

Judgment Under Emotional Certainty and Uncertainty: The Effects of Specific Emotions on Information Processing

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The authors argued that emotions characterized by certainty appraisals promote heuristic processing, whereas emotions characterized by uncertainty appraisals result in systematic processing. The 1st experiment demonstrated that the certainty associated with an emotion affects the certainty experienced in subsequent situations. The next 3 experiments investigated effects on processing of emotions associated with certainty and uncertainty. Compared with emotions associated with uncertainty, emotions associated with certainty resulted in greater reliance on the expertise of a source of a persuasive message in Experiment 2, more stereotyping in Experiment 3, and less attention to argument quality in Experiment 4. In contrast to previous theories linking valence and processing, these findings suggest that the certainty appraisal content of emotions is also important in determining whether people engage in systematic or heuristic processing.

An extensive and growing body of research has examined the effects of emotions, moods, and affect on judgment and information processing (for reviews, see Clore, Schwarz, & Conway, 1994; Fiedler, 1988, 2000; Forgas, 1995; Martin, 2000; Rusting, 1998; Schwarz & Bless, 1991; Schwarz, Bless, & Bohner, 1991). Although some studies document the influences of affect that are relevant to the target of emotion, (i.e., integral affect), most studies have sought to understand the influence of irrelevant, or incidental, affect on cognition. Investigations of incidental affect have mainly examined the effects of moods induced in one situation on cognition in another situation using a dual process framework (e.g., Chaiken, Liberman, & Eagly, 1989; Petty & Cacioppo, 1986). In general, participants in these studies are induced to feel positive or negative affect and then are given a task in which their depth of processing can be inferred. The majority of findings within this domain suggest that people engage in more systematic processing when in negative emotional states or moods, whereas people in positive moods or emotional states engage in more heuristic processing (Batra & Stayman, 1990; Bless, Bohner, Schwarz, & Strack, 1990; Mackie, Asuncion, & Rosselli, 1992; Mackie & Worth, 1989, 1991; Murray, Surjan, Hirt, & Surjan, 1990;

Schwarz, 1990; Schwarz et al., 1991; Sinclair, 1988; Sinclair & Mark, 1992; Worth & Mackie, 1987; however, see Isen, 1993; Parrott & Sabini, 1990; Wegener, Petty, & Smith, 1995, for exceptions).

Existing explanations for the incidental mood and processing findings, which include those based on capacity, motivation, and information, stipulate that the information processing consequences arise from the valence of the affective state. Capacity explanations are based on associative network theories and suggest that because positive affect is associated with so many conceptual nodes, it creates a state of cognitive busyness (Mackie & Worth, 1991). Motivational explanations focus on the desire to avoid negative states, arguing that systematic and careful thinking is necessary to find the means to reduce negative experiences (Bless et al., 1990; Clark & Isen, 1982; Wegener & Petty, 1994; Wegener et al., 1995). Informational explanations posit that people use their affective states as signals about the current situation or about their judgment. The "affect as information" approach argues that the experience of negative affect indicates a threat to the achievement of desired goals and, thus, that the situation calls for systematic and attentive processing, whereas positive affect signals that the situation is safe and, thus, general knowledge constructs are a sufficient basis for judgment (Bless, 2000; Bless et al., 1996; Schwarz, 1990; Schwarz & Clore, 1983). Similarly, the "mood as input" approach contends that positive affect signals that one has sufficient information to make a judgment. Thus, when a person's goal is accurate judgment or decision making, that person will look to his or her mood as an indicator of whether he or she knows enough (Hirt, Melton, McDonald, & Harackiewicz, 1996; Martin, Abend, Sedikides, & Green, 1997; Martin, Ward, Achee, & Wyer, 1993). Although these approaches postulate different mechanisms, they all stipulate that the valence (i.e., the subjective positivity or negativity associated with the emotion) of the affective state is

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responsible for the effects of incidental moods and emotions on cognitive processing.

However, it is important to note that some recent research has found differences in processing among negative affective states. It appears that although sadness promotes systematic processing, anger encourages heuristic processing (Bodenhausen, 1993; Bodenhausen, Kramer, & Süsler, 1994; Lerner, Goldberg, & Tetlock, 1998; Tiedens, in press). These studies provided evidence for such differences but did not focus on explaining or studying why they exist.¹ Certainly, a valence approach does not suffice. The goal of this article is to provide an explanation for the effects of specific emotions on processing. Our explanation emphasizes differences in the certainty appraisals of these emotions.

