The Role of Affect in Naturalistic Decision Making

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Abstract: The field of naturalistic decision making (NDM) assumes a "cold" cognitive model in that nonemotional, valence-neutral cues and information are predicted to influence decision making in identifiable ways. Judgment and decision-making research over the past 10 to 15 years, however, has greatly enhanced knowledge of the ways in which affect that is present at the time of decision making influences how people make decisions—specifically, how they process information, how they respond to risk, and which outcomes they prefer. The purpose of this article is to review relevant aspects of the literature on affect and decision making and to present the argument that NDM researchers need to be cognizant of the potential impact of affect on decision processes to adequately describe and predict expert decision making.

Introduction

Judgment and decision-making (JDM) research during the past 2 decades provides overwhelming evidence that people's judgments and decisions are critically influenced by emotions they experience at the time of decision making. How people respond to a situation—for instance, whether they are more or less inclined to take risks or prefer punitive to lenient measures—has been shown to vary depending on their concurrent mood (see Lerner & Tiedens, 2006, for a review) as well as feelings they associate with potential outcomes (e.g., Loewenstein, Weber, Hsee, & Welch, 2001). In addition, affect has been found to determine people's cognitive strategies—that is, whether they are systematic in their decision making or rely on heuristic cues (e.g., Bodenhausen, Sheppard, & Kramer, 1994; Forgas, 2003; Schwarz, 2001).

In contrast to their colleagues in the JDM research community, researchers of naturalistic decision making (NDM) have emphasized the role of decision makers in shaping their understanding of problem situations and in generating and evaluating possible solutions (Lipshitz, Klein, Orasanu, & Salas, 2001). Moreover, NDM researchers have been sensitive to the impact of contextual factors on decision making, especially the fact that decisions are often made by teams under ambiguous, time-critical, high-risk conditions and embedded within organizations and their operational goals (Mosier & Fischer, 2010; Orasanu & Connolly, 1993).

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It is thus surprising that with few exceptions (e.g., H. A. Klein & Schneider, 2007; Lipshitz & Shulimovitz, 2007; Mosier & Fischer, 2009; Mosier, Rettenmaier, et al., 2009), NDM research in the past 20 years has been virtually silent on the issue of emotions. This is an unfortunate knowledge gap, and it suggests that we as researchers do not consider the potential impact of emotions in expert decision making to be noteworthy. It is certainly a reasonable hypothesis that experts, by virtue of their expertise, are protected from the influence of emotions and base their decisions squarely on an objective assessment of the situation via cues, procedures, or patterns. On the other hand, we posit that the role of affect in expert decision making may be complex and significant.

In this article we summarize the most influential JDM theories on affect and decision making and discuss roles that affect has been shown to play in judgment and decision making. We define the difference between incidental and integral affect and note the lack of research on task-relevant integral affect. We present three hypotheses concerning the role of affect in expert decision making and argue, using G. A. Klein's (1993) recognition-primed decision-making (RPD) model for illustration, that task-relevant affect may function as one cue in a pattern or may be used to evaluate a pattern of cues, and that experts' affective reactions to task-relevant cues may have important signal character and/or guide their sensemaking in NDM environments.

Background: Existing Research on Affect and Decision Making

Affect is sometimes equated with intuition and gut feeling (Gigerenzer, 2007; G. A. Klein, 2003). Although we agree that these terms are related, we do not presume that they are synonymous. Both intuition and gut feeling are conceived of as unconscious processes that give rise to some undifferentiated feeling—that is, individuals are not able to specify what it is about an event, person, or object that makes them feel the way they do (Hayashi, 2001; Lipshitz & Shulimovitz, 2007). References to one's intuition or gut feeling are usually called upon in situations in which one has a vague sense that something "smells fishy" or, alternatively, "feels right." These sensations are included in the conceptualization of affect we adopt in this paper; however, they represent only a subset of affective responses.

Current theories emphasize that emotions are the result of appraisal processes during which individuals evaluate external stimuli or mental representations "in terms of their perceived relevance for their current needs and goals, including considerations of their ability to cope with consequences" (Scherer, 2003, p. 564). Individuals' appraisals may involve automatic, unconscious mechanisms as well as rely on more controlled and deliberate cognitive processes (Forgas, 2008; Roseman & Smith, 2001; Scherer, 2003; Smith & Kirby, 2001). Moreover, individuals are frequently able to identify what triggered their affective responses (Ochsner & Gross, 2005).

Part of the NDM community's reluctance to embrace affect as a component of expert decision making may have to do with the way the construct has been

defined and studied by JDM researchers in the past (e.g., Loewenstein & Lerner, 2003; Schwarz, 2000; Weber & Johnson, 2009). Much of the research has examined how people's decisions are influenced by emotions that they bring to the task and that are unconnected to the task at hand. Thus the emphasis has been on incidental—task-irrelevant—affect, on its impact on judgment and choice, and on people's misattribution of their affective reactions to task features instead of realizing their extraneous nature.

Incidental affect is usually studied by employing some variant of the emotion induction procedure. Prior to a decision task, individuals are asked to participate in an unrelated task, often entailing the recall of pleasant or unpleasant memories. Even when the independence of the tasks is stressed, emotions evoked by the first task carry over to the subsequent decision task.

These manipulations of incidental affect have been shown to impact how people make decisions—specifically, how they respond to risk and which outcomes they prefer (e.g., Isen, Nygren, & Ashby, 1988; Lerner & Keltner, 2001; Loewenstein & Lerner, 2003; Peters, Västfjäll, Gärling, & Slovic, 2006; Raghunathan & Pham, 1999). Research, in particular by Lerner and Keltner (2000, 2001), further refined researchers' understanding of the impact of incidental affect. They were able to show that emotions have a more differentiable impact on decision making than is suggested by the traditional distinction between positive and negative valence. Anger and sadness, for example, are associated with risk-seeking behaviors (Lerner & Keltner, 2001; Raghunathan & Pham, 1999), whereas positive affect as well as fear and anxiety are associated with risk-aversive choices (Isen et al., 1988; Lerner & Keltner, 2001; Lerner & Tiedens, 2006).

Considerably fewer studies concern integral affect, the influence of emotions that are elicited by features integral to the decision situation itself or by its potential consequences. This imbalance in the research literature suggests that incidental and integral affect are believed to influence decision processes similarly, an assumption that has received some empirical support. However, integral affect is usually manipulated through aspects of the task such as pleasantness versus unpleasantness of the task, effort required (e.g., Garbarino & Edell, 1997; Luce, Bettman, & Payne, 1997), or framing of the decision situation (e.g., Dunegan, 1993), which bear little substantive relation to the decision objective. In other words, integral affect as it is commonly operationalized in experimental studies may not be significantly different from incidental affect in terms of its decision relevance, and therefore it is not germane to expert decision processes.

We argue that integral affect as it occurs in the NDM world may be rather different from the affective responses induced in the lab. People's decisions, especially those of experts, seem frequently to be guided by affective evaluations of information and elements within the situation itself that are critical to the decision (e.g., Dominguez, 2001; G. A. Klein, 2003; Lipshitz & Shulimovitz, 2007). This type of integral affect—task-relevant affect—may provide essential cues as well as structure to the decision process. This is an important and qualitatively different conceptualization of integral affect than is standard in the literature.

Theoretical Explanations of the Role of Affect in Decision Making

Models of Affect and Decision Making

Several different theoretical explanations have been put forth to account for the impact of emotion on decision making. Affect has been found to function as "spotlight" or attention guide, as information, as motivator, and as common currency (Peters et al., 2006; Weber & Johnson, 2009). *Affect as information* approaches suggest that decision makers use their affective state as information in their judgment process (Peters et al., 2006; Slovic, Finucane, Peters, & MacGregor, 2002; Slovic & Peters, 2006). Feelings of happiness, for example, signal that one has sufficient information and that the situation is benign and requires little cognitive effort; feelings of fear or anxiety signal that the situation is threatening in some way and requires more scrutiny—that is, systematic processing (e.g., Schwarz, 2001, 2002; Schwarz & Clore, 2003).

Affect has also been posited to function in a two-step process, as described by the *appraisal tendency framework.* According to this model, emotions are characterized by specific appraisal patterns (Ellsworth & Scherer, 2003; Smith & Ellsworth, 1985) and motivate individuals toward specific goals and behaviors or "action tendencies" (Chen & Bargh, 1999; Frijda, 1986; Frijda, Kuipers, & ter Schure, 1989; Lerner & Keltner, 2001; Lerner & Tiedens, 2006).

Anger, for example, is experienced when an event is appraised as negative and unfair, when a person is perceived as responsible for this negative event, and when the victim is able to take steps toward retribution. These appraisals will induce risk-taking behavior, actions to change the situation, and an inclination to redress injustice and to punish the perpetrator (see Lerner & Tiedens, 2006, for a review). Gault and Sabini (2000), for instance, found that anger-induced participants responded to a toxic-waste-dumping scenario with greater support for agent-punishing goals relative to reparative or preventive goals. Fear, in contrast, has been associated with the appraisal of situational control and outcome uncertainty and triggers the goals of uncertainty reduction, self-protection, and preventing harm (e.g., Nabi, 2003; Raghunathan & Pham, 1999).

Another popular motivational model of affect is Forgas's (1995, 2001) *affect infusion model* (AIM). AIM assumes that the extent to which affect infuses judgment is conditional on the kind of strategy adopted by the person. The model incorporates a taxonomy of processing strategies; affect infusion is most likely to occur in conditions that recruit constructive, substantive, generative processing (rather than predetermined processing strategies). A second assumption of the model is that people are "effort-minimizing information processors who adopt the simplest and least effortful processing strategy as long as it satisfies the minimal contextual requirements" (Forgas, 2001, p. 101). Analyses of recalled memories and processing latencies data have provided evidence that more substantive processing elicits greater affect infusion in interpersonal perception tasks (Forgas, 1992, 1993). According to AIM, affect will impact analytical decision processes, suggesting that it may not influence some expert decisions in NDM contexts insofar as they rely on pattern recognition.

Affect may also serve an anticipatory function, providing decision makers with a "common currency" by which to evaluate different decision outcomes (Mellers, Schwartz, & Ritov, 1999; Weber & Johnson, 2009). The anticipation of regret or disappointment resulting from a potential outcome, for example, can steer an individual toward more thoughtful processes to justify the decision or toward an option that will instead be accompanied by more positive affective responses (Connolly & Zeelenberg, 2002).

Affect and Information-Processing Style

Perhaps most critically, affect influences information processing and ultimately behavior (Peters et al., 2006). In this function, affect encourages decision makers toward information-processing strategies that preserve positive and avoid negative experiences (e.g., Isen et al., 1988; Weber & Johnson, 2009). Information that is congruent with one's mood may be more attended to, more believable, and more compelling (DeSteno, Petty, Rucker, Wegener, & Braverman, 2004).

Affect is also associated with heuristic or systematic processing styles (e.g., Bodenhausen et al., 1994; Forgas, 2003; Schwarz, 2001). Garbarino and Edell (1997), for instance, found that negative affect in response to increased task difficulty biased participants to favor the less challenging option.

Anger, in particular, has been linked with heuristic processing—that is, with more stereotypic judgments, minimal data collection, limited analyses, less attention to the quality of arguments, and more attention to superficial cues (e.g., Bodenhausen et al., 1994; Lerner & Tiedens, 2006). Fear or anxiety, in contrast, is believed to lead to systematic, controlled and comprehensive information processing (Loewenstein & Lerner, 2003). For instance, Luce et al. (1997) gave participants the task of choosing which of a group of children would receive aid. The more difficult the task in terms of trade-offs and resources, the more negative affect was exhibited by participants and the more extensive was their processing both in terms of decision time and amount of information accessed prior to their decision. Positive affect, in contrast, has been found to foster quicker, more superficial, and less effortful strategies using little information but also to produce more creative, open, and inclusive thought (Estrada, Isen, & Young, 1997; Fredrickson, 2001; Isen, 1984; Isen & Labroo, 2003).

Affect may also constrain information search. Lerner and Tiedens (2006) posited that emotional states may prompt differential attention to information based on whether or not it is mood congruent. Consistent with this notion, Nabi (2003) found that participants who were prompted to anger desired retributive information and that those in the fear group desired protection-related information. Additionally, if a situation is ambiguous with respect to some critical aspect (e.g., certainty of outcome), then incidental emotion (e.g., fear) may impact decision making more (e.g., risk avoidance), as compared with its effect in unambiguous situations (Lerner & Keltner, 2001).

Interestingly, most research on affect and information processing has focused on processes (e.g., thorough vs. heuristic) and decision direction (e.g., risk taking

vs. risk averse) rather than on accuracy of choices. Relatively few studies have looked at the influence of affective information processing on performance (Finucane, Peters, & Slovic, 2003). One exception is the Estrada et al. (1997) study, which found that physicians in the positive-affect condition began considering the correct disease domain earlier than the controls did.

Expertise and Affect

Does affect play a role in expert decision making? Three hypotheses may be derived from the literature.

1. One possible hypothesis is that experts are no different from laypeople and will be influenced by their emotions, irrespective of their task relevance or unrelatedness. After all, why should experts be immune to affect? Several studies have demonstrated that the impact of incidental emotion is both unconscious (e.g., Forgas, 1998) and difficult to put aside, even when participants are given incentives to ignore irrelevant influences (e.g., Lerner, Small, & Loewenstein, 2004; Lerner & Tiedens, 2006). Moreover, research by Estrada et al. (1997) indicates that experts may not always succeed in recognizing incidental affect. They found that inducing positive affect with a small package of candy significantly influenced physicians' diagnostic processing. Physicians who received the candy were better at recognizing and integrating symptoms and signs, showed less distortion or ignoring of potentially disconfirming information, and showed greater care and thoroughness in decision processes than those who did not receive candy.

On the negative side, expertise does not necessarily shield individuals from using potentially dangerous shortcuts (e.g., Parasuraman, Molloy, & Singh, 1993; Wickens, 2000), as, for instance, the work on automation bias by Mosier and colleagues (Mosier, Skitka, Heers, & Burdick, 1998; Skitka, Mosier, & Burdick, 1999) demonstrates. In these studies pilots and laypersons alike tended to use automation as a heuristic replacement for vigilant information seeking and processing.

Affect may also limit—and thus bias—the interpretation of information in the operational context, as has been observed for laypeople in the lab (Lerner & Tiedens, 2006; Nabi, 2003). Analogous to the phenomenon of attentional tunneling (Wickens, 2000), even expert decision makers may search for and focus on only information that is consistent with their affective state, neglecting or misrepresenting inconsistent information.

Experts who are influenced by particular affective states may also lock on to situation interpretations and action modes that are congruent with that state. Anger, for example, is associated with the perception of personal control over a situation, whereas fear and anxiety are associated with the perception that a situation is not under one's control. Anger may thus encourage a "blame" mode, in which decision makers focus on responsibility and retribution rather than problem solving. In the aviation operational environment, for example, pilots who are annoyed by what they consider to be a "risky" clearance from air traffic control (ATC) may be more motivated to report the controller to authorities than to negotiate a safe

clearance. Fear or anxiety, in contrast, may elicit an almost hypervigilant (Janis & Mann, 1977) concern for self-protection and safety.

2. An alternative hypothesis is that experts making domain-related decisions are immune to the impact of affect. A tenet of this view is that emotions are distractions that interfere with deliberate, rational thought. This position not only has its roots in a long philosophical tradition (most notably that of Descartes) but is implicit in many experimental psychology studies examining the impact of emotions on cognitive processes. In these studies participants' emotions are typically manipulated by using stimuli that are not pertinent to the "real" task. The consistent finding is that participants' task performance (judgments, risk taking, etc.) is influenced by these (unrelated) emotions. The experimental approach thus insinuates the view that emotions are task-irrelevant intrusions.

Whereas the undergraduate participants of these experiments misattributed the origin of their emotions to the task, one might hypothesize that experts will not fall prey to this misconception. This hypothesis is grounded in the expertise literature that emphasizes experts' knowledge of and sensitivity to task-relevant information (e.g., Chi, Glaser, & Farr, 1988; Ericsson & Smith, 1991). Experts know what to look for, what cues are relevant to the decision, which information to obtain, and which rules and procedures to call upon. They can push irrelevant information aside and have learned to cope with task complexity and task-related stress (e.g., Cohen, 1993; Fischer, Orasanu, & Montalvo, 1993; Stokes & Kite, 1994). Moreover, when making domain-related decisions, experts are likely to be imbued with a sense of accountability for their decisions (Mosier et al., 1998) and should engage in motivated processing (e.g., the goal to maintain flight safety). Thus affect should not influence their judgment and decision making (Forgas, 2003).

3. Excluding affect from the discussion of expert decision making, however, may be shortsighted. A third hypothesis is that emotions are not necessarily irrelevant distractions but, rather, may provide valid information about the task at hand. Evidence in support of this assumption comes from the relatively new field of cognitive neuroscience. Research has identified neural circuits that process the emotional significance of stimuli and interact with cognitive systems (Cacioppo, Gardner, & Berntson, 1999; Ochsner et al., 2009). The emotional significance of stimuli enhances their salience, directs attention, and supports memory consolidation (see the review by Phelps, 2006). Cosmides and Tooby (2000) viewed emotions as superordinate programs that activate and coordinate cognitive and physiological processes as well as behavioral responses. Consistent with this view, Damasio (1994) reported that patients who lost their ability to process emotional stimuli normally also showed marked defects in their decision-making ability.

It seems important, therefore, to distinguish between task-relevant affect and emotions that are extraneous to the problem individuals try to solve. We posit that this distinction is critical to the discussion of affect in expert decision making because experts have been shown to be selectively sensitive to task-critical information (see Chi et al., 1988). Accordingly, experts, unlike laypersons, may differentially respond to task-related and unrelated affect. This assumption has two implications:

a. Experts may be able to identify emotional responses that are not relevant to the task at hand and thus prevent them from impacting their decision making—that is, experts may be good at identifying potentially intrusive emotions and at emotion control. For example, in a recent study of incidents from the Aviation Safety Reporting System (ASRS), pilots noted that they were cognizant of emotions that might negatively influence their decision making, such as aggravation or agitation (e.g., Mosier et al., 2009). In other work, proficient athletes used task-oriented coping mechanisms to neutralize counterproductive emotions such as anger/dejection and were found to experience lower levels of anger/dejection and higher levels of positive affective state, self-referenced goal attainment, and experience of control (Gaudreau & Blondin, 2004).

b. Experts may be well attuned to affect that is in response to critical elements of the task context and that may have significance for their decisions. As a result of years of practice, experts have learned the emotional significance of cues. In other words, for experts, an affective reaction to a situation (i.e., a task-relevant affective response) may represent a knowledge-based informational cue and may be a salient component of their decision making.

Emotional cues may have signal character that triggers appropriate responses without much deliberation. In that sense emotional cues may be part of recognition-primed decision making. We see this function of affect illustrated in the following *New York Times* story by Benedict Carey on the role of "hunches" in soldiers' split-second decision making:

> The sight was not that unusual, at least not for Mosul, Iraq, on a summer morning: a car parked on the sidewalk, facing opposite traffic, its windows rolled up tight. Two young boys stared out the back window, kindergarten age maybe, their faces leaning together as if to share a whisper. The soldier patrolling closest to the car stopped. It had to be hot in there; it was 120 degrees outside. "Permission to approach, sir, to give them some water," the soldier said to Sgt. First Class Edward Tierney, who led the nine-man patrol that morning. "I said no—no," Sergeant Tierney said in a telephone interview from Afghanistan. He said *he had an urge to move back before he knew why*: "*My body suddenly got cooler; you know, that danger feeling*" [italics added] (Carey, 2009, p. A1).

Sergeant Tierney's hunch saved his soldier's life. Seconds after he called him back, a bomb ripped the car apart. Similarly, G. A. Klein (2003) described canceling a potential acquisition of his consulting firm because he felt "tense and agitated" after meetings with the manager. "What was behind my hunch? I believe it was the strain of the interaction with the manager. Even when he was saying all the right things I was getting a sense of confrontation and punitiveness and pressure. I wasn't labeling these qualities at the time. I was just noticing that our meetings were taking a toll on me" (p. 98). In another domain, Dominguez (2001) reported that physicians frequently referred to their comfort level while deciding on whether or not to continue with laparoscopic surgery. Pilots in the ASRS study

mentioned previously sometimes expressed concern or discomfort about clearances they were given, and they expected ATC to respond with similar affect. In fact, when referring to a controller one reporter stated, "We are very concerned about his apparent lack of concern" (ASRS #486349; Mosier et al., 2009).

Experts' emotional reaction to cues may also provide a frame for their sensemaking and, as predicted by the appraisal tendency framework, may guide their information search and integration. As an illustration, consider the following quotes from a study by Fischer, Orasanu, and Davison (2003) in which commercial pilots verbalized their thoughts during hypothetical aviation decision scenarios. The first two quotes are by pilots in response to a potential wind shear situation at takeoff. The last quote occurred in response to an approach scenario.

> Subject 24 (First Officer): "See whether ATIS has anything, or Tower reports . . . "moderate rain" now start seeing some effect of that, the runway is grooved as you showed me earlier . . . starting to get close, *starting to get into my comfort zone*. But I still would continue to go ahead. . . . may look at my take-off data one more time."
>
> Subject 8 (Captain): "Well, I tell the passengers that I made a decision not to take off because of the weather and that . . . other pilots may choose to go but my level of . . . *my level of comfort . . . was exceeded* by the way the thunderstorm is coming to the airport."
>
> Subject 33 (Captain): "[A]t this point I think I'd be *getting pretty concerned about my fuel situation, real concerned,* and I'd be talking to dispatcher and asking for feedback from them and see where they want us to go 'cause now I am thinking I don't even want to fool with this airport anymore . . . because if they got thunderstorms in the area we've got traffic problems . . . *I'm not comfortable with 11 thousand pounds of fuel on my airplane* . . . I'm totally in a divert mode. I wanna go somewhere else already. *I don't like this* . . . even though the weather is going to clear up that there's still a bunch of airplanes out here to get on the ground" [italics added throughout].

As flight conditions changed over time, pilots apparently used their affective reactions to decision-relevant information to frame their decision making. Logistic regression analyses using pilots' positive and negative evaluations of features in the flight context as well as statements reflecting nonevaluative cognitive processes (e.g., planning) as predictors indicated that pilots' level of comfort in response to a flight situation apparently shaped their interpretation of information and ultimately their decision (Fischer, Orasanu, & Davison, 2006).

In the approach scenario, pilots who expressed optimism about the conditions, the likelihood of landing at their original destination, and making the curfew were likely to continue with the approach; pilots who viewed conditions more negatively tended to divert. Similarly, pilots who decided to depart in the takeoff scenario evaluated the weather and airspeed loss more positively than did those who delayed the

departure. They tended to emphasize the fact that the weather was behind them, still 8 miles (about 13 km) away, and that the departure path was clear. In addition, they focused on the quantity of airspeed loss, which they considered to be within limits, and interpreted the reported decrease in airspeed loss as an indication that weather conditions were improving. In contrast, pilots who delayed the takeoff were primarily concerned about the airspeed loss per se and took the variability in reported airspeed loss to indicate unstable winds. In line with this interpretation, they stressed the fact that the weather was getting closer. Because they assumed that they could not outrun the storm and that the winds were becoming unpredictable, they decided not to risk a takeoff but instead to wait for the weather to pass.

Incorporating Affect into NDM Models

How does task-relevant affect fit into current models of NDM? We propose that it may fulfill several functions, both in situation assessment and as an action trigger. We can posit, for example, how affect would play a part in G. A. Klein's (1993) RPD model (RPD; see Figure 1). Experts' affective reactions to a situation may first act as a spotlight, drawing attention to specific cues and information. Fear or anxiety, for example, may focus the decision maker on cues that confirm or disconfirm the threatening nature of the situation.

Affective responses may also be recognized as part of a pattern of cues, as the same emotions may have been evoked by similar situations in the past. In this respect, they serve an informational function, providing input with respect to situation assessment, plausible goals, and expectancies. Experts' affective reactions may also influence how information in the operational context is evaluated, resulting in affect-congruent interpretations of the decision situation. We speculate that this function of affect may be especially salient in situations that involve ambiguous information or require the integration of many pieces of information. Experts' affective reactions to task-relevant information may also serve as trigger for an action program. This function is illustrated by the sergeant in the *New York Times* story who sensed danger and called back his soldier just in time before the IED exploded.

When a situation is not recognized as familiar, affective responses such as unease or discomfort may motivate the decision maker to engage in more information gathering or more substantive sensemaking processes. Affect may also provide a metric (or currency) for mental simulation. If the decision maker does not feel comfortable with the probable outcome of an imagined course of action, he or she will probably seek another option.

Although suggestive, these observations need to be substantiated by further research into the role of task-relevant integral affect in expert decision making. More specifically, research needs to address the following issues: To what extent do professionals rely on their affective reactions to task-relevant information? How does task-relevant affect impact their decision process? Does affect serve as a frame that guides the integration of available information and cues, resulting in affect-consistent interpretations and decisions, or does it limit their information search

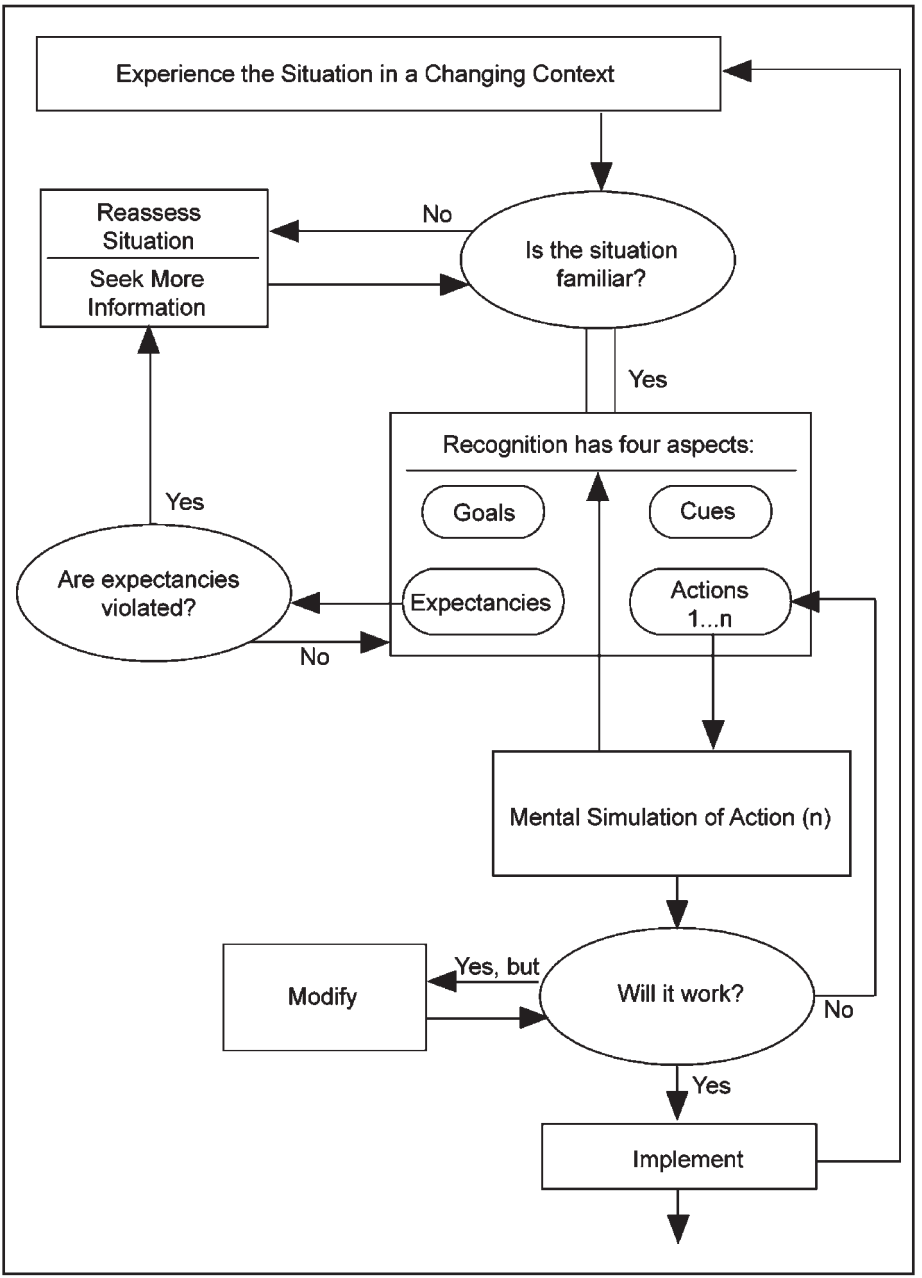

Figure 1. Recognition-primed decision-making (RPD) model. From G. A. Klein, 1993, p. 141. Decision making in action: Models and methods. G. A. Klein, J. Orasanu, R. Calderwood, C. E. Zsambok, Editors. Copyright © 1993 by Ablex Publishing Corporation. Norwood, NJ. Reproduced with permission of Greenwood Publishing Group, Inc., Westport, CT.

to only a few cues, leading to biased decisions? Do specific emotions, such as anger or fear, influence experts' decision process in specific ways? Moreover, researchers need to examine whether experts do indeed respond differentially to task-related and unrelated affect—that is, do they integrate the former into their decision making and disregard the latter? If they do, which strategies do they employ to counter the impact of unrelated affect?

Research addressing the role of affect in expert decision making could also address some shortcomings of the current emotion literature, most notably by highlighting the value of affective information. Although JDM researchers acknowledge the evolutionary benefit of affect, their studies almost exclusively concern incidental affect—that is, affect that is irrelevant to the task at hand and thus conflicts with sound decision making. Considerably fewer studies have focused on the impact of what we have called task-related affect. By turning their attention to experts' use of affective information, researchers have come to a better understanding of what it means for affect to be task-relevant and when affect should be an integral part of experts' decision making.

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