in charge of making personnel selection decisions are not well-informed on the validity of various selection instruments. Furthermore, it is difficult to overcome one’s reliance on intuition or expertise (Colbert, Rynes, & Brown 2005, Highhouse, 2008, Rynes, Giluk, & Brown 2007). Early efforts of communicating the utility of organizational interventions focused on translating effect sizes into monetary gains such as the utility analysis. Utility analysis provides the utility of a particular tool (e.g. Structured interview) in terms of monetary gain (e.g., $5000 per hire). Researchers found, however, that managers were often negative or indifferent toward the resulting values (Latham & Whyte 1994; Macan & Highhouse, 2004; Sturman, 2000). On the other hand, some scholars later argue that the initial disinterest toward utility analysis has to do with its credibility and mode of presentation (Carson, Becker, & Henderson, 1998; Skarlicki, Latham, & Whyte, 1996). Carson et al. (1998) found that utility analysis is more likely to be accepted if it is presented in a user-friendly manner. Macan, Lemming, & Foster (2012) also found that managers are generally in favor of having utility analysis as part of their decision making process provided that the computational process is explained adequately.

More recently, researchers have focused on examining alternatives to traditional effect sizes indices to communicate validity information to decision makers (e.g., Brooks, Dalal, & Nolan, 2013). Traditional numerical indices of statistical information such as the correlation or coefficient of determination are insufficient at communicating validity information (McGraw & Wong, 1992). Many of these statistics also downplay the utility of the selection instruments. Recent studies have examined using more intuitive metrics of communicating correlations and highlighting its value. For example, Brooks et al., (2013) used common-language effect sizes to transform correlations (e.g. *r* = 0.3) into probability statements such as saying: “If you attend the Academic Aces GRE Program, there is a 60% chance that you will increase your GRE score more than someone who did not attend the program.” By transforming statistical information into more context-specific descriptions based on probability and frequency, they were able to improve understandability, perceived usefulness, and effectiveness of the training program. Convincing managers to use technologies for reducing decision error (e.g. structuring interviews, combining assessment data using formulas) has long been a challenge to I-O psychologists, and effective description and representation of statistical information can be the first step in bridging the gap between scientists and practitioners

EMOTIONS IN DECISION MAKING

Models of decision making have placed considerable focus on cognitive mechanisms (e.g. Prospect Theory). In the past decade, the field of JDM has recognized the importance of affect and emotion in decision processes (Loewenstein, Weber, Hsee, & Welch 2001; Loewenstein & Lerner, 2003; Rottenstreich & Shu, 2004; Weber & Johnson, 2009).

 Two types of emotions affect judgment and choice. The first is immediate emotions and the second is anticipated emotions. Immediate emotions are ones that affect the judgment and decision process. The risk-as-feelings hypothesis suggests that affective reactions affect one’s judgment of risk and uncertainty independent of the cognitive evaluation (Lowenstein et al. 2001). Along the same lines, Schwarz (2001) suggested that experienced emotions are processed as information for making judgments and decisions. Slovic, Finucane, Peters, and MacGregor (2007) found when people are in a good mood, they perceive risky activities such as skiing as less risky and more beneficial; Au, Chan, Wang, and Vertinsky (2003) found financial market traders made more risky trades and were more overconfident when in a good mood; and they made more conservative trades when in a bad mood, which resulted in better performance.

 Emotions affect judgments differently depending on situational variables. Emotions that are similar on valence and intensity may lead to different behaviors across contexts (Ellsworth & Scherer, 2003). Lerner and Keltner (2001) found that fear and anger affected risk perception in opposite directions: fear increased risk estimates while anger decreased it. Lerner, Gonzalez, Small, and Fischoff (2003) surveyed a large sample of Americans about their attitude after the 9/11 attack on the world trade center; he found that trait anxiety (feelings of fear) led to higher perceived *risk* of a terrorist attack than those high on desire-for-vengeance (feelings of anger). Finally, emotions also play a central role in how people assign values to objects. For example, Hsee and Rottenstreich (2004) asked individuals how much money they would donate to save a panda. People pledged more money when the pandas were represented as cute, fuzzy creatures than when simply represented as black dots.

Anticipated emotions are emotions that occur after a decision is made; but they can also affect the decision process. People often anticipate post-decisional emotions by making counterfactual comparisons (Mellers, Schwartz, & Ritov, 1999). For example, one may ask: “How would I feel if I quit my job compared to if I had stayed”. Counterfactual thinking can lead to various anticipated emotions such as: regret, disappointment, and anxiety (Coricelli, Critchley, Joffily, O’Doherty, Sirigu, & Dolan, 2005; Schwarz, 2000, Zeelenberg, 1999). Anticipated emotions can lead to negative outcomes such as indecision (Anderson, 2003). Anticipated regret has been shown to be one of the key factors in why people fail to make decisions or consciously choose to delay a decision. When provided with multiple choices, people anticipate the regret associated with choosing one of the options and be incorrect to be much greater than the choice to simply defer the decision. This phenomenon is called the omission bias (Baron, 1992; Ritov & Baron, 1995, Zeelenberg, 1999). The degree to which individuals experience anticipated regret can be influenced by a number of factors. If the outcome of the decision is irreversible, such as hiring a job candidate, then there is higher anticipate regret (Zeelenberg, Beattie, van der Pligt, & de Vries, 1996). On the other hand, if the hiring manger is told that there would be a trial period of the employee and the decision can be reversed, then the hiring manager may be more willing to make a definitely decision. Decisiveness is often the hallmark of a good manager. It is important to understand the mechanisms that lead to indecision and improve the efficiency of high-stakes decisions (Brooks, 2011). Some researchers have started examining emotional intelligence in the work place, which is defined as competencies related to self-awareness, impression management, and social awareness (Goleman 1998). The dichotomy between traditional intelligence and emotional intelligence resembles the analytical and intuitive dichotomy in decision-making. Yet, there is little research that examines how emotional intelligence is related to decision outcomes.

# INDIVIDUAL DIFFERENCES IN DECISION MAKING

Individual differences is perhaps the fastest growing area of JDM research. Recent work has started to examine various traits related to how people make decisions across domains (Mohammed & Schwall, 2009). Moreover, the Decision Making Individual Differences repository (http://www.sjdm.org/dmidi/) has made research in the area more accessible. In the following section, we will address some of the key individual differences in decision making as they relate to work place behaviors and decision outcomes.

*Attitude Toward Risk*

Many professions require risk assessment and risk management skills (e.g. entrepreneurs, risk analysts, mutual fund managers; Stewart & Roth, 2001). One of the major recent undertakings in measuring individuals’ risky tendencies is the Domain-Specific Risk Taking Scale (DOSPERT) developed by Weber, Blais, and Betz (2002). The DOSPERT measures risk taking attitudes by assessing (a) risk perceptions and (b) risk behaviors. The scale measures these things in five different risk domains: (1) ethical, (2) financial, (3) health/safety, (4) recreational, and (5) social. Despite its short existence, the DOSPERT is highly-popular and widely-used (e.g. Hanoch, Johnson, & Wilke, 2006; Weller & Tikir, 2011). The DOSPERT predicts risk behavior in various domains such as stock-trading (Markiewicz & Weber, 2013), gambling (Mishra, Lalumiere, & Willams, 2010), and unhealthy sexual behaviors (Szrek, Chao, Ramlagan, & Peltzer, 2012). The domain-specificity theory of risky behavior would suggest the assessment of risk must be job and domain specific. For example, if a specific job has potential safety hazards and it is important for the employees to avoid risky situations, the selection tool must assess risk-propensity within that risk-domain. On the other hand, some jobs may encourage some risk taking; for example, a hedge fund manager has to be able to make critical decisions that may result in loss of the clients’ asset.

Although the DOSPERT met an important need in the measurement of risk as a disposition, it has come to symbolize a belief among many in the decision-making community that there is no general disposition toward risk (e.g. Figner & Weber, 2011; Fox & Tannenbaum, 2011). The position that risk cannot be assessed as a general trait, but must be assessed as a situation-specific trait, is inconsistent with research in the personality assessment literature. Indeed, there is no disputing the idea that situations influence the display of traits (see Epstein, 1980), but psychologists are in general agreement about the meaningfulness of general traits such as the “Big Five” (Saucier & Goldberg, 1996). Similarly, although research suggests that people have different mean levels of risk in different domains (Blais & Weber, 2006), the question of whether there is enough cross-situational consistency in risk attitudes to treat general risk taking as a meaningful trait is far from settled.

*Decision Styles*

Decision styles reflect tendencies to approach decisions in similar ways across time and situations (Epstein, Pacini, Denes-Raj, & Heier, 1996; Harren, 1979; Rowe & Mason, 1987; Scott & Bruce, 1995). Researchers have identified various categories of decision styles (e.g. Allinson & Hayes, 1996; Epstein et al., 1996; Kirton, 1989; Scott & Bruce, 1995), but it remains unclear how they differ from cognitive abilities and personality traits (Kozhevnikov, 2007). Nevertheless, previous research has demonstrated the usefulness of decision styles for predicting person-job fit (Singh & Greenhaus, 2004), method of conflict resolution (Sáez de Heredia, Arocena, & Gárate, 2004), susceptibility to stress (Thunholm, 2008), and job satisfaction (Crossley & Highhouse, 2005).

 The most widely-used decision style measure is Scott and Bruce’s (1995) General Decision-Making Style (GDMS) questionnaire. The five decision making styles assessed by the GDMS are: rational, intuitive, dependent, avoidant, and spontaneous. Dependent, avoidant and spontaneous decision-styles have been linked to negative outcomes such as negative feelings in the decision making process and inadequate planning (Baiocco, Laghi, & D’Alessio, 2009; Galotti et al., 2006). Wood and Highhouse (2014) found the rational, intuitive, and spontaneous styles predicted self-ratings of decision quality over and above the Big-Five personality traits. Only the rational style predicted peer-ratings of decision quality.

IMPROVING DECISION MAKING

The chapter thus far has outlined how people make erroneous decisions and ways in which innocuous factors can lead to inconsistent and irrational decisions. More recently, decision making researchers realized that biases and flaws in human judgment can be corrected or even used to influence people in making better choices in life. Next, we will cover two topics in how decisions in the workplace can be improved. The first is how to reduce biases in judgments and the second is how to shape the environment to influence better decisions.

*Debiasing*

For much of the chapter, we discussed ways in which the context and cognitive processes bias judgments and choice. Equipped with the understanding of how these systematic biases occur, JDM researchers have begun to explore ways to close the normative and descriptive gap. One strategy is to hold decision makers accountable for their choices. Holding an individual accountable has a motivational effect on the decision maker by forcing him to be more critical and more considerate. For example, De Cremer & van Dijk (2005) found that when accountability was low, leaders tended to allocation more resources toward themselves rather than his followers. However, when making the decision makers more accountable, one has to be aware of the negative consequences as well. For example, the social nature of accountability may induce socially desirable behaviors (Brown, 1999). Accountability can also strength certain biases. For example, Slaughter et al. (2006) found that it amplified the decoy effect in a performance judgment task. Accountability can lead to better decisions when people take the extra time and are using valid cues. However, it can backfire if people are incorporating invalid cues in their judgment and decision process. Tetlock & Boettger (1989) found that, when judges are held accountable, they rely more heavily on irrelevant information in performance judgments, thus leading to more diluted judgments.

A second strategy to reduce bias is to “consider the opposite.” Asking individuals to consider the opposing choice have shown to reduce overconfidence, hindsight bias, and anchoring effects (Larrick, 2004; Mussweiler, Strack, & Pfeiffer, 2000). This strategy works because people in general tend to succumb to confirmation bias: which is the bias to seek confirmatory information. Therefore, considering contradictory reasons partially alleviate this bias, which can lead to better calibrated judgments. Finally, if we cannot fix the flaws in human intuition, then the best solution is to rely on statistical linear models (Meehl, 1954). Dawes (1994) provided several instances in which ‘expert’ judgments have been made in light of statistical information 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). Nevertheless, even ‘broken-leg’ cues are not always predictive or diagnostic of future behaviors (Highhouse, 2008).

*Choice Architecture*

One of the emerging topics in decision making is an area called choice architecture. Choice architecture is at the intersection of psychology, behavioral economics, and policymaking. The founder of choice architecture, Richard Thaler coined the term “nudges” to describe small things that we can do to shape decisions (Thaler & Sunstein, 2008). A nudge is defined as “… any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives.” Rather than eliminating individual biases in judgments and decisions, choice architecture embraces these biases and takes advantage of them by modifying the choice environment (or “nudging”) to promote better decisions.

Choice architecture has been successful in modifying consumer behaviors, investment decisions, and even credit card payments. Johnson and Goldstein (2003) examined the power of defaults in organ donation frequencies. They found that in countries where the default option for organ donation was to opt-in, there is close to 100% agreement rate for organ donation. On the other hand, countries where the default option is to opt-out, the organ donation rate is abysmally low. Choice architecture has also been used to promote employees in making better decisions toward their retirement saving, insurance, and investment decisions (Benartzi & Thaler, 2007; Johnson, Hershey, Meszaros, & Kunreuther, 1993; Sunstein and Thaler 2003). The choice architect’s toolbox has many tools: calling attention to the future outcomes can reduce our tendency to be myopic and discount future rewards; reduce the number of alternatives and make the attributes more comparable can reduce the cognitive load of decisions and improve understanding in decision outcomes (Larrick and Soll 2008, Soll, Keeney, & Larrick, 2013). One key feature of nudges is that they are simple and inexpensive interventions that can lead to significant changes in behavior if applied to a large group of people. I-O researchers should strongly consider these tools and ways that they can improve workplace decisions.

THE CRITERION PROBLEM

The “criterion problem” has been with applied psychology for nearly a century (see Austin & Villanova, 1992, for a review). It is only more recently that decision theorists have focused on defining and measuring good decision making for the purpose of performance prediction (Bruine de Bruin, Parker, & Fischhoff, 2007; Weiss, Shanteau, & Harries, 2006; Witteman, Weiss, & Metzmacher, 2012; Yates & Tschirhart, 2006; Yates, Veinott, & Patalano, 2003). Bruine de Bruin et al. (2007) developed the Decision Outcome Inventory (DOI), a self-report measure of decision-making success. Respondents are asked about a series of negative decision outcomes weighted according to the proportion of people who reported not experiencing them. Another approach to assessing decision quality, developed by Curseu and Schruijer (2012) used a criterion composed of items assessing one’s tendency to engage in common decision errors.

Yates and Tschirhart (2006) noted that lay notions of decision quality are multi-faceted, and that almost any objective indicator will be deficient or contaminated. Milkman, Chugh, and Bazerman (2009) suggested that, in addition to the traditional benchmarks from economic theory, decision quality can be evaluated based upon whether (a) after the fact, the decision maker remains satisfied with his or her decisions, and (b) decisions are considered high-quality by others. Accordingly, Wood and Highhouse (2014) measured decision quality by asking the decision maker, and people close to the decision maker, whether he or she generally makes good decisions.

In most psychological research, constructs are measured using reflective indicators. That is, changes in the latent construct are reflected in (i.e. cause) changes in the indicators (Borsboom, Mellenbergh, & Heerden, 2003). In some cases, however, indicators can be viewed as causing, rather than being caused by, the latent construct. This occurs when a number of indicators are combined to form a construct (e.g. socioeconomic status) without any assumptions as to the patterns of inter-correlation between the items. The DOI is clearly a formative measure of decision quality. Scores on the inventory are arrived at by aggregating responses to life outcomes (e.g. got divorced, loan foreclosed), which have low intercorrelations. There have been a number of concerns raised about the use of formative measures (Bagozzi, 2007; Edwards & Bagozzi, 2000; Howell, Breivik, & Wilcox, 2007). For example, the failure to include relevant outcomes can severely alter construct meaning (Tepper & Henle, 2011).

We believe there is a need for more theory-directed measurement of decision quality. Many of the principles summarized by Austin and Villanova (1992) could help guide such research. One of those principles is to choose criterion dimensions based upon how broadly the conceptual criterion is construed. A very broad judgment of quality may only require a unidimensional performance measure, whereas one that specifies outcomes of good decision making would need to identify the broader domains under which different outcomes fall. Failure to articulate the values involved when including some measures of performance as criteria while excluding others exacerbates the criterion problem.

RESEARCH METHODS

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). Other approaches such as analysis of variance (Anderson, 1981), 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, Hults, & 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). More recently, scholars have used computational models and simulations to model choice over time (Busemeyer & Johnson, 2004). 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 non-compensatory approach early in the decision process, but switch to a compensatory approach when a smaller number of finalists survive initial screening (Ford, Schmitt, Schechtman, Hults, & Doherty, 1989). Computational models demonstrated that decision processes across individuals could also be modeled with a general sequential sampling paradigm (Busemeyer & Townsend, 1993).

 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. One example of this is the Daily Reconstruction Method (DRM) (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). The DRM allows individuals to record their experiences and emotions with as little memory bias as possible. With easier access to the internet and electronic mobile devices, it has become increasing easy to collect longitudinal and in-the-moment data using methods such as the DRM and Daily Diaries. These methods are particularly use for examining how attribute evaluations evolve or change over extended periods. This would be particularly valuable for I/O psychologists interested in studying decision processes that unfold over a long period of time such as job search, recruitment or termination decisions.

# CONCLUDING COMMENTS

Even though we have argued throughout that JDM has much to offer to I-O psychology, we also believe that there is a lot of I-O research and knowledge that JDM researchers should know about. Here are some examples:

* 1952 the United States contracted I-O psychologists to construct a method to assess (1) ability to organize information, (2) balance a large number of considerations, and (3) arrive at decisions. The psychologists created a simulation called the “in-basket” (Frederiksen, Saunders, & Wand, 1957). Considerable research suggests that the in-basket assesses ability to carefully process information and take decisive action. This clearly requires one to balance both intuition (System 1) and analysis (System 2). It also predicts on-the-job decision performance (Meyer, 1970).
* Field research in I-O shows that “thin slices” are very poor predictors of job performance (see Eisenkraft, 2013). Meta-analyses of the unstructured job interview show that it predicts, at best, 4% of the variance in on-the-job performance (Huffcutt & Arthur, 1994). I-O psychologists have, however, developed methods to *structure intuition* that result in considerable validity gains (Levashina, Hartwell, Morgeson, & Campion, 2014).
* I-O has considerable field data to support the assertion that mechanical combination of predictors outperforms intuitive combination of predictors (Kuncel, Klieger, Connelly, & Ones, 2013) and that group discussion *dilutes* the predictive efficacy of even simple formulas (Dilchert & Ones, 2009). As shown in Table 3, well-intentioned assessors are destroying the validity of high-fidelity simulations.

The cross-fertilization of I-O and JDM provides new perspectives for studying decisions in the workplace and a rich platform in which decision processes can be explored.

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Notes

 We are grateful to Bill Balzer, Mike Doherty, Jody Hoffman, Jerel Slaughter, Jeff Stanton, and Klaudia Konik for their helpful comments on earlier drafts of this manuscript. We are also grateful to Lilly Lin for her assistance in copy editing.

1This example was taken from Fox & Ulkumen (2011)

2Whereas 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).

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