Specific Emotions, Appraisals, and Appraisal Congruent Judgment

Recent work on affect and emotions has emphasized the necessity of examining the effects of a more diverse set of emotions than just happiness and sadness and more dimensions than merely positive and negative (Duclos et al., 1989; Green & Sedikides, 1999; Lerner & Keltner, 2000; Niedenthal, Halberstadt, & Setterlund, 1997; Raghunathan & Pham, 1999; C. A. Smith, 1989). Specific emotions vary in terms of their physiology (Levenson, 1992), facial expression patterns (Ekman, 1993), and cognitive components (C. A. Smith & Ellsworth, 1985). Because we are concerned with cognitive consequences of emotions, examining their cognitive components, or appraisals, seemed particularly promising.

Appraisal theorists contend that emotions can be meaningfully distinguished at a more fine-grained level than merely positive and negative. Dimensions such as responsibility, control, motive consistency, pleasantness, and certainty provide important distinctions among emotions (Roseman, 1984; Scherer, 1982; C. A. Smith, 1989; C. A. Smith & Ellsworth, 1985; C. A. Smith & Lazarus, 1993). Studies of emotion–appraisal associations show that experiences of specific emotions are reliably associated with particular sets of appraisals. For example, when people feel angry or remember feeling anger, they report thinking that the situation is unpleasant and not of their own doing and that they are certain about what is happening. This appraisal pattern can be contrasted with that of fear, for which people also report that the situation is negative and not of their own doing but also report that they are highly uncertain about what has happened and what will happen. These patterns emerge across populations, using a range of methods, suggesting that an emotion can be partially defined by its constituent appraisals (Mauro, Sato, & Tucker, 1992; C. A. Smith, 1989).

Initial evidence suggests that incidental emotions produce judgments that are congruent with their constituent appraisals. For example, Keltner, Ellsworth, and Edwards (1993) found that angry participants were more likely to blame someone else for a subsequent negative event, an appraisal associated with anger, whereas sad participants were more likely to blame the situation, the agency appraisal associated with sadness (also see Goldberg, Lerner, & Tetlock, 1999; Lerner et al., 1998; Niedenthal, Tangney, & Gavanski, 1994). Relatedly, Lerner and Keltner (2000, 2001) found that the experience of fear, an emotion associated with the appraisal that the situation is risky, increased perceptions of risk in a subsequent situation (also see DeSteno, Petty, Wegener, & Rucker, 2000; Johnson & Tversky, 1983). The converse occurred with the

experience of anger, an emotion associated with the appraisal that a situation is not risky. These studies demonstrate that congruency along appraisal dimensions can exist between incidental emotional states and subsequent judgments, a phenomenon that Lerner and Keltner (2000) called *appraisal tendencies*. They argued that these appraisal-congruent judgments can exist along any appraisal dimension.²

In this article, we focus on the certainty–uncertainty appraisal dimension. We suggest that the certainty associated with an emotion can lead to appraisal-congruent judgments in a subsequent situation and that the resulting experience of feeling certain or uncertain might ultimately affect cognitive processing. Appraisal theory has shown that the experience of some emotions is accompanied by feeling certain, understanding what is happening in the current situation, and feeling able to predict what will happen next. Other emotions are characterized by feeling uncertain, not understanding what is happening, and feeling unsure about what will happen next (Ellsworth & Smith, 1988; C. A. Smith & Ellsworth, 1985). Emotions such as anger, disgust, happiness, and contentment occur with the sense of certainty; the emotions of hope, surprise, fear, worry, and, to some extent, sadness, are associated with the sense of uncertainty (Roseman, 1984; Scherer, 1984; C. A. Smith & Ellsworth, 1985). The literature on appraisal-congruency effects suggests that the certainty associated with emotions should affect people's certainty in subsequent situations. Specifically, the experience of certainty-associated emotions should lead to more certainty in subsequent judgments than should the experience of uncertainty-associated emotions. We further suggest that some of these appraisal dimensions may affect the degree to which people engage in systematic versus heuristic processing.

Certainty and Processing

Certainty is a particularly interesting dimension of emotions to examine because various literatures indicate that it might be related to processing. For example, the work of Weary and her colleagues (Weary & Jacobson, 1997) on individual differences in causal uncertainty has shown that people who chronically feel uncertain process information more systematically than do people who chronically feel certain. Relatedly, depressed individuals tend to process more systematically because they lack confidence in

¹ Bodenhausen (1993) suggested that the different levels of arousal that accompany these emotions might lead to their different processing effects, but he did not include any physiological measures in his study, so it is difficult to assess this possibility. Others have argued that arousal cannot explain the effects of affective states on processing (Isen, 1984; Isen, Daubman, & Nowicki, 1987). For example, Isen (1984) found that arousal without affect did not have the same cognitive effects as did arousal accompanied by affect.

² It is not entirely clear what mechanism underlies appraisal-congruent judgments. Attentional processes, accessibility, and informational functions have all been suggested (Clore, 1992; DeSteno et al., 2000; Lerner & Keltner, 2000; Schwarz, in press). At this point, there is the most support for the informational approach (see Clore & Parrott, 1991; DeSteno et al., 2000). For the purposes of the present research, however, we are less concerned with exactly why appraisal congruency occurs and more concerned with whether such congruency could explain why emotions with the same valence affect processing differently. We use the term *appraisal-congruent judgment* to remain impartial about the exact mechanisms.

their own judgments (Edwards & Weary, 1993; Gleicher & Weary, 1991; Weary, 1990).

It is unlikely that the sense of uncertainty and its effects on information processing are only valuable in understanding individual differences. Rather, all individuals encounter situations in which they feel highly certain and other situations in which they experience grave uncertainty. Early theories of social cognition recognized the role of passing uncertainty as a motivator for engaging in various effortful cognitive processes. Festinger (1954) claimed that individuals engage in social comparison when they feel uncertain about themselves. Pelham and Wachsmuth (1995) extended that argument and showed that when people are uncertain about their self-views, they engage in more systematic processing when making social comparisons than they do when certain about themselves. Likewise, early attribution theorists argued that careful determination of the causal structure of events is the result of uncertainty (Heider, 1958; Kelley, 1973).

Further, more recent dual processing theories of attitude change have also emphasized the importance of feelings of certainty. Eagly and Chaiken (1993), in describing Chaiken et al.'s (1989) sufficiency threshold hypothesis, wrote that people "will invest whatever amount of effort is required to attain a sufficiently confident assessment of message validity" (p. 330). When people's actual level of confidence or certainty is below their desired level of confidence or certainty, they will apply more effort in their processing. Because feeling certain is an internal cue that one is already correct and accurate, it may also suggest that further processing is not necessary (also see Mackie et al., 1992). Indeed, Martin et al.'s (1993) work on mood as input suggests that positive mood leads to heuristic rather than systematic processing because it provides a sense of subjective certainty. They argued that people in a positive mood achieve Chaiken et al.'s (1989) sufficiency threshold more easily than do those in a negative mood. In this article we extend this reasoning and suggest, more broadly, that any emotion associated with feeling certain (regardless of its valence) promotes heuristic processing and that any emotion associated with feeling uncertain (regardless of its valence) leads to more systematic processing.

Overview of the Current Research

To test the hypotheses, we conducted four experiments, using a range of emotions and different measures of depth of processing. In the first experiment, participants were induced to feel emotions that were either positive or negative and either associated with certainty or with uncertainty by writing about autobiographical emotional memories. Participants then made predictions about what events would occur in the year 2000. For each prediction, they rated the degree to which they felt certain about their responses. We hypothesized that participants would be more certain about their predictions when they had been induced to feel a certainty-associated emotion than when they had been induced to feel an uncertainty-associated emotion. In other words, we expected certainty-appraisal-congruent judgments.

The other three experiments examined whether the levels of certainty associated with emotions affect information processing. Participants in the second experiment were again induced to feel positive or negative emotions that were either associated with certainty or associated with uncertainty by writing about an autobiographical emotional event. Then, the degree to which their

assessment of an argument was based on the expertise of the source (a heuristic) served as a measure of depth of processing. In the third experiment, participants were induced to feel either a certainty-associated negative emotion (disgust) or an uncertainty-associated negative emotion (fear) by viewing film clips. We then assessed their stereotype use (a heuristic) in a subsequent task. In the final experiment, participants were induced to feel sadness with certainty appraisals, sadness with uncertainty appraisals, or sadness without any certainty directions and then were exposed to either a weak or a strong persuasive message. In all of these experiments, we predicted that participants would engage in more heuristic processing following certainty-associated emotions and more systematic processing following uncertainty-associated emotions.

Experiment 1: Emotions and Certainty-Appraisal Congruence

The first experiment examined whether emotions create appraisal-congruent judgments along the dimension of certainty. Specifically, we tested the hypothesis that the experience of certainty-associated emotions results in greater certainty in subsequent judgments than does the experience of uncertainty-associated emotions.

Research in other domains suggests that this certainty-appraisal congruence should occur. As we described earlier, other researchers have shown this kind of phenomenon with emotions associated with agency and risk (DeSteno et al., 2000; Johnson & Tversky, 1983; Keltner et al., 1993; Lerner & Keltner, 2000, 2001; Lerner et al., 1998). In addition, Clore (1992) has documented a similar phenomenon in his research on nonemotional feelings. Clore and Parrott (1994) found that participants who were induced to feel uncertain by hypnosis and were unaware of this effect of the hypnosis subsequently judged themselves to be less certain of the meaning of a poem than did both participants who were not hypnotized and participants who knew that the hypnosis led them to feel uncertain. This demonstrates that the certainty associated with one experience can lead to congruency on that dimension in a later judgment. Previous work therefore supports the current hypothesis: Emotions associated with certainty lead to more certainty in subsequent judgments, and emotions associated with uncertainty result in more uncertainty. Experiment 1 directly tests this proposition.

Method

Participants and Procedure

One hundred eighteen undergraduate students (61 men and 57 women) participated in this experiment in exchange for \$10. They were recruited from dormitories, libraries, and other locations around a western university campus.

Students who were sitting alone (usually studying) were approached by a female research assistant. The experimenter told potential participants that she was looking for people to participate in a few different studies. She explained that each study would take 5–20 min and that participants would be given \$5 for each study in exchange for their time. The researcher asked those who were interested in participating a few questions, including their school affiliation, age, and year in school. All undergraduates were told that on the basis of the information they provided, they fit the desired profile for two of the three studies. Therefore, they had the opportunity to earn \$10. This procedure was followed to reduce demand effects.

The stated purpose of the "first study" was to examine emotional memories. The "second study" involved Year 2000 predictions. The experimenter first gave the participants the materials for the emotional memory study. Once participants completed the emotional memory study, the experimenter distributed the millennium questionnaire. On completion of all of the materials, participants were debriefed, paid, and thanked for their participation.

Materials

The emotion induction was adapted from the procedure used by Strack, Schwarz, and Gschneidinger (1985). The directions indicated that we were interested in emotions and memory and that this study required participants to write about an autobiographical emotional event. The design was a 2 (positive vs. negative emotion) \times 2 (certainty vs. uncertainty emotion) structure, resulting in four conditions. In the disgust (negative, certainty) condition, participants were asked to remember, relive, and vividly recall a negative event that had made them feel disgusted ($n = 28$). In the fear (negative, uncertainty) condition, participants focused on a negative event that had made them feel scared ($n = 26$). The directions for the positive mood induction were identical except that they requested that the participants remember a positive event. One group of participants ($n = 36$) recalled a happy (positive, certainty) event. The fourth group ($n = 28$) recalled a hopeful (positive, uncertainty) event. The emotions were chosen on the basis of the appraisal literature, which shows that they vary along the dimensions *pleasant-unpleasant* and *certain-uncertain* (see Roseman, 1984; C. A. Smith and Ellsworth, 1985).

After writing about the event, the participants responded to a shortened version of C. A. Smith and Ellsworth's (1985) appraisal questionnaire. Participants rated the degree to which they understood what was happening around them, how well they could predict what would happen next, and how uncertain they were about what was happening (reverse scored) when they were feeling the target emotion. The wording for these questions was taken directly from C. A. Smith and Ellsworth's (1985) questionnaire. The certainty items constituted a reliable scale ($\alpha = .79$), which was used as a manipulation check. Two items to capture valence were also included. These were two of C. A. Smith and Ellsworth's (1985) items for measuring the pleasantness dimension: "How unpleasant was it to be in the situation you wrote about?" (reverse scored) and "How enjoyable was it to be in the situation you wrote about?" ($\alpha = .72$). All of these items were rated on 11-point scales ranging from 1 (*not at all*) to 11 (*extremely*).

In the "second study," participants were asked to make a series of predictions about what would occur in the year 2000, such as how much tuition would have increased at their school by the year 2000, whether Mark McGwire's home run record would have been beaten by the end of the year 2000, and whether same-sex marriages would be legal in California in the year 2000. There were eight predictions in all. After each of these questions, participants not only recorded their answers but also indicated how certain they were that their predictions would be correct on a 9-point scale ranging from 1 (*not at all certain*) to 9 (*extremely certain*). These certainty ratings were averaged to provide the measure of overall certainty about the millennium. These data were collected in November and December of 1998, so the events of the year 2000 were hardly objectively certain.

Results and Discussion

In all of the experiments, analyses were first conducted including gender as an independent variable. No main effects or interaction effects involving gender were found in any of the experiments. Therefore, we report the simpler analyses in which gender is collapsed and do not discuss gender further.

Manipulation Checks

Certainty appraisals. A 2 (valence) \times 2 (certainty) analysis of variance (ANOVA) showed the predicted difference between certainty emotions and uncertainty emotions, $F(1, 114) = 27.75, p < .001$. Participants who were induced to feel fear ($M = 5.07, SD = 2.72$) and hope ($M = 6.56, SD = 2.14$) had lower ratings of event certainty than did those who were induced to feel disgust ($M = 8.10, SD = 2.91$) and happiness ($M = 8.21, SD = 2.00$).³ Neither the main effect for valence nor the interaction effect was statistically significant.

Pleasantness. A 2 (valence) \times 2 (certainty) ANOVA showed only a main effect for valence of the emotion induction on the rating of how pleasant the event was, $F(1, 114) = 144.98, p < .001$. Participants who had undergone the happiness ($M = 8.25, SD = 1.54$) and hope ($M = 8.52, SD = 1.29$) inductions rated the experience as more pleasant than did those who had undergone the disgust ($M = 4.45, SD = 1.60$) and fear ($M = 5.09, SD = 2.00$) inductions.

Effects of Emotions on Certainty of Predictions About the Year 2000

The eight judgments of certainty about the millennium predictions were averaged for each participant ($\alpha = .81$). This average score was used as a dependent variable to assess whether the certainty experienced in the emotion induction led to a congruency effect in certainty judgments in the Year 2000 questionnaire. A 2 (valence) \times 2 (certainty) ANOVA indicated that emotion valence did not affect Year 2000 certainty, $F(1, 110) = 1.06, p > .3$, but certainty did, $F(1, 110) = 5.38, p < .05$.⁴ Participants who were induced to feel a certainty-associated emotion were more certain about their Year 2000 predictions ($M = 5.67, SD = 1.82$) than were participants who were induced to feel uncertainty-associated emotions ($M = 4.98, SD = 1.37$). As further evidence for the proposed relationship between the certainty associated with the emotion and certainty about the predictions, we examined the correlation between the composite certainty appraisal and the average certainty about the millennium. This correlation was positive and statistically significant ($r = .36, n = 114, p < .001$), consistent with our expectations.

This experiment extends Clore and Parrott's (1994) findings by showing that even when certainty is produced by emotion induction, it still affects subsequent judgments. In addition, the certainty-appraisal-congruent judgments demonstrate that many appraisal components can create congruency effects, thereby extending the work of Keltner et al. (1993) and Lerner and Keltner (2000, 2001). Because different emotions result in varying degrees of certainty in subsequent tasks, we argue that certainty could play an influential role in the effects of different emotions on the depth

³ The certainty ratings were all in the upper portion of the certainty scale. This may be because of the method used to induce the emotions. All participants wrote about events that had already happened and had already been resolved; thus, the overall level of uncertainty might have been reduced. We are primarily interested in relative differences in certainty and uncertainty rather than absolute differences, so it is sufficient that the emotions varