Choice Processing in Emotionally Difficult Decisions

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Choice conflicts between one's important values may cause negative emotion. This article extends the standard effort-accuracy approach to explaining task influences on decision processing by arguing that coping goals will interact with effort minimization and accuracy maximization goals for negatively emotion-laden decision tasks. These coping goals may involve both a desire to process in a thorough, accurate manner and a desire to avoid particularly distressing aspects of processing. On the basis of this extended framework, the authors hypothesized and found in 3 experiments that decision processing under increasing negative emotion both becomes more extensive and proceeds more by focusing on one attribute at a time. In particular, increased negative emotion leads to more attribute-based processing at the beginning of the decision process. The results are inconsistent with views that negative emotion acts only as an incentive or only as a source of decision complexity.

Individuals make decisions by using a wide variety of processing strategies, ranging from normative procedures that process all relevant information and explicitly consider trade-offs between attributes to more heuristic procedures that use information selectively and avoid trade-offs between attributes. For a number of years, behavioral decision research has addressed how properties of choice tasks influence these decision-processing strategies (Einhorn & Hogarth, 1981; Payne, Bettman, & Johnson, 1992). Decision makers are often depicted as deciding how to decide on the basis of trade-offs between the accuracy of various decision strategies and the cognitive effort required to implement those strategies. Thus, research has investigated both the factors affecting the relative effort needed for various strategies (e.g., task complexity, information format, and response mode) and the factors influencing the relative accuracy of various rules or the importance of making an accurate decision (e.g., correlation among attributes and incentives; see Payne, Bettman, & Johnson, 1993, for a review).

Within the effort--accuracy theoretical framework, decision difficulty is often thought to result from information that is too voluminous or complex for the decision maker's available cognitive resources (e.g., Einhorn & Hogarth, 1981; Payne, 1982). Thus, decision research has focused on the cognitive aspects of decision difficulty. Negative emotion, such as that arising from choice conflicts between important goals, can also contribute to perceived decision difficulty (Beattie & Barlas, 1993; Festinger, 1957; Janis & Mann, 1977; Shepard, 1964; Simon, 1987). For example, a decision maker may have to trade off his or her own opportunities for career advancement against a spouse's when deciding whether to accept a job requiring relocation. The task may be negatively emotion-laden and characterized as very difficult, even if the relevant information is easy to comprehend; this negative emotion may be an important task variable influencing the decision strategy selection process.1

This task-related negative emotion has been largely neglected in the literature on strategy selection in decision making. Although some research has addressed how ambient affect, such as negative mood or stress attributable to background noise, influences decision-processing patterns (e.g., Hammond & Doyle, 1991; Isen, 1984; Lewinsohn & Mano, 1993), the influence of affect on processing is likely to differ depending, in part, on whether that affect is task related (e.g., Bodenhausen, 1993; Christianson, 1992; see Yates, 1990, for discussion of the task--ambient distinction).

The basic effort--accuracy framework has proven to be a powerful resource for explaining decision-processing behavior; however, people have other goals that may interact with effort and accuracy goals in decision making (e.g., coping with negative emotion, maintaining self-esteem, or justifying a decision to others). Because negative emotion may be prevalent in many important decisions, as noted above, we examine goals for coping with negative emotion and develop an extended effort--accuracy framework that allows coping goals to interact with more general effort minimization and accuracy maximization goals. We use this extended framework to make predictions regarding how negative,

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1 When asked to describe a difficult decision, many managers in executive education programs conducted by John W. Payne described decisions that appear to be more emotionally difficult than cognitively complex. A common recently described difficult decision was choosing which employee(s) to let go in a downsizing effort.
specifically task-related emotion influences decision processing.

This article proceeds as follows. In the following section, we review aspects of decision tasks and decision strategies. Then we discuss an effort-accuracy framework that is the dominant theoretical model for explaining how aspects of decision tasks can influence processing behaviors. We develop two alternative predictions for decision processing under negative emotion on the basis of the basic effort-accuracy theoretical framework, and we then extend the framework by considering individuals' motivations to cope with negatively emotional decisions. Next, we develop hypotheses for decision processing under negative emotion on the basis of the extended framework and present data from three experiments that support these hypotheses.

Decision Tasks and Decision Strategies

Decision tasks such as the job choice illustrated in Table 1 often involve selection from a set of alternatives, each defined by some set of potential future consequences (e.g., being paid enough money to live comfortably, being laid off from one's job). These consequences vary in terms of both their likelihood of occurrence and their value or desirability. The attribute values defining each alternative (e.g., Job A's starting salary, Job B's level of job security) influence which potential consequences are considered during decision processing. For example, if all of a decision maker's current options offer excellent job security, the potential consequence of being laid off is unlikely to be considered during his or her decision process.

The information processing carried out during a decision often varies depending on such properties of a decision task as its complexity and, as we propose, its level of negative task emotion. Three primary measures of information acquisition behavior capture much of this variance in decision processing. The first is simply how much information is processed. For instance, a job choice may include lengthy consideration of all information relevant to each of one's job offers, or the decision process may involve a cursory examination of a few pieces of information. The second is whether information is processed selectively across either attributes or alternatives (i.e., different amounts of information are processed for each attribute or alternative) or consistently (i.e., the same amount of information is processed for each attribute or alternative). Thus, if an individual considering the jobs in Table 1 decided that the most important attribute was his or her spouse's career options and simply chose Job B, with the best possible value on that attribute, the decision process would involve highly selective use of attribute information. The third important characteristic of decision behavior is the pattern of processing. Information processing may be organized primarily by alternative, in which multiple attributes (dimensions) of a single alternative are considered before information about another alternative is processed, or by attribute, in which the values of several alternatives on a single attribute are processed before information about another attribute is processed. For instance, a person considering the decision in Table 1 might engage in an attribute-based processing pattern by examining the salary levels of the five jobs, noting that Job A offers the highest salary and that Job C offers a very good salary. Conversely, the person may engage in an alternative-based processing pattern by combining his or her impressions of the spouse's career options, initial salary, job security, and work-week length offered by Job A to form an overall valuation of that job.

Many different strategies for solving decision problems exist, and these strategies can be characterized by the above processing measures, particularly when a decision problem involves more than two alternatives. For instance, if attributes are of differing importance to decision makers, and they attach subjective values to each possible attribute level, then they may use the weighted additive strategy often recommended by decision analysts (Keeney & Raiffa, 1976). Using this strategy, they would consider each alternative sequentially, multiplying each attribute value (e.g., Job A's value for spouse's options, initial salary, etc.) by its importance weight and summing across all of these weighted values to compute an overall value for each alternative (e.g., an overall value for Job A, then for Job B, etc.). The alternative with the highest overall value would be chosen. This weighted additive strategy is therefore characterized by processing that is extensive, consistent (rather than selective) across both attributes and alternatives, and alternative based in pattern.

In contrast, the simpler lexicographic strategy (Tversky, 1969) involves choosing the alternative with the best value on the most important attribute. For instance, a decision maker for whom spouse's career options was the most important attribute could resolve the job choice in Table 1 by considering this attribute for all five jobs and choosing the job with the best value (Job B). The lexicographic strategy is characterized by limited processing that is attribute based and selective across attributes but consistent across alternatives. Finally, the elimination-by-aspects (EBA) strategy involves elimination of options that do not meet a minimum cutoff value for the most important attribute, followed by consideration of the second most important attribute, with the process continuing until a single option remains (see Tversky, 1972). For instance, assume that a decision maker's two most important attributes were spouse's career options and then job security and that the cutoff value for both attributes was an "average" value. To use EBA, this

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Example Decision Task</th>
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<tbody>
<tr>
<td>Job</td>
<td>Spouse's career options in area</td>
</tr>
<tr>
<td>A</td>
<td>Worst</td>
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<tr>
<td>B</td>
<td>Best</td>
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<td>C</td>
<td>Poor</td>
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<td>D</td>
<td>Average</td>
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<tr>
<td>E</td>
<td>Worst</td>
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Note. Attributes are all scored on a 7-point scale ranging from best to worst, with best indicating the most desirable value for the attribute and worst indicating the least desirable value for the attribute.
decision maker would first process spouse's career options, eliminating any job with a below-average value on that attribute (eliminating Jobs A, C, and E); he or she would then eliminate Job B because of its below-average value on job security, leading to a choice of Job D. The EBA strategy is attribute based and will vary in terms of the extent and selectivity of processing, depending on how quickly in the process alternatives are eliminated. See Payne, Bettman, and Johnson (1988) or Svenson (1979) for more detailed discussion of these and other processing strategies.

On the basis of observation of processing characteristics, one may make some general inferences regarding participants' underlying decision strategies. One important distinction among strategies is the degree to which they require explicit trade-offs between attributes, that is, the degree to which they are compensatory. For instance, deciding how much additional salary one would require to relocate to an area where one's spouse has poor rather than average career options involves making an explicit trade-off between salary and spouse's career options. The presence of this sort of processing operation indicates a compensatory decision strategy, in which a good value on one attribute can compensate for a poor value on another. Compensatory decision rules tend to be characterized by less selective and more alternative-based decision processing (e.g., Payne, 1976).

Noncompensatory strategies, in contrast, are those for which a good value on one attribute cannot make up for a poor value on another. For example, if a decision maker is using EBA and spouse's career options is the most important attribute, then a job with an unacceptable value on that attribute will be eliminated from consideration, regardless of the level of job security or salary that job offers. Note that although the EBA and lexicographic strategies involve judgments about overall attribute importance, their attribute-based comparisons do not require trade-offs of specific attribute values.

More generally, decision strategies differ in terms of the degree to which they are normatively accurate. The most straightforward definition of normative decision accuracy is in terms of decision outcomes, with outcomes that maximize the decision maker's expected utility considered to be more accurate (e.g., Keeney & Raiffa, 1976; Thorngate, 1980). However, it is often difficult to measure a chosen alternative's distance from utility maximization. Normative accuracy can also be defined in terms of the decision process, with decision processes that are both extensive and compensatory considered to be more normative (e.g., Frisch & Clemen, 1994). Thus, the weighted additive decision strategy is typically considered to be the classic model of normative decision making because it both identifies the utility-maximizing alternative (if completed without error) and involves extensive, compensatory decision processing (Hogarth, 1987; Keeney & Raiffa, 1976). More generally, extensive, consistent, and alternative-based processing is typically associated with normative accuracy (see Bettman, Johnson, Luce, & Payne, 1993).

There is some direct experimental evidence linking processing characteristics with decision accuracy. Decision makers who are instructed to maximize decision accuracy shift to more extensive, less selective, and more alternative-based processing sequences compared with decision makers who are instructed to minimize effort (Creyer, Bettman, & Payne, 1990; Payne, Bettman, & Luce, 1996). Further, Payne et al. (1996) found that participants making choices among positive, low-stakes monetary gambles (in which expected value is a good approximation of expected utility) are more likely to choose the alternative with the highest expected value under an accuracy goal than under an effort goal, and participants are more likely to choose alternatives that are consistent with a lexicographic rule under an effort goal. Payne et al. also reported a correlation analysis indicating that choices consistent with expected value maximization tend to be associated with more extensive, less selective, and more alternative-based processing, whereas choices consistent with a lexicographic strategy tend to be associated with less extensive, more selective, and more attribute-based processing. Thus, the relationships between accuracy versus effort goals, processing behavior, and the degree to which actual choices are consistent with more or less normative decision rules are relatively well established, at least for decisions involving simple gambles (see also Gilliland & Landis, 1992).

An Effort–Accuracy Framework for Strategy Selection

The most frequently used framework for explaining how decision makers choose between more normative and more heuristic strategies, given task demands, is the cost-benefit perspective. Essentially, this framework assumes that decision strategy selection is a function of some trade-off between the benefits offered by and the costs extracted by each available strategy (Beach & Mitchell, 1978; Lipman, 1991; Russo & Dosher, 1983; Shugan, 1980). Payne et al. (1993) developed this general cost-benefit notion by arguing that the primary adaptive trade-off made by individuals is between the cognitive effort required by a decision strategy (a cost) and the accuracy offered by that strategy (a benefit). Consistent with Simon's (1956, 1978) notion of bounded rationality, the effort–accuracy framework argues that decision makers exploit environmental structure to attain reasonable decision accuracy subject to the constraints of limited cognitive resources (see also Gigerenzer & Goldstein, 1996, and see Wickens, 1986, for a similar theoretical perspective in the context of performance-resource functions). Thus, decision makers are assumed to trade off the increased potential accuracy offered by more normative decision strategies, such as weighted adding, with the increased effort savings offered by more heuristic strategies, such as lexicographic or EBA. Next we consider the implications of this theoretical perspective for decision processing under task-related emotion.

How might increased negative emotion influence decision making in general and decision strategy selection in particular? At a general level, some have argued that individuals will respond to more negatively emotional tasks by simply avoiding the relevant decision (e.g., Janis & Mann, 1977).
Similarly, others have argued that individuals cope with emotion-laden decision tasks by choosing alternatives that minimize likely regret and guilt (J. Baron, 1992; Bell, 1982; Loomes & Sugden, 1982; Simonson, 1992), protect self-esteem (Larrick, 1993), or maximize security (Schneider & Lopes, 1986). However, research has not addressed the important question of how negative emotion associated with the decision task might alter the details of decision processing.

One obvious approach is to view negative emotion as a factor within the accuracy-effort framework for decision strategy selection and to examine how emotion might affect either accuracy or effort. Two possibilities suggested by the accuracy-effort framework are, first, that negative emotion might act as a signal of decision importance or as an incentive (increasing the desire for accuracy), and, second, that negative emotion might act as a source of effort-taxing decision complexity (increasing the costs of decision processing). We briefly develop these two possibilities below, noting that they have implications for decision processing under negative emotion that are inconsistent with one another. We then argue that this conflict can be resolved by taking an alternative approach to understanding how emotion affects decision processing: that of directly examining a third goal, minimizing negative emotion, and considering how that goal interacts with accuracy and effort concerns.

**Effort-Accuracy Hypotheses Regarding Task-Induced Emotion**

*Emotions as incentives.* One way that negative emotion may influence decision strategy selection is by signaling the importance of making an accurate decision. Emotions are generally thought to draw attention to states of the world that require a change in one's action tendencies (e.g., Frijda, 1988). Negative emotions, in particular, tend to signal situations requiring coping efforts to forestall or minimize some threat or harm (Lazarus, 1991a, 1991b; Schwarz, 1990). For instance, Schwarz (1990) argued that any negative affective state may indicate that one's current situation is problematic, directly priming effortful, analytic processing strategies. Negative emotion may therefore operate as an incentive to perform the decision task well, increasing a decision maker's relative emphasis on accuracy over effort and causing a shift to more normative processing patterns. For example, an individual's initial distress at receiving a job offer in a new city may draw his or her attention to the implications of the job choice for his or her family and may therefore underscore the necessity of making the best overall decision. On the basis of our discussion of normative processing patterns above, this view predicts that increased negative, task-related emotion will lead to more extensive, less selective, and more alternative-based processing patterns.

*Emotions as complexity.* Decisions involving important goals or difficult conflicts often seem more taxing than do more mundane decisions. Eysenck (1984) argued that arousal can adversely affect cognitive performance, and Lewinsohn and Mano (1993) argued that emotional arousal related to negative mood limits the attentional capacity available for decision making. Similarly, Seibert and Ellis (1991) demonstrated that negative mood states lead to an increased incidence of task-irrelevant thoughts, apparently lowering available cognitive capacity. A decision may therefore seem increasingly difficult or complex as it becomes increasingly emotion laden. One of the most well-established findings in decision research is that as tasks become more complex, people typically shift toward more simplified, heuristic decision strategies (Klayman, 1985; Payne, 1976; Payne et al., 1988; Stone & Schkade, 1994; Zakay, 1985). Thus, a second possible prediction is that by increasing decision complexity or difficulty, negative task-related emotion will encourage less extensive, more selective, and more attribute-based processing. For example, a decision maker feeling distress at the prospect of choosing between two job offers may conclude that thinking through various decision criteria and potential outcomes is too taxing, and he or she may therefore develop a simple decision rule (e.g., taking the higher paying job).

The views of emotions as incentives and emotions as complexity thus result in conflicting predictions about decision processing. We believe that we can resolve this inconsistency between the two predictions based on considering emotion as a factor within the effort-accuracy framework by taking a different approach, namely, by directly considering how the goal of coping with negative emotion will interact with effort and accuracy goals.

**Coping Hypotheses Regarding Task-Induced Emotion**

Emotion was considered above within the effort-accuracy approach as a factor influencing either the decision maker's desire for accuracy or the decision maker's desire for effort conservation. We believe that both of these views have some merit. However, we believe that the motivation to directly reduce the experience of negative emotion may interact with effort and accuracy goals, and therefore one must consider this additional goal to make clear predictions. We argue below that individuals cope with threatening decisions by altering their processing to reduce experienced negative emotion. As a result of doing so, decision makers may depart from the general patterns of processing typically observed in less emotional decision tasks. Thus, decision behavior under negative emotion may incorporate elements of both increased accuracy maximization and increased simplicity as directed by emotion minimization concerns.

Lazarus and Folkman (1984) identified two general coping behaviors for dealing with emotion. These are (a) problem-focused coping, or direct actions intended to improve the person-environment relationship eliciting emotion, and (b) emotion-focused coping, or indirect actions intended to minimize experienced emotion through changes in (only) the amount or content of thought about the emotion-eliciting situation. As we discuss below, there are parallels between considering emotion as an incentive and considering problem-focused coping; there are also parallels between considering emotion as a source of increased complexity and considering emotion-focused coping. Al-
though problem-focused coping and emotion-focused coping tend to involve very different types of behavior, the two forms of coping are typically used simultaneously (e.g., Carver, Scheier, & Weintraub, 1989; Folkman & Lazarus, 1988; Lazarus & Folkman, 1984; Terry, 1994). To make clear predictions, we consider the specific aspects of processing that each coping motivation is likely to affect most strongly.

Problem-focused coping. Problem-focused coping involves direct attempts to solve a problem. The focal issue in decision making is to make a good decision; hence, the major potential problem is the possibility of making a suboptimal choice, resulting in negative outcomes, regret, and blame. As we discussed under Emotions as incentives above, negative emotion may act as a signal that important outcomes are relevant, and therefore more potentially accurately processing strategies may be elicited as part of the decision maker's problem-focused coping efforts. Thus, in decision domains, problem-focused coping should involve processing efforts directed at identifying the most accurate alternatives. Recall, decisions that emphasize accuracy are generally associated with extensive, consistent, and alternative-based processing.

The motivation to perform accurately should be particularly closely associated with extensive processing, rather than other aspects of processing, because thorough processing is the most readily available (to oneself) and observable (to others) indicator of the motivation to achieve decision accuracy. Indeed, when asked to enumerate factors leading to decision accuracy, individuals most often mention consideration of all relevant information (see Payne et al., 1988, p. 551, footnote 4). Therefore, we expect negative, task-related emotion to elicit more extensive processing; Hypothesis 1 was that decision makers will process more extensively in environments characterized by more negative task-related emotion.

Emotion-focused coping. Emotion-focused coping can involve both avoidance (e.g., engaging in a distracting hobby) and changing the subjective meaning of a situation (e.g., deciding that another person is responsible for a negative outcome). We concentrate on avoidance because attempts to change meaning seem more idiosyncratic to particular decision makers. Avoidance can involve simply not making a decision (e.g., Janis & Mann, 1977), or, as we argued earlier in the context of complexity, avoidance can involve use of simplified heuristic strategies. However, given Hypothesis 1 above, we believe that avoidance will be rather narrowly directed toward the most emotion-laden, and therefore the most taxing, aspects of processing. That is, emotion-focused coping may operate by motivating the decision maker to avoid particularly emotion-laden decision-processing operations, even though the overall extent of processing may increase as negative, task-related emotion increases.

One particularly unpleasant aspect of decision processing is accepting less of one attribute for more of another, and these attribute trade-offs are generally avoided when feasible (Abelson & Levi, 1985; Einhorn & Hogarth, 1981; Hogarth, 1987; Shepard, 1964; Tetlock, 1992; Tversky & Shafir, 1992). Shepard (1964, p. 277), for example, noted that an important goal when faced with a choice involving conflicting objectives (i.e., attributes that must be traded off) is to "escape from the unpleasant state of conflict induced by the decision problem itself." Hogarth (1987) proposed further that noncompensatory decision rules are attractive because they allow one to avoid the negative feelings brought about by explicitly confronting the potential losses associated with trade-offs between attributes. Thus, a particularly emotionally costly aspect of decision processing is making explicit attribute trade-offs because these call attention to areas of compromise that are linked with potential losses. For instance, a decision maker may experience negative emotion if he or she has to think through the potential outcomes associated with a spouse having limited career options in order to explicitly determine how a decrement in that attribute should be traded off against an increase in his or her own salary. Individuals may therefore cope with decision-related emotion by avoiding explicit consideration of necessary trade-offs. Processing by attributes over several alternatives can minimize confrontation of the knowledge that one attribute must be sacrificed for another to be maximized, whereas processing by alternative highlights the trade-offs that must be made. Thus, emotion-focused coping motivations may result in more attribute-based processing; Hypothesis 2 was that decision makers will process more by attribute in environments characterized by more negative task-related emotion.

Hypotheses 1 and 2 address the extent of processing and the degree to which processing is attribute based, respectively. A third aspect of decision processing is selectivity. As we noted earlier, increased selectivity in processing is frequently viewed as indicative of more heuristic, noncompensatory decision strategies (e.g., the lexicographic strategy). In emotion-laden decision domains, predictions regarding the impact of emotion on the selectivity of processing are not as clear cut as those for the amount and the pattern of processing. One possibility is that, as we argued on the basis of emotion-focused coping, increased emotion will lead to less compensatory processing and therefore increased selectivity. However, as we argued on the basis of problem-focused coping, increased emotion may lead to more extensive processing and therefore decreased selectivity. Given the conflicting predictions generated by our theoretical framework, we do not make a specific directional hypothesis regarding selectivity.

Considerations of selectivity will be relevant to an exploratory set of analyses that we report after the results of three experiments testing Hypotheses 1 and 2. This analysis examines how the pattern and the selectivity of processing unfolds over the time course of participants' decision processing. This dynamic analysis of processing is motivated by research indicating that decision behavior often proceeds in discrete phases (e.g., Bettman & Park, 1980; Russo & Leclerc, 1994), as well as by arguments that emotion and coping interact with one another over the time course of any emotion-laden encounter (e.g., Lazarus, 1991a, 1991b).
Summary of Hypotheses

We hypothesize that task-related emotion will encourage decision makers to process both more extensively and more by attribute. This joint hypothesis is inconsistent with past research concluding that factors leading to more extensive processing also encourage more alternative-based processing. It is also inconsistent with the two alternative hypotheses based on the effort–accuracy framework. We argue that the decision maker may use motivations to cope with negative emotion as a guide in choosing which specific accuracy maximization operations to increase (e.g., overall decision effort) and which particularly taxing operations to decrease (e.g., alternative-based processing sequences). Thus, we consider how coping goals interact with accuracy and effort goals to make predictions regarding the processing of negatively emotion-laden decision tasks. The primary insight we gain from this coping perspective is that negative emotion may have two simultaneous effects over the time course of the decision episode; emotion may serve as a signal regarding problem importance (Hypothesis 1) at the same time that people try to minimize the experience of negative emotion through avoidance (Hypothesis 2).

It is important to note that our hypotheses are intended to generalize to only a particular subset of decisions. Previous behavioral decision research has typically involved decision situations in which the alternatives (e.g., small monetary gambles or hypothetical consumer goods) have limited potential to elicit negative task-related emotion; we would expect coping goals to be largely irrelevant to these situations. Further, although task-related emotion may be present in domains involving cognitive tasks other than decision making (e.g., memory, judgments of attribution), our work is not intended to generalize to these other domains because coping strategies are likely to be domain specific. Finally, we focus on generalized negative emotion and do not distinguish among specific negative emotions such as anxiety, guilt, or sadness. We also do not generalize our research to situations involving positive task-induced emotion because reactions to negative affect often are very different from, and more diverse than, reactions to positive affect (Clark & Isen, 1982; Fiske & Taylor, 1991). Next we report three experiments investigating our hypotheses.

Overview of Methodology

We conducted three experiments involving task-related negative emotion and decision processing. Although these experiments involved differing manipulations of task-related emotion, the conceptual basis for the emotion manipulations was similar across studies. All three studies also involve the same information acquisition methodology and the same dependent variables assessing processing. These shared methodological elements are discussed below.

Manipulations of Emotion in Decision Domains

Manipulating task-related emotion. To test Hypotheses 1 and 2, it was necessary to manipulate task-related emotion within a controlled decision-making environment, allowing examination of the details of information processing. To manipulate emotion, we relied on Lazarus's (e.g., 1991a, 1991b) general argument that negative emotion is heightened when an encounter is appraised as likely to thwart more important or more numerous goals, particularly when one's options and prospects for coping are limited. Thus, a decision should be more negatively emotion laden to the degree that its unwanted potential consequences are either more severe (e.g., involving more numerous or important goals) or more likely. Further, for negative emotion to be classified as specifically decision-related, decision conflict must be present; that is, one alternative cannot dominate (i.e., cannot be better than every other alternative in terms of every possible choice criterion). Conflict implies that one cannot further one goal (e.g., maximize one attribute) without making sacrifices on another goal (e.g., accepting less of some other attribute). For example, a decision maker choosing between Jobs A and B in Table 1 may experience negative emotion tied directly to the necessity of sacrificing either his or her own salary and job security or a spouse's career options because negative consequences could follow from either sacrifice. Overall then, a decision task should be inherently negatively emotional when severe negative consequences are possible, but the best course of action is unclear.

In Experiments 1 and 2, we manipulated task-related emotion by using descriptions of the likelihood and vividness of particular negative decision consequences for options characterized by decision conflict. In Experiment 3, we manipulated emotion jointly through decision conflict (the degree to which losses on one attribute must be accepted for gains on another attribute to be realized) and trade-off difficulty (the degree to which attributes are linked to highly valued goals). We discuss these manipulations in greater detail in the context of each experiment.

Emotion-manipulation check measures. For all three studies, the manipulation check variable of primary interest is based on a paper-and-pencil emotion-adjective checklist scale, similar to the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; Watson & Tellegen, 1985). Immediately after each decision, participants indicated the degree to which the adjectives reported in Table 2 described the way they had felt while making their decision by writing a number between 1 (not very well at all) and 5 (extremely well) next to each adjective. Positive emotion terms were included on the checklist to disguise the focus of our research from participants, rather than for inclusion in the dependent measure. Thus, our emotion composite, denoted $\text{NEGAVG}$, was constructed by taking a simple average of the negatively valenced emotion terms.2

2 We also calculated and analyzed a composite positive-emotion term. The negative- and positive-emotion terms either correlated negatively ($r = -.45$ for Experiment 1 and $r = -.36$ for Experiment 3) or nonsignificantly ($r = .08$ for Experiment 2) with one another. Further, the positive emotion composite shows no significant effects of the emotion manipulations across our three experiments. Finally, a difference score constructed by taking the negative composite minus the positive composite showed the same mean and significance patterns as $\text{NEGAVG}$. 
Experiments 1, 2, and 3.

Table 2

<table>
<thead>
<tr>
<th>Emotion Terms From the Adjective Checklist Measures for Experiments 1, 2, and 3</th>
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<tbody>
<tr>
<td><strong>Experiment 1</strong> emotion terms</td>
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<tr>
<td>AFRAID</td>
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<tr>
<td>AMUSED</td>
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<td>ANGRY</td>
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<td>ANXIOUS</td>
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<td>CALM</td>
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<td>CAREFREE</td>
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<td>CHEERFUL</td>
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<td>DEPRESSED</td>
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<td>EDGY</td>
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<td>EMOTIONAL</td>
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<td>GUILTY</td>
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<td>HAPPY</td>
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<td>HOPEFUL</td>
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<td>INTERESTED</td>
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<td>UPSET</td>
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<td>WORRIED</td>
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**Note.** Underlined items were averaged to form the relevant NEGAVG composite measure. The exact emotion terms making up the checklist measure were altered between Experiments 1 and 2, as shown in the table. PANAS = Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988); NEGAVG = average of negative emotion terms.

Participants also completed several 7-point Likert-type scales assessing factors such as the stressfulness or difficulty of their decisions and differing somewhat for each experiment. These scales, particularly the stress scale, generally mimicked the findings for NEGAVG. For simplicity, we report only NEGAVG below.

The Mouselab Computer Program

Participants' information acquisitions, response times, and choices were monitored by using the Mouselab software system (Payne et al., 1993) on an IBM-compatible computer. Mouselab presented choice stimuli in the form of a matrix of available information, with rows defined by alternatives and columns defined by attributes. All choice information was hidden behind closed boxes that participants opened one at a time by moving a mouse-controlled cursor into a box. Participants indicated their choices by clicking a mouse button while in a box corresponding to one of the available alternatives. Mouselab recorded the order in which boxes were opened, the time spent in each box, and the chosen option.

**Dependent Variables Assessing Processing**

The information acquisition data recorded by Mouselab were used to create three primary measures of decision processing. Two dependent variables measured the extent of decision processing. The first, **TIME**, was simply the total time spent on each choice trial. The second, **ACQUISITIONS**, reflected the total number of acquisitions (i.e., the number of times information boxes were opened for a particular decision; reacquisitions of a previously considered piece of information were counted toward the total).

We calculated an index reflecting processing pattern on the basis of the sequence of information acquisition. Given the acquisition of a particular piece of information, we assessed the relative incidence of two cases for the acquisition of the next piece of information. First, the next acquisition could involve the same alternative but a different attribute (alternative-based transitions). Second, an acquisition could involve the same attribute but a different alternative (attribute-based transitions). A simple measure of the relative amount of alternative- or attribute-based processing was calculated by subtracting the number of attribute-based transitions for a trial from the number of alternative-based transitions for that trial and dividing this difference by the sum of alternative- and attribute-based transitions (Payne, 1976). This resulting measure, denoted **PATTERN**, ranged from a value of -1.0 to a value of 1.0, with lower numbers indicating relatively more attribute-based processing. Reacquisitions of the same piece of information and transitions that are neither attribute- nor alternative-based are not reflected in the **PATTERN** index. A **PATTERN** score indicating more attribute-based processing (e.g., a lower value) is interpreted as indicating greater avoidance of trade-offs.

**Experiment 1**

Experiment 1 provided an initial test of our processing hypotheses. Recall that we expected participants processing...
Table 3
Choice Screen Presented to Participants for Experiments 1 and 2

<table>
<thead>
<tr>
<th>Child</th>
<th>IQ-willing</th>
<th>Age</th>
<th>Personality</th>
<th>Family size</th>
<th>Living conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sang</td>
<td>Poor</td>
<td>6</td>
<td>Good</td>
<td>6 people</td>
<td>Bad</td>
</tr>
<tr>
<td>Rene</td>
<td>Very good</td>
<td>3</td>
<td>Average</td>
<td>3 people</td>
<td>Adequate</td>
</tr>
<tr>
<td>Zvaa</td>
<td>Very good</td>
<td>6</td>
<td>Very poor</td>
<td>6 people</td>
<td>Adequate</td>
</tr>
<tr>
<td>Kito</td>
<td>Very poor</td>
<td>4</td>
<td>Very good</td>
<td>4 people</td>
<td>Very bad</td>
</tr>
<tr>
<td>Jaime</td>
<td>Very poor</td>
<td>7</td>
<td>Don't prefer</td>
<td>7 people</td>
<td>Very bad</td>
</tr>
</tbody>
</table>

Note. Both IQ-willing to learn and personality were described as important because children scoring better on these attributes would be more likely to help others in their community. Age was described as relevant because the participant would develop a relationship with the child through correspondence (attribute values refer to whether the participant would prefer, be indifferent to, or not prefer the age of the child under consideration). Family size was described as important because the entire family benefits from the charity. Living conditions were described as relevant because decision makers could attempt to help children living in relatively worse conditions.

Table 4
Means and Standard Deviations of Negative Emotion and Processing Measures as a Function of Emotion Group for Experiment 1

<table>
<thead>
<tr>
<th>Dependent measure</th>
<th>Lower emotion (n = 13)</th>
<th>Higher emotion (n = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>NEGAVG</td>
<td>1.90</td>
<td>0.60</td>
</tr>
<tr>
<td>ACQUISITIONS</td>
<td>48.80</td>
<td>20.74</td>
</tr>
<tr>
<td>TIME</td>
<td>62.10</td>
<td>24.48</td>
</tr>
<tr>
<td>PATTERN</td>
<td>0.22</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Note. NEGAVG = average of negative emotion terms; ACQUISITIONS = number of acquisitions; TIME = time taken; PATTERN = index reflecting relative amount of attribute-based (−) and alternative-based (+) processing.
view of emotion as only an incentive nor the view of emotion as only increasing decision complexity; instead, they are consistent with our argument that problem-focused and emotion-focused coping motivations interact with effort and accuracy concerns when a decision elicits negative emotion.

Experiment 2

The methodology for the 80 undergraduate participants run during Experiment 2 was very similar to that used in Experiment 1, but the manipulation of emotion differed somewhat. We chose to manipulate the vividness and perceived likelihood of negative decision consequences jointly to have a strong manipulation in Experiment 1. We manipulated these aspects separately in Experiment 2. Also, we implemented a single response mode in Experiment 2 (i.e., all participants were instructed to choose one child) to avoid any possibility that the increase in attribute-based processing we observed in Experiment 1 was due to the “eliminate” instructions in the higher emotion group. Instead, we operationalized our manipulation of the likelihood of decision consequences through a statement regarding the base rate of support for nonchosen children. We expected cells associated with high (vs. low) vividness and low (vs. high) base rate to be associated with more negative, task-related emotion, leading to more extensive processing (Hypothesis 1) and more attribute-based processing (Hypothesis 2).

Method

Emotion manipulations. Both base rate and vividness were manipulated between subjects. Participants in the low base-rate condition were told that the children they did not choose had a 10% chance of receiving support from any sponsor; participants in the high base-rate condition were told that the children they did not choose had a 90% chance of receiving support from another sponsor. This manipulation was intended to lead to increased negative emotion by increasing the perceived likelihood of the most severe (imagined) potential consequences of the decision, so that important goals would be more likely linked with the decision. The second manipulation, vividness, was identical to the vividness aspect of the emotion manipulation from Experiment 1: Participants in the high-vividness condition received more voluminous and detailed background information than did participants in the low-vividness condition. Manipulation checks. Participants completed the adjective checklist described in Table 2 immediately after their decision. Then, participants were asked to complete two additional manipulation check measures on 7-point scales. The first measure asked participants to assess (on a scale ranging from not at all likely to very likely) the probability that nonchosen children would receive support from another sponsor (P(SUPP)); this was a manipulation check for base rate. The second asked participants to assess how serious the consequences were (to each child) of not receiving support from any sponsor (SERIOUS). This measure was a manipulation check for vividness because high vividness was expected to increase the perceived severity of decision consequences.

Additional scale measures. Three additional scale measures assessing how participants appraised their decision tasks were included to more fully evaluate the alternative hypothesis that negative emotion functions simply as an incentive. Immediately after the emotion manipulation and just before beginning processing, participants were asked to evaluate the importance of their upcoming decision (IMPORTANCE), how threatening they expected their decision to be (THREAT), and how challenging they expected their decision to be (CHALLENGE), all on 7-point scales. The means and standard deviations for these scale measures, the manipulation checks, and the processing variables are reported in Table 5.

Results

Emotion and other manipulation checks. The NEGAVG adjective checklist composite had a coefficient alpha of .94 and showed a main effect of the base-rate manipulation, with

<table>
<thead>
<tr>
<th>Dependent measure</th>
<th>Low base rate</th>
<th></th>
<th></th>
<th>High base rate</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low vividness</td>
<td>High vividness</td>
<td>Low vividness</td>
<td>High vividness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(n = 21)</td>
<td>(n = 20)</td>
<td>(n = 20)</td>
<td>(n = 19)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>NEGAVG</td>
<td>2.03</td>
<td>0.87</td>
<td>2.23</td>
<td>0.77</td>
<td>1.47</td>
<td>0.48</td>
<td>1.76</td>
</tr>
<tr>
<td>P(SUPP)</td>
<td>3.04</td>
<td>1.95</td>
<td>3.43</td>
<td>1.88</td>
<td>5.39</td>
<td>1.71</td>
<td>5.41</td>
</tr>
<tr>
<td>SERIOUS</td>
<td>5.76</td>
<td>1.16</td>
<td>5.75</td>
<td>1.22</td>
<td>5.46</td>
<td>1.46</td>
<td>5.59</td>
</tr>
<tr>
<td>ACQUISITIONS</td>
<td>86.00</td>
<td>43.66</td>
<td>91.20</td>
<td>42.17</td>
<td>59.60</td>
<td>21.74</td>
<td>66.60</td>
</tr>
<tr>
<td>TIME</td>
<td>82.10</td>
<td>47.26</td>
<td>95.50</td>
<td>39.75</td>
<td>58.90</td>
<td>21.87</td>
<td>69.10</td>
</tr>
<tr>
<td>PATTERN</td>
<td>0.01</td>
<td>0.30</td>
<td>0.05</td>
<td>0.36</td>
<td>0.19</td>
<td>0.41</td>
<td>0.12</td>
</tr>
<tr>
<td>IMPORTANCE</td>
<td>5.84</td>
<td>1.17</td>
<td>5.64</td>
<td>0.85</td>
<td>5.86</td>
<td>0.99</td>
<td>5.33</td>
</tr>
<tr>
<td>THREAT</td>
<td>4.05</td>
<td>1.57</td>
<td>3.69</td>
<td>1.71</td>
<td>2.85</td>
<td>1.77</td>
<td>2.16</td>
</tr>
<tr>
<td>CHALLENGE</td>
<td>5.29</td>
<td>1.08</td>
<td>5.41</td>
<td>1.23</td>
<td>5.45</td>
<td>1.46</td>
<td>5.78</td>
</tr>
</tbody>
</table>

Note. NEGAVG = average of negative emotion terms; P(SUPP) = probability of nonchosen children being supported elsewhere; SERIOUS = probability of the consequences for nonchosen children; ACQUISITIONS = number of acquisitions; TIME = time taken; PATTERN = index reflecting relative amount of attribute-based (−) and alternative-based (+) processing. IMPORTANCE = rated importance of task; THREAT = rated threat associated with decision task; CHALLENGE = rated challenge associated with decision task.
participants in the low base-rate condition reporting feeling more negatively (\(M = 2.13\) vs. \(M = 1.61\), \(F(1, 76) = 9.78, p < .003, MSE = 0.55\). Although the means were in the predicted direction, \(\text{NEGAVG}\) did not show a significant effect for vividness (\(M = 1.76\) vs. \(M = 2.00\), \(F(1, 76) = 2.12, p < .15, MSE = 0.55\). Base rate and vividness did not interact, \(F(1, 76) = 0.08, p < .78, MSE = 0.55\).

The above pattern of results for \(\text{NEGAVG}\) is unsurprising once one considers the remaining two manipulation check measures. As we expected, participants in the low base-rate condition reported that nonchosen children had a lower probability of being supported elsewhere (\(r(\supp)\)) than did participants in the high base-rate condition (\(M = 3.22\) vs. \(M = 5.40\), \(F(1, 76) = 30.90, p < .0001, MSE = 3.04\). \(r(\supp)\) was not influenced by vividness (\(M = 4.19\) vs. \(M = 4.39\), \(F(1, 76) = 0.27, ns, MSE = 3.04\), or by the interaction of base rate and vividness, \(F(1, 76) = 0.22, ns, MSE = 3.04\). In contrast, the manipulation check assessing the severity of consequences to nonchosen children (\(\text{SERIOUS}\)) did not show the expected effect of the vividness manipulation (\(M = 5.61\) vs. \(M = 5.67\), \(F(1, 76) = 0.04, ns, MSE = 1.74\). \(\text{SERIOUS}\) also did not show effects of base rate (\(M = 5.52\) vs. \(M = 5.76\), \(F(1, 76) = 0.65, ns, MSE = 1.74\), or an interaction, \(F(1, 76) = 0.06, ns, MSE = 1.74\). Consistent with these results, we found significant main effects of base rate on processing, but no main effects or interactions involving vividness. Thus, we focus on base rate in reporting the results below.

**Processing variables.** As we expected (Hypothesis 1), both variables assessing the amount of processing showed that participants in the low base-rate condition processed more extensively: \(\text{ACQTIME}\), \(M = 88.5\) versus \(M = 63.0\), \(F(1, 76) = 9.59, p < .003, MSE = 1,358.60\); \(\text{TIMETO}\), \(M = 88.6\) versus \(M = 63.8\), \(F(1, 76) = 9.28, p < .003, MSE = 1,321.60\). Further, and again as we expected, the \(\text{PATTERN}\) variable indicated more attribute-based processing in the low base-rate condition (\(M = -0.03\) vs. \(M = .16\), \(F(1, 76) = 5.25, p < .02, MSE = .13\).

**Additional scale measures.** Recall that three scale measures were taken to assess how participants appraised their decision tasks. The measure assessing the overall importance of the upcoming decision task showed no effects for base rate (\(M = 5.60\) vs. \(M = 5.86\), \(F(1, 76) = 0.88, ns, MSE = 1.30\). The \(\text{THREAT}\) measure did show an effect for base rate, with the more emotion-laden, low base-rate condition associated with higher threat (\(M = 3.87\) vs. \(M = 2.52\), \(F(1, 76) = 15.56, p < .001, MSE = 2.36\). However, base rate did not affect the \(\text{CHALLENGE}\) measure (\(M = 5.53\) vs. \(M = 5.61\), \(F(1, 76) = 0.95, ns, MSE = 1.44\). As we discuss below, we consider these joint results to be further evidence that negative emotion does not function simply as an incentive.

**Discussion**

The results of Experiment 2 replicate and strengthen the results from Experiment 1. Once again, as a decision task becomes more inherently emotion laden, participants simultaneously shift toward more extensive and less alternative-based processing patterns. These combined (effort and pattern) effects of negative emotion on decision processing are once again inconsistent with either of the simple hypotheses that follow from consideration of emotion only as an incentive or emotion only as a source of increased decision complexity within the effort-accuracy framework. We again conclude that in order to understand responses to task-related emotion, one must consider how the goal of coping with or minimizing negative emotion interacts with effort and accuracy concerns.

Three scale measures from Experiment 2 provide further evidence for the conclusion that negative emotion cannot be treated as only an incentive within the accuracy-effort framework. First, if the two base-rate conditions differed only in terms of perceived incentives, one might have expected participants’ ratings of task importance to vary with base rate; they did not. Further, the \(\text{THRASSE}\) and \(\text{CHALLENGE}\) scales were directly derived from Lazarus’s emotion framework (see Tomaka & Blascovich, 1993, for a discussion of these measures). According to that framework, increased negative emotion should lead to increased perception of threat relative to participants’ perception of challenge, as we found. If increased negative emotion were simply acting as an incentive, however, we would also expect to observe increased perception of challenge. Thus, we attribute the observed increases in decision effort to problem-focused coping motivations brought about by negative emotion rather than simply to an increase in perceived incentives.

Finally, note that although our manipulation of base rate influenced negative emotion and processing, our manipulation of vividness failed to do so. Our student participants appeared to be aware of the potential problems of needy children without extra prodding by using vividness. Note that our more successful emotion manipulation, base rate, is actually more directly tied to potential decision consequences.

**Experiment 3**

Experiments 1 and 2 support our general hypothesis that negative emotion will encourage processing patterns that are inconsistent with those one would expect given the basic accuracy-effort theoretical framework. Therefore, current theoretical explanations of contingent decision behavior must be expanded to explain an important class of decisions: negatively emotion-laden decisions. In these initial experiments, however, we manipulated negative emotion by directly altering decision consequences, independent of the matrix of alternatives and attributes from which participants chose. We now examine negative emotion that is related more directly to aspects of decision attributes and attribute values, consistent with our conceptualization of task-related emotion. Thus, we altered the pattern of attribute values (high vs. low conflict) to increase the prevalence of threats to the decision maker’s goals, and we altered attribute identities (high vs. low trade-off difficulty) to manipulate the importance of these goals. Although we were implementing new emotion manipulations, we once again expected more emotion-laden conditions to be associated with increased
effort and increased attribute-based processing. Experiment 3 also involved a different decision task, job choice. Thus, Experiment 3 attempted to replicate our basic pattern of results from Experiments 1 and 2 by using a new decision context and by manipulating emotion with aspects of the decision options.

Method

Task and procedure. Forty-one first- and second-year daytime students mastering in business administration were paid $20.00 for participation in two experimental sessions separated by 1 to 3 days. Session 1 was used to collect pretest information for a trade-off difficulty manipulation. In Session 2, participants made two decisions as to which of five jobs, described by four attributes, they would choose to take after completion of their degree programs. Participants completed an emotion-adjective checklist after each decision. Prior to their experimental decisions, participants completed two practice decisions differing from the experimental task only in terms of attribute identities. Participants were encouraged to ask questions during their practice decisions if the task was not clear, but none asked questions. The experiment was run just before the end of the academic year, and all participants had either completed or were completing decisions regarding summer internships (first year) or permanent jobs (second year). Thus, we thought the subject matter would have a high degree of realism for participants.

Manipulations. Our trade-off difficulty manipulation was within subjects with order counterbalanced across subjects. This manipulation was operationalized by altering two of the four attributes participants considered so that the high trade-off difficulty attributes would involve threats to more highly valued goals. High and low trade-off difficulty attributes were selected individually for each participant on the basis of assessments participants provided during Session 1, as we explain in detail below.

Interattribute conflict was operationalized between subjects by altering the manner in which the values on one attribute were related to the values on other attributes. For the low-conflict decisions, the average correlation between attribute values was .14, indicating a weak tendency for alternatives favored by one attribute to be favored by others as well. The average interattribute correlation in the high-conflict sets was −.31, indicating a tendency for alternatives favored by one attribute to not be favored by other attributes. More generally, participants in the low-conflict condition could choose an alternative with average to good values on all of the relevant attributes, whereas participants in the high-conflict condition had to accept below-average values on at least two attributes. Thus, participants in the high-conflict condition were required to accept more numerous or aversive relative losses to reach a decision. Note that participants' practice decisions were characterized by the same level of conflict as in their experimental decisions, so participants likely approached their experimental tasks with some knowledge regarding the type of conflict they would be considering.

To summarize, each participant made two experimental decisions, one low and one high in trade-off difficulty. For any given participant, both of these decisions were characterized by the same level of conflict; conflict was low for half of the participants and high for the other half. Higher trade-off difficulty and higher conflict were both expected to increase negative emotion. Further, decisions were expected to be particularly emotion laden when more losses had to be accepted (under high conflict) and those potential losses were more distressing (under high trade-off difficulty). That is, the emotion-eliciting effects of increased trade-off difficulty were expected to be accentuated as higher conflict

necessitated that more losses be accepted. Thus, we expected the simple main effects of trade-off difficulty on both emotion and processing to be stronger within high (vs. low) conflict.

Measures. The measures necessary to implement our manipulation of trade-off difficulty were taken with a paper-and-pencil survey administered during experimental Session 1 and are described in more detail in the following section. For both of the participants' Session 2 decisions, the emotion and processing variables were collected in the same manner as described for Experiment 2.

Session 1 Method and Results

Intuitively, it seems that some attributes (e.g., opportunity for job advancement, spousal career potential in a geographical area) are more distressing to trade off than are others (e.g., frequency of company outings, decor in the company cafeteria). Beattie (1988; Beattie & Barlas, 1993) has developed and tested an intriguing alternative-level framework for trade-off difficulty, classifying options as noncommodities (e.g., health, pain, promotions), commodities (e.g., cameras, VCRs), and currencies (e.g., money, time). She argued that decisions among noncommodities are hardest. Attribute-level frameworks for trade-off difficulty are lacking, however.

To quantify trade-off difficulty at the attribute level, we extrapolated from the notion of loss aversion, or the general aversion to accepting the losses required by trade-offs. More specifically, decision makers typically react to losses more strongly than they react to gains of equivalent magnitude (e.g., Kahneman & Tversky, 1979), and this tendency appears to systematically vary by attribute (Hardie, Johnson, & Fader, 1993; Irwin, 1994). For example, decision makers are often particularly reluctant to accept losses in such domains as public safety risks for nuclear plant siting and other environmental policies (Kunreuther, Basterling, Desvousges, & Slovic, 1990; Slovic, Fischhoff, & Lichtenstein, 1976), codes for moral behavior (J. Baron, 1986), consumer protection (Viscusi, Magat, & Huber, 1987), noncommodities such as health (Beattie, 1988; Beattie & Barlas, 1993), and employment opportunities (Shapira, 1981). We argue that attributes associated with higher levels of loss aversion are more difficult to trade off because such trade-offs require that a loss be accepted. Hence, our first step in operationalizing trade-off difficulty involved pretesting the levels of loss aversion participants associated with each of several job-related attributes.

A second quality of decision attributes, attribute importance, is also of interest. We believe that importance and loss aversion are related, but not identical, concepts. For instance, currency attributes such as purchase price are often associated with very little loss aversion (Beattie, 1988; Beattie & Barlas, 1993; Kahneman, Knetsch, & Thaler, 1990; Tversky & Kahneman, 1991), although such financial attributes are often highly important. Because variations in attribute importance can affect the effortfulness and pattern of decision processing (e.g., Payne et al., 1988), the goal for our trade-off difficulty manipulation was to match attributes on importance while varying loss aversion. Therefore, multiple measures of both importance and loss aversion
were taken during Session 1. This measurement process is described below.

Session 1 measures. There is no single, accepted measure of either loss aversion or importance. Thus, three different measures of importance, all well-accepted in the decision analysis literature (see Von Winterfeldt & Edwards, 1986), were collected for the following 15 attributes: cost of living in general geographical area of job, crime rates in general geographical area of job, expected pay increases, firm prestige, health care in general geographical area of job, industry characteristics, industry growth, initial salary, job security, leisure activities in general geographical area of job, opportunity for advancement, pollution in general geographical area of job, expected pay increases, and work-week length. To aid in these importance assessments, we provided participants with a table describing minimum and maximum attribute values. Three measures adapted from the literature on loss aversion were also collected for each attribute.

Our first importance measure, pricing improvement, involved placing a dollar value on changes from the average value of an attribute to a new value reflecting a 20% improvement (over average) for that attribute. The swing improvement measure, based on the common swing weight measure from the decision analysis literature, asked participants to first imagine that they were forced to accept a job with the worst possible value for each attribute. Participants were then asked to decide which attribute they would most want to change (or “swing”) from its worst to its best value and to indicate so by assigning that attribute a value of 100. Participants were then asked to rate the value of changing each of the remaining 14 attributes from worst to best by assigning each attribute a point value relative to the 100 points assigned to the initial attribute. Finally, for the ratio weights method, participants were given a list of all 15 attributes and asked to first assign a value of 100 to the attribute that would be most important to them, were they choosing a job. Then, participants were asked to assign values to the remaining attributes relative to that value of 100.

We also collected three measures of loss aversion. First, for pricing decrement, participants were asked to imagine they possessed a job characterized by average values on all attributes and to report the amount of money they would require in return for accepting a 20% decrease on each attribute. Given that this measure involves explicit acceptance of a loss, attributes differing in terms of loss aversion should show differences on pricing decrement, even if the pricing improvement measure were held constant. The ratio of pricing decrement to pricing improvement can be used as an index of loss aversion (Kahneman et al., 1990; Tversky & Kahneman, 1991). Thus, participants were asked to indicate the magnitude of the 50% probable above-average salary they would require to balance the 50% chance of a 20% lower-than-average salary. Larger values for such responses reflect greater loss aversion (Tversky & Kahneman, 1991).

Manipulation development. We entered each participant’s Session 1 data into a spreadsheet to design his or her Session 2 decisions. First, sets of attributes that were almost or exactly identical in terms of the three importance measures were identified. Next, within each of these matched sets of attributes, we identified attributes associated with higher and lower levels of loss aversion. In Session 2, each participant processed a high trade-off difficulty decision involving two attributes for which he or she was relatively loss averse. Each participant also processed a low trade-off difficulty decision involving two attributes for which he or she was less loss averse, but that were each matched to one of the high trade-off difficulty attributes in terms of importance. We completed the set of four attributes provided to each participant by adding the same two additional attributes to both the high and low trade-off difficulty conditions for that participant.

The specific identities of the high and low trade-off difficulty attributes were unique to each participant. In Table 6, we report average values for each of the six measures collected, calculated by pooling observations of the 82 low

<table>
<thead>
<tr>
<th>Measure</th>
<th>Low trade-off difficulty</th>
<th>High trade-off difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance measure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pricing improvement</td>
<td>$6,053</td>
<td>$5,985</td>
</tr>
<tr>
<td>Swing improvement</td>
<td>74</td>
<td>77</td>
</tr>
<tr>
<td>Ratio weights</td>
<td>78</td>
<td>79</td>
</tr>
<tr>
<td>Loss-aversion measure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pricing decrement</td>
<td>$18,561*</td>
<td>$32,750*</td>
</tr>
<tr>
<td>Swing decrement</td>
<td>62*</td>
<td>75*</td>
</tr>
<tr>
<td>Risk aversion</td>
<td>52*</td>
<td>99*</td>
</tr>
</tbody>
</table>

*p < .01.
trade-off difficulty attributes (2 for each of our 41 participants) and the high trade-off difficulty attributes with which they were paired. Across all of the data, the three loss-aversion measures correlated .86, .81, and .74 with one another. The three importance measures correlated .83, .82, and .78. By construction and as desired, the differences between the high and low trade-off difficulty groups were not significant for the three importance measures (all \( F \) values < 1), but these differences were significant at \( p < .01 \) for all of the loss-aversion measures. Thus, we were able to hold participants’ reported attribute importance weights constant between the low and high trade-off difficulty conditions, while varying levels of loss aversion.

Session 2 Results

Table 7 provides the means for negative emotion and for the processing variables by conflict and trade-off difficulty. Once again, we expected that more emotion-laden decision tasks would be associated with both more extensive and more attribute-based processing. We expected tasks that were higher in trade-off difficulty and conflict to be more emotion-laden. We also expected trade-off difficulty and conflict to interact in determining emotion and processing, as we expected the effects of trade-off difficulty to be accentuated under higher conflict.

Emotion manipulation check. The coefficient alpha for NEGAVG was .96. Participants reported more negative emotion under high conflict (\( M = 1.22 \) vs. \( M = 2.45 \)), \( F(1, 39) = 51.56, p < .0001, MSE = 0.59 \), and high trade-off difficulty (\( M = 1.66 \) vs. \( M = 1.94 \)), \( F(1, 39) = 7.82, p < .008, MSE = 0.23 \). Further, the interaction of conflict and trade-off difficulty was significant, \( F(1, 39) = 5.99, p < .02, MSE = 0.23 \). As expected, trade-off difficulty had a stronger effect under high conflict. The simple main effect of trade-off difficulty was significant within high conflict, \( F(1, 39) = 13.65, p < .01, MSE = 0.23 \), but not within low conflict, \( F(1, 39) = 0.15, ns, MSE = 0.23 \).

Processing. Participants in the high-conflict group processed more extensively, making more acquisitions (\( M = 55.00 \) vs. \( M = 87.10 \)), \( F(1, 39) = 13.81, p < .0006, MSE = 1,523.70 \) and taking more time (\( M = 66.10 \) vs. \( M = 109.90 \)), \( F(1, 39) = 11.95, p < .01, MSE = 3,273.90 \). Participants did not process more extensively for higher trade-off difficulty trials: ACQUISITIONS, \( M = 68.8 \) versus \( M = 70.9 \), \( F(1, 39) = 0.26, ns, MSE = 334.30 \); TIME, \( M = 86.6 \) versus \( M = 86.1 \), \( F(1, 39) = 0.01, ns, MSE = 470.70 \). However, the expected interaction between trade-off difficulty and conflict was found, with the (highest emotion) high trade-off difficulty/high-conflict cell associated with the most extensive processing: ACQUISITIONS, \( F(1, 39) = 6.69, p < .01, MSE = 334.30 \); TIME, \( F(1, 39) = 6.07, p < .02, MSE = 470.70 \). As we expected, the effects of trade-off difficulty are accentuated under high conflict for ACQUISITIONS; the simple main effect of trade-off difficulty within high conflict is significant, \( F(1, 39) = 5.04, p < .05, MSE = 334.30 \), whereas the effect within low conflict is not, \( F(1, 39) = 1.92, ns, MSE = 334.30 \). For TIME, the simple effects of trade-off difficulty were unexpectedly marginally significant within both low conflict, \( F(1, 39) = 3.11, p < .09, MSE = 470.70 \), and high conflict, \( F(1, 39) = 2.97, p < .10, MSE = 470.70 \).

The PATTERN variable did not show significant main effects for conflict (\( M = .07 \) vs. \( M = .05 \)), \( F(1, 39) = 0.03, ns, MSE = .16 \), or for trade-off difficulty (\( M = .06 \) vs. \( M = .06 \)), \( F(1, 39) = 0.01, ns, MSE = .08 \). Under high conflict, participants shifted to more attribute-based processing as trade-off difficulty increased, as we expected. The pattern of results under low conflict is less interpretable, with participants in the low-conflict group shifting to more alternative-based processing as trade-off difficulty increased. The simple effects of trade-off difficulty within low conflict, \( F(1, 39) = 6.28, p < .02, MSE = .08 \). Under high conflict, participants shifted to more attribute-based processing as trade-off difficulty increased, the simple effects of trade-off difficulty within low conflict, \( F(1, 39) = 3.13, p < .09, MSE = .08 \), and within high conflict, \( F(1, 39) = 3.16, p < .09, MSE = .08 \), are both marginally significant, although, as noted, the effects are in opposite directions.

Discussion

Considering the high-conflict group from Experiment 3, we again replicated the results of Experiments 1 and 2, as we observed more extensive and more attribute-based processing as trade-off difficulty (and emotion) increase. We believe

<table>
<thead>
<tr>
<th>Dependent measure</th>
<th>Low trade-off difficulty (( n = 22 ))</th>
<th>High trade-off difficulty (( n = 22 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEGAVG</td>
<td>( M = 1.20 ), ( SD = 0.30 )</td>
<td>( M = 1.26 ), ( SD = 0.35 )</td>
</tr>
<tr>
<td>ACQUISITIONS</td>
<td>( M = 58.80 ), ( SD = 26.66 )</td>
<td>( M = 51.10 ), ( SD = 19.77 )</td>
</tr>
<tr>
<td>TIME</td>
<td>( M = 71.80 ), ( SD = 32.77 )</td>
<td>( M = 60.30 ), ( SD = 21.70 )</td>
</tr>
<tr>
<td>PATTERN</td>
<td>( M = 0.00 ), ( SD = 0.37 )</td>
<td>( M = 0.14 ), ( SD = 0.35 )</td>
</tr>
</tbody>
</table>

Note. NEGAVG = average of negative emotion terms; ACQUISITIONS = number of acquisitions; TIME = time taken; PATTERN = index reflecting relative amount of attribute-based (-) and alternative-based (+) processing.
that it provides strong support for our hypotheses to have replicated these processing effects in three different experiments in two very different decision domains, by using very different manipulations. We believe we have presented strong evidence that it is necessary to consider the interaction of coping goals with effort and accuracy goals when attempting to understand decision processing in environments characterized by task-induced negative emotion.

Note that results within the low-conflict group of Experiment 3 are more difficult to interpret than are results within the high-conflict group. Under low conflict, participants show a tendency to process more by alternative and a marginal tendency to process longer as trade-off difficulty increases. As conflict was reduced, we expected the link between trade-off difficulty and negative emotion to weaken because the decision maker would have less cause to consider potential losses. In fact, trade-off difficulty should become irrelevant to negative emotion as conflict reaches a zero level (so no losses need to be accepted). Note that the simple main effect of trade-off difficulty on negative emotion is significant within high, but not within low, conflict. The inclusion of the low-conflict group in our experimental design validated our assumption that trade-off difficulty becomes more relevant to negative emotion as the potential for loss increases through conflict. However, the low-conflict group data are less relevant to our primary theoretical question regarding how negative emotion influences decision processing.

In the following sections, we address two further questions relevant to extending theoretical frameworks for contingent decision behavior to allow coping goals to interact with effort minimization and accuracy maximization goals. First, we address whether there is a direct relationship with effort minimization and accuracy maximization goals. Second, we attempt to address how participants had felt during their entire processing episode, some participants may have reported how they felt during the peak of their emotion experience (see Fredrickson & Kahneman, 1993, for research on retrospective affective assessments). In the following section, we once again consider data pooled across our three experiments to more fully describe the unique processing patterns we have observed.

Mediation Analysis

Hypotheses 1 and 2 followed from the argument that our manipulations would generate negative emotions that, in turn, would motivate alterations in processing patterns. Thus, implicit in our theoretical framework is the hypothesis that the NEPAV variable partially mediates the effects of on decision processing. Although our data from Experiments 1-3 support our hypotheses that negative emotion influences decision processing in relatively unique ways, we have not yet tested the direct link between these processing patterns and negative emotion.

We completed a mediation analysis on pooled data from Experiments 1 and 2 and from the high-conflict group of Experiment 3. For this pooled data set, we created a new independent variable, denoted emotion (high vs. low). For data from Experiment 1, this factor is identical to the factor indicating the higher versus lower emotion group. For Experiment 2, we collapsed across vividness and coded emotion as high when base rate was low and emotion as low when base rate was high. Finally, for the Experiment 3 high-conflict group, we coded emotion as high when trade-off difficulty was high and low when tradeoff difficulty was low.

To demonstrate mediation, we must show that three relationships hold (R. M. Baron & Kenny, 1986): (a) the emotion factor significantly affects NEPAV; (b) NEPAV is significantly related to processing, and (c) the effect of the emotion factor on processing is weakened or eliminated if NEPAV is used as a covariate. The first criterion for mediation was met because the emotion factor we defined for the pooled data set significantly affects NEPAV, F(1, 143) = 23.4, p < .0001, MSE = .65. The second criterion was met for variables assessing the extent of processing because NEPAV is significantly correlated with TIME (r = .40, p < .0001) and ACQTSN (r = .29, p < .0004); the criterion was not met for PATTERN (r = -.13, p < .13), although the direction of the relationship was as expected (these correlations were based on 145 observations). To test the third criterion, we examined the effect of the emotion factor on processing with and without NEPAV in the model as a covariate. For all three processing variables, significance levels were reduced when NEPAV was introduced into the model. For ACQUISITIONS, the F value for emotion alone, F(1, 143) = 13.50, p < .0003, MSE = 1,321.90, was roughly twice the size of the F value for emotion when NEPAV was included in the model, F(1, 142) = 6.38, p < .01, MSE = 1,274.80. For PATTERN, the significant effect of emotion, F(1, 143) = 7.80, p < .006, MSE = 1,971.10, became nonsignificant once NEPAV was introduced into the model, F(1, 142) = 1.16, ns, MSE = 1,739.10. The explanatory power of emotion for PATTERN, F(1, 143) = 12.07, p < .0007, MSE = .12, also dropped once NEPAV was included as a covariate, F(1, 142) = 9.60, p < .002, MSE = .12.

This mediation analysis provides evidence that the self-reported NEPAV variable partially mediates the effects of our manipulations on decision processing. However, the processing effects are not completely explained by variance in NEPAV, perhaps because it is measured with error. For instance, although the question relevant to NEPAV was intended to address how participants had felt during their entire processing episode, some participants may have reported how they felt at the conclusion of processing, after task-related negative emotion had been mitigated by coping behavior, whereas others may have reported how they felt during the peak of their emotional experience (see Fredrickson & Kahneman, 1993, for research on retrospective affective assessments). In the following section, we once again consider data pooled across our three experiments to more fully describe the unique processing patterns we have observed.

[^3]: These results show the same patterns, although they are sometimes weaker, when data from each experiment are considered separately.
The Time Course of Decision Processing

Overview

Our explicit hypotheses and major results characterize decision processing at the fairly general level of the amount and overall pattern of processing. Our findings are novel in that participants seem to be shifting neither toward more normative (i.e., more extensive, more alternative-based) nor toward more heuristic (i.e., less extensive, less alternative-based) decision rules. We predicted these processing results on the basis of a theoretical framework considering the interaction of coping goals with effort minimization and accuracy maximization goals in decision strategy selection.

Given that our processing findings call for extending the current effort-accuracy theoretical framework for contingent decision behavior, it seems useful to consider participants’ processing behavior in greater depth. In particular, there is evidence that people often respond to task demands by changing their processing over the time course of decision making (e.g., Bettman & Park, 1980; Russo & Leclerc, 1994). That is, it is possible that any particular processing episode is actually characterized by differing substrategies at different points in the process (e.g., Montgomery, 1983; Payne et al., 1993). This view of decision processing unfolding over time is consistent with Lazarus’s (1991a, 1991b) argument that experienced emotion and coping efforts reciprocally influence one another over the time course of an emotion-laden event. In this section, we attempt to isolate the point in the decision process at which emotion has its greatest influence; more generally, we analyze the time course of decision processing under negative emotion. This time-dependent approach to analyzing decision processing may allow us to better isolate the way negative emotion generates the unique overall processing patterns we observed.

Recall that decision behavior is typically characterized in terms of measures addressing the pattern, extent, and selectivity of processing. So far, we have focused on the pattern and extent of processing. Below, we analyze the pattern of processing over the time course of participants’ decision-processing episodes. We also decompose the pattern variable into its component parts and consider participants’ relative emphasis on attribute- and alternative-based transitions over the time course of decision processing.

As we look at the time course of processing, we are no longer able to consider our general measures of the extent of processing because phases in decision processing are defined relative to the total amount of processing carried out. It is, however, possible to analyze the relative amount of effort devoted to differing aspects of a decision across time. Standard measures of selectivity reflect the consistency of effort across attributes or alternatives during decision processing. Thus, we also consider whether and how selectivity, or the relative amount of effort, is altered over participants’ decision-processing episodes. Finally, we assess the relative amount of effort focused on the ultimately chosen alternative. Overall, then, this analysis addresses the pattern of processing and the relative effort devoted to several decision aspects over the time course of processing.

Defining Processing Stages

To analyze the time course of processing, we created an independent variable denoted place that indexes the first 13 (the beginning) and the last 13 (the end) acquisitions for each trial. All other acquisitions are eliminated from this analysis. The value 13 was chosen because 95% or more of the processing trials within each experiment contain at least 26 acquisitions. If total acquisitions for a trial numbered less than 26, acquisitions falling within the first half of a participant’s processing were assigned to the beginning of processing and the remaining half of a participant’s acquisitions were assigned to the end. The place factor allows us to investigate early versus late stages of decision processing while unconfounding the total number of acquisitions from the two levels of the emotion factor. Thus, in the following sections, we analyze several processing indices in terms of the emotion (high vs. low) and place (beginning vs. end) factors calculated for our pooled data; means and standard deviations are reported in Table 8.

Note that although we are interested in how processing unfolds over the time course of a decision, our place variable only addresses the very early and very late stages of processing. We conducted a similar analysis by using an independent variable that assigned each acquisition in a trial to one of four quarters of the decision process, where quarters were defined for each choice in terms of the total number of acquisitions for that choice. The results for this analysis were very similar to those for place, with the means of the first and fourth quarters mimicking the means for place = beginning and place = end; means for the second and third quarters tended to fall in between these extremes. Given this overlap and for simplicity, we report only the analyses of place.

Results

The time course of processing pattern. We reanalyzed the pattern measure by emotion and place to determine whether participants’ decision behavior exhibited distinguishable changes over the time course of processing and whether these changes varied with emotion. Overall, we found that participants engaged in more attribute-based processing under the high (more emotional) level of the composite emotion factor (M = .17 vs. M = .05), $F(1, 286) = 11.66$, $p < .001$, $MSE = 0.29$, consistent with the individual results for each experiment. Participants also processed more by attribute during the initial stage of processing ($M = -.16$ vs. $M = .28$), $F(1, 286) = 50.17$, $p < .001$, $MSE = .29$ (see Johnson, Meyer, & Ghose, 1989, for a similar finding). These results are qualified by an Emotion × Place interaction, $F(1, 286) = 7.10$, $p < .01$, $MSE = .29$. There is much more attribute-based decision processing under high (vs.

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6 The results show the same patterns when data from each experiment are considered separately.
By the end of processing, participants processed in a low emotion in the beginning stage of decision processing. In fact, the simple main effect of emotion was significant for the beginning of processing, $F(1, 286) = 18.5, p < .001$, $MSE = 9.10$. Thus, participants responded to task-related emotion primarily by elevating the relatively high emotion (M = 6.68 vs. M = 5.54), $F(1, 286) = 9.50, p < .002$, $MSE = 9.92$. There was also a main effect of place, with the number of alternative-based transitions increasing over the course of processing (M = 4.72 vs. M = 7.48), $F(1, 286) = 55.10, p < .0001, MSE = 9.92$. Finally, there was an Emotion X Place interaction, $F(1, 286) = 5.74, p < .02, MSE = 9.92$. Once again, the main effect of emotion was significant within place = beginning, $F(1, 286) = 14.64$, $p < .0002, MSE = 9.92$, but not within place = end, $F(1, 286) = 0.25, ns, MSE = 9.92$.

It is also possible to measure the length of participants' attribute- and alternative-based processing sequences to address where in the decision process participants seem most motivated to avoid trade-offs. Given our argument that considering multiple alternatives' values on a single attribute shields the decision maker from explicitly considering trade-offs, a stronger version of Hypothesis 2 would predict particularly long strings of attribute-based processing under negative emotion. We define ATTLENGTH to be the average length of within-attribute processing sequences, including in the analysis only those attribute-based processing sequences completed during the initial stage of processing.

The effects of negative emotion on ATT-TOTAL are generally the opposite of the effects on ATT-TOTAL, as would be expected given that the majority (93%) of acquisitions are either alternative-based or attribute-based transitions. There was a main effect of emotion, with the mean number of alternative-based transitions decreasing under high emotion (M = 6.54 vs. M = 4.04), $F(1, 286) = 49.92, p < .0001, MSE = 9.10$. Finally, there was a significant Emotion X Place interaction, $F(1, 286) = 14.71, p < .001, MSE = 9.10$, but not within place = end, $F(1, 286) = 0.35, ns, MSE = 9.10$. Thus, participants responded to task-related emotion primarily by elevating the relative number of attribute-based transitions completed during the initial stage of processing.

The effects of negative emotion on ALT-TOTAL are generally the opposite of the effects on ATT-TOTAL, as would be expected given that the majority (93%) of acquisitions are either alternative-based or attribute-based transitions. There was a main effect of emotion, with the mean number of alternative-based transitions decreasing under high emotion (M = 5.86 vs. M = 4.03), $F(1, 286) = 9.92$. There was also a main effect of place, with the number of alternative-based transitions increasing over the course of processing (M = 4.72 vs. M = 7.48), $F(1, 286) = 55.10, p < .0001, MSE = 9.92$. Finally, there was an Emotion X Place interaction, $F(1, 286) = 5.74, p < .02, MSE = 9.92$. Once again, the main effect of emotion was significant within place = beginning, $F(1, 286) = 14.64$, $p < .0002, MSE = 9.92$, but not within place = end, $F(1, 286) = 0.25, ns, MSE = 9.92$.

The effects of emotion on the number of attribute-based and alternative-based transitions were also analyzed with all of the participants' acquisitions for a trial (not just the beginning and ending acquisitions) included in the analysis. There was a main effect of emotion on ATT-TOTAL, with the mean number of attribute-based transitions increasing under higher emotion (M = 24.5 vs. M = 39.2), $F(1, 143) = 24.12, p < .001, MSE = 320.10$. The total number of alternative-based transitions also increased under negative emotion, although the effect of emotion on ALT-TOTAL was not as large and only approached significance (M = 34.3 vs. M = 40.3), $F(1, 143) = 2.65, p = .11, MSE = 492.00$. Thus, considering the entire decision trial, participants responded to task-related emotion primarily by elevating the number of attribute-based transitions that they completed.

### Table 8

**Means and Standard Deviations of Negative Emotion and Processing Measures as a Function of Emotion and Place for Combined Data**

<table>
<thead>
<tr>
<th>Place = beginning</th>
<th>Place = end</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low emotion</td>
<td>High emotion</td>
</tr>
<tr>
<td>(n = 71)</td>
<td>(n = 74)</td>
</tr>
<tr>
<td>(n = 71)</td>
<td>(n = 74)</td>
</tr>
<tr>
<td><strong>ATT-TOTAL</strong></td>
<td><strong>ATT-TOTAL</strong></td>
</tr>
<tr>
<td>5.76</td>
<td>6.72</td>
</tr>
<tr>
<td>3.30</td>
<td>2.81</td>
</tr>
<tr>
<td>4.63</td>
<td>2.95</td>
</tr>
<tr>
<td>3.30</td>
<td>2.92</td>
</tr>
<tr>
<td><strong>ALT-TOTAL</strong></td>
<td><strong>ALT-TOTAL</strong></td>
</tr>
<tr>
<td>5.76</td>
<td>6.72</td>
</tr>
<tr>
<td>3.30</td>
<td>2.81</td>
</tr>
<tr>
<td>4.63</td>
<td>2.95</td>
</tr>
<tr>
<td>3.30</td>
<td>2.92</td>
</tr>
</tbody>
</table>

Note. PATTERN = index reflecting relative amount of attribute-based (-) and alternative-based (+) processing; ATT-TOTAL = number of attribute-based transitions; ALT-TOTAL = number of alternative-based transitions; ATTLENGTH = average number of acquisitions associated with each attribute-based processing sequence; ALTLENGTH = average number of acquisitions associated with each alternative-based processing sequence; VARALT = variance in the proportion of time spent processing each attribute; VARAT = variance in the proportion of time spent processing each alternative; TCHOSEN = proportion of time spent examining the ultimately chosen alternative.
for which at least half of the relevant acquisitions fell within place = beginning or place = end.8 Within-attribute processing sequences were longer under high emotion (M = 3.1 vs. M = 4.0), F(1, 286) = 11.57, p < .001, MSE = 5.56, and in the initial stage of processing (M = 4.4 vs. M = 2.8), F(1, 286) = 31.93, p < .001, MSE = 5.56. There was again an interaction, F(1, 286) = 13.71, p < .001, MSE = 5.56, with particularly long attribute-based sequences under high emotion at the beginning of processing. We again found a simple main effect of emotion at the beginning, F(1, 286) = 25.24, p < .001, MSE = 5.56, but not at the end of processing, F(1, 286) = 0.05, ns, MSE = 5.56. Consistent with the results for pattern, participants responded to negative emotion by initially engaging in particularly long attribute-based processing sequences. This finding provides further support for our prediction that decision makers will cope with negative emotion in part by shifting toward more noncompensatory processing strategies.

A variable analogous to ATTLENGTH, but assessing within-attribute processing sequences, was calculated and denoted ALTLENGTH. If decision makers are avoiding trade-offs under negative emotion, we would predict shorter alternative-based sequences under high emotion. As we expected, alternative-based processing sequences were shorter under high emotion (M = 4.7 vs. M = 4.0), F(1, 286) = 4.33, p < .04, MSE = 7.85, and at the beginning of processing (M = 4.0 vs. M = 4.6), F(1, 286) = 4.15, p < .04, MSE = 7.85. There was a marginally significant interaction, F(1, 286) = 3.35, p < .07, MSE = 7.85, and we again found that the simple effect of emotion was significant for the beginning of processing, F(1, 286) = 7.55, p < .001, MSE = 7.85, but not for the end, F(1, 286) = 0.03, ns, MSE = 7.85. Overall, there was a tendency for emotion to encourage shorter alternative-based processing sequences in the initial stage of processing. Although the results for ATTLENGTH were weaker, they were generally the inverse of those for ATTLENGTH, as would be expected. In sum, our five variables assessing the pattern of decision processing indicate that decision makers respond to increased task-related negative emotion primarily by engaging in more attribute-based processing with longer attribute-based sequences in the initial phase of the decision. Processing became more alternative-based at the end of the decision, but this result did not vary with the level of emotion.

The time course of selectivity in processing. Measures of selectivity characterize a decision process by reflecting the relative emphasis given to the various attributes and alternatives that define a decision problem. We assessed two major aspects of selectivity by calculating the variances in the proportions of time spent on each attribute (VARATT) and on each alternative (VARALT). We then analyzed these measures by emotion and place. We found more selectivity over attributes (VARATT) under high emotion (M = .027 vs. M = .039), F(1, 286) = 9.10, p < .003, MSE = 0.001, and at the beginning of processing (M = .047 vs. M = 0.19), F(1, 286) = 52.67, p < .001, MSE = 0.001; there was a marginally significant interaction, F(1, 286) = 3.10, p < .08, MSE = 0.001. Once again, we found a simple main effect of emotion at the beginning, F(1, 286) = 11.41, p < .01, MSE = 0.001, but not at the end of processing, F(1, 286) = 0.79, ns, MSE = 0.001. Thus, emotion encourages processing that is initially more selective over attributes, that is, that initially concentrates on more extensive examination of fewer attributes. Recall that more compensatory decision rules such as weighted adding tend to be low in selectivity (Payne, 1976), whereas EBA and lexicographic rules, for example, tend to be higher in selectivity across attributes. Thus, the VARATT result is again consistent with our conclusion that negative emotion encourages the use of attribute-based, noncompensatory strategies in the initial stage of decision processing.

The VARALT measure showed a pattern opposite to VARATT; that is, participants were more selective over alternatives under low emotion (M = .060 vs. M = .051), F(1, 286) = 6.18, p < .01, MSE = 0.001, and in the end stage of processing (M = .048 vs. M = .063), F(1, 286) = 12.83, p < .001, MSE = 0.001. There was no interaction for VARALT, F(1, 286) = 1.54, ns, MSE = 0.001; however, there was again a simple effect of emotion at the beginning, F(1, 286) = 6.94, p < .001, MSE = 0.001, but not at the end, F(1, 286) = 0.78, ns, MSE = 0.001, of processing. The effect of emotion on VARALT in the initial stage of processing appears to be driven by the more attribute-based nature of processing under high emotion; extremely attribute-based processing will actually tend to be less selective over alternatives (i.e., if an individual scans down an attribute across alternatives, the time spent on each alternative will tend to be more similar). Taken together, these patterns for VARATT and VARALT at the beginning of processing are once again consistent with increased use of such noncompensatory strategies as the EBA or lexicographic rules, that is, attribute-based processing focused on a few attributes across multiple alternatives.

The time course of focus on the chosen alternative. One interesting aspect of the above analysis is that participants in both emotion groups processed in a similar, alternative-based manner during the final stage of processing. It seems possible that this end stage may have involved verification of a tentatively chosen alternative (e.g., Johnson et al., 1989; Montgomery, 1983; Russo & Leclerc, 1994). To address this possibility, we constructed a measure denoted TCOUNDED, which reflected the proportion of time spent considering information about one's ultimately chosen alternative. We found that TCOUNDED was higher at the end of processing (M = .27 vs. M = .52), F(1, 286) = 81.36, p < .001, MSE = 0.06, but there was neither a main effect of emotion (M = .41 vs. M = .39), F(1, 283) = 0.27, ns, MSE = 0.06, nor an interaction, F(1, 286) = 1.55, ns, MSE = 0.06. Thus, it appears that participants focused extensively on their to-be-chosen alternative in the final stage of decision processing, and they did so regardless of the degree to which their decision task was emotion laden.

8 The mean and significance patterns are identical if reacquisitions of a piece of information are not counted toward the length of each processing string. Furthermore, as noted in footnote 3, the average length of the attribute-based processing strings is much greater than would be expected if participants were using an additive difference strategy.
Discussion of the Time Course Analysis

The effects of emotion on the time course of processing are fairly clear in our experiments. Participants responding to increasing levels of task-related emotion used a phased-decision strategy in which the effects of the emotion manipulations were particularly strong during the initial phase of processing. In particular, our participants initially approached more emotion-laden decisions with long, attribute-based processing sequences (PATTERN, ALTLENGTH, ATT-TOTAL) that were quite selective over attributes (VARATT). These results are consistent with the use of attribute-based, noncompensatory strategies that avoid trade-offs in the initial phase of processing. It is not surprising that our emotion manipulations had their strongest effects during the initial phase of processing, given how these manipulations were operationalized. The emotion manipulations from Experiments 1 and 2 were accomplished entirely and immediately before the presentation of the decision matrix. For Experiment 3, decision makers likely had some implicit information regarding the type of decision conflict they would experience prior to processing because their practice decisions were matched to their experimental decisions in terms of conflict; these decision makers were also instructed regarding the (high vs. low trade-off difficulty) decision attributes they would consider immediately prior to decision processing.

By the last several acquisitions, participants in both emotion groups seem to engage in verification of a tentatively chosen alternative. In this stage, all participants tend to display relatively long alternative-based processing sequences (PATTERN, ALTLENGTH, ALT-TOTAL) that are selective over alternatives (VARALT), but not over attributes (VARATT). Further, over half of participants' time in this phase is spent considering their ultimately chosen alternative (TCHOSEN).

General Discussion

Summary of Results

Basic findings and implications. Our emotion manipulations resulted in more extensive processing, with participants taking a longer time to choose and opening more information boxes in more threatening decision environments. These manipulations also resulted in more attribute-based decision processing, or a greater tendency to consider successive pieces of information pertaining to the same attribute. The patterns of processing we observed under negative, task-induced emotion are relatively unique because environmental factors causing a shift to more extensive processing typically cause a simultaneous shift to more alternative-based processing.

Our processing results are not consistent with either of the obvious ways in which negative emotion could be incorporated as a task variable into the standard effort-accuracy framework for decision strategy selection. First, it seems implausible that negative emotion functions only as an incentive for increased accuracy. Considering previous research explicitly manipulating accuracy goals, one finds that a greater emphasis on such goals leads to more extensive and more alternative-based processing (Creyer et al., 1990; Payne et al., 1996). In addition, the auxiliary scale measures from Experiment 2 indicate that task threat is influenced by the base-rate emotion manipulation, but task importance and challenge are not, casting doubt on the efficacy of a simple incentive hypothesis for explaining the data in that experiment.

Second, it also seems implausible that negative emotion functions only as a factor increasing task complexity. Although decisions higher in task-related emotion may be judged as more difficult and more complex, previous work on cognitive sources of task complexity has indicated that decision makers respond to such complexity by using less extensive, more attribute-based processing (see Payne et al., 1993, for a review). Emotional sources of decision difficulty seem unique in that they encourage the decision maker to work harder at the same time they shift processing toward more attribute-based decision rules.

We believe that a framework considering accuracy and effort goals explains contingent decision behavior very well for many decision tasks. However, our current findings imply that one must sometimes augment this framework to include other goals that may interact with accuracy and effort concerns. In this article, we attempted to understand the effect of emotion on decision processing by explicitly considering how the motivation to cope with task-related negative emotion might interact with accuracy and effort concerns. Our results show that negative emotion may simultaneously signal decision importance, encouraging some processing operations associated with accuracy maximization (Hypothesis 1), and elicit avoidance, encouraging other processing operations associated with effort minimization (Hypothesis 2). We believe these results represent important progress toward integrating ideas about task-related emotion and coping into the study of decision processing.

Analyses of the time course of processing. In addition to testing our major hypotheses regarding the amount and pattern of processing, we also explored the time course of decision processing. Although we cannot precisely ascertain participants' decision rules, it appears that participants in the conditions associated with higher emotion approached their decisions by initially searching for an attribute-based way to decide. However, participants continued processing much longer than is typical given this initially attribute-based approach. This processing pattern is consistent with participants' initially engaging in dominance structuring (Montgomery, 1983), examining attribute information in an attempt to build an argument for an acceptable choice without making difficult between-attribute trade-offs. Participants in more emotion-laden situations may have shifted toward more alternative-based rules if and when it became apparent that no attribute-based rule was sufficient to indicate a choice. In any case, by the final stages of processing, participants across all conditions engaged in alternative-based processing that focused on their to-be-chosen alternative.

One further result from Experiment 3 supports the view that participants in the more emotion-laden situations approached their tasks by initially attempting to construct a
noncompensatory, attribute-based decision rule. In this experiment, the decision matrix always displayed either the two high trade-off difficulty attributes or the two low trade-off difficulty attributes (depending on the condition) in the first and second positions on the computer screen. Further, the more loss averse of the two attributes was displayed first under high trade-off difficulty. To see if the manner in which participants approached the more versus the less loss-averse attributes differed, we reanalyzed ATTITUDE by column. We found a particularly long average attribute-based processing sequence at the beginning of processing and for the first (most loss-averse) attribute in the high trade-off difficulty, high-conflict condition ($M = 4.8$, vs. all other $M$s $< 3.5$). Thus, participants in the most emotion-laden decision situation may have initially approached their task by attempting to identify a choice on the basis of the most potentially emotion-laden attribute. Because effects from left-to-right reading order are confounded with effects of attribute identity, these results are merely suggestive.

Because identical patterns of information acquisition can result from differing underlying strategies, there are competing explanations for our observations of processing. For instance, participants may have believed that their initial increase in attribute-based processing involved information gathering necessary to enhance decision accuracy. We believe that this alternative explanation is unlikely because the motivation to increase decision accuracy has consistently been linked with both more effortful and more alternative-based processing (e.g., Creyer et al., 1990; Payne et al., 1996).

**Emotion and Decision Performance**

Behavioral decision researchers have often noted that it is important to understand the implications of task variables for both processing measures (e.g., the measures discussed throughout this article) and choice outcomes (e.g., the finally chosen alternative or the judgment made). Some researchers have argued that stress can harm the quality of choice outcomes (e.g., Janis & Mann, 1977; Hancock & Warm, 1988; Simon, 1987), whereas others have argued that stress can act as an energizer, perhaps leading to higher quality choice outcomes (e.g., Eysenck, 1984). Although the work on stress involves both ambient and more task-related sources of negative emotion, we believe our work has some relevance to this important unresolved issue (see Lazarus, 1993, on the close relationship between stress and negative emotion).

Our current studies do not include any measures of decision quality. We speculate, however, that our processing results indicate that decision makers will be less accurate as task-related emotion increases. Recall that the degree to which processing is extensive and the degree to which it attempts to accurately resolve trade-offs between attributes is considered to be two important aspects of normatively accurate decision processing (e.g., Frisch & Clemen, 1994). The finding that our participants shifted to more attribute-based processing in more emotion-laden environments indicates that they may have been avoiding explicit trade-offs, and their performance could be expected to suffer as a result of such actions.

Further, Luce (1996) used a trade-off difficulty manipulation similar to the one reported in Experiment 3 to more directly examine the influence of increased negative emotion on avoidance of processing and decision outcomes. Among other results, she demonstrated that increases in negative emotion lead to increased choice of the status quo option in a setting where participants are asked to imagine choosing between a tentatively chosen car (the status quo option) and four newly available alternatives. The tendency for participants to prefer the status quo is generally referred to as a decision bias: An alternative's status quo position is irrelevant to the normative accuracy of that alternative because it is irrelevant to the alternative's benefits. Consistent with that view, Luce found an increased incidence of within-subject preference reversals favoring the status quo option in more emotion-laden decision environments. A detailed examination of the effects of emotion on decision outcomes represents an important area for future research.

**Task-Related Negative Emotions Versus Negative Moods**

Although we believe that our manipulations of task-related emotion are new to the literature on decision processing, a related literature involving negative moods does exist (e.g., Clark & Isen, 1982; Isen, 1984; Johnson & Tversky, 1983; Lewinsohn & Mano, 1993; Mano, 1992; see Hammond & Doyle, 1991, for a review of related work). The most prevalent theoretical argument regarding negative mood and processing is that negative moods will cause more effortful, complex decision processing (e.g., Isen, 1984; Schwarz, 1990). This proposal has typically been addressed through investigation of judgment and choice outcomes; for instance, sadder individuals seem to be more sensitive to the strength of persuasive arguments (vs. peripheral cues; Bless, Bohnr, Schwarz, & Strack, 1990). This prediction would generalize to the hypothesis that use of normative decision strategies should increase with negative mood (see Forgas, 1991, for this pattern of results). Alternative theoretical positions are also prevalent in the mood literature, however. For example, Mano (1992; Lewinsohn & Mano, 1993) argued that negative moods cause individuals to approach decision tasks as burdens to be quickly alleviated and that increased emotional arousal (e.g., distress as opposed to sadness) lowers decision-processing abilities. As they predicted, Lewinsohn and Mano found that processing is less extensive and more attribute-based when naturally occurring moods involve more negative emotion, higher arousal, or both.

Although a clear, consistent hypothesis regarding negative affect and decision processing does not emerge from the mood literature, this literature does consistently associate more extensive processing with more alternative-based processing. The fact that we find a different pattern of effects under task-induced emotion is consistent with the argument that the way affect influences cognitive processing is, in part,
dependent on the degree to which that affect is tied to the task at hand (Bodenhausen, 1993; see also Christianson, 1992, for a similar argument in the context of memory research).

**Emotion in the Laboratory**

Given our interest in decision-processing patterns, it was necessary to conduct our experiments in highly controlled laboratory settings. We were able to manipulate levels of reported negative emotion related to decision tasks, and we obtained our predicted processing patterns. However, our overall levels of reported emotion tended to be moderate and below the midpoint of our scale, even in the highest emotion conditions. Therefore, we make no claim that our obtained levels of emotion mimic the intensity of real-world emotional decisions.

There are obvious barriers to studying the high-stakes decisions that elicit significant stress in a real-world setting. One such effort, however, is that of Janis and Mann (1977), who built a comprehensive model of high-stakes decision making by using the case study method. They argued that decision performance is degraded for high-emotion decisions unless several somewhat restrictive conditions are met. Specifically, they argued that normatively accurate processing will be undertaken in stressful situations only when decision makers both are optimistic regarding their abilities to identify an alternative that is better than the status quo and believe that there is ample time to search and deliberate.

Janis and Mann (1977) proposed that decision makers who are not optimistic regarding their ability to identify better alternatives will procrastinate, shift responsibility to another decision maker, or bolster (e.g., develop spurious arguments in favor of) one alternative course of action. Each of these behaviors is a form of emotion-focused coping; procrastination and shifting responsibility involve avoidance, whereas bolstering changes the meaning of the decision. Thus, Janis and Mann argued that decision makers' assessments of their own self-efficacy influence the degree of emphasis placed on problem-focused versus emotion-focused coping. Because Lazarus (1991a, 1991b) also argued that such assessments of self-efficacy influence the cognitive appraisals leading to emotional experience, it seems that examining how perceived self-efficacy influences both task-related emotion and processing is a fruitful area for further research.

Finally, if a decision maker believes that better options than the status quo exist, but that there is not ample time to identify these options, Janis and Mann (1977) proposed that a form of processing called hypervigilance will ensue. Hypervigilant processing is characterized by frantic search and hasty seizure of any alternative seeming to offer immediate relief from one's unfortunate situation. The extreme distress, even panic, associated with hypervigilance seems nearly impossible to study within controlled laboratory environments; however, their theory implies that time pressure is an interesting variable to study in combination with task-related emotion.

**Conclusion**

We find that increased negative, task-related emotion associated with a decision problem influences both how and how much people process information when making a choice. Specifically, our participants simultaneously shift to more attribute-based and more extensive processing in more negatively emotional environments, as hypothesized by our theoretical approach recognizing that participants may be motivated to cope with negative task-related emotion. This theoretical position represents a significant expansion of the currently dominant accuracy–effort view of contingent decision behavior, in which deviations from extensive and alternative-based processing are typically explained in terms of cognitive limitations (e.g., Einhorn & Hogarth, 1981; Payne et al., 1993; however, see Janis & Mann, 1977, and Simon, 1987, for views similar to ours). We believe these findings represent an important step toward enhancing the versatility of the effort–accuracy framework by illustrating how the situation-specific goal of minimizing negative emotion may interact with effort and accuracy considerations to shape decision behavior.

**References**


EMOTIONALLY DIFFICULT DECISIONS


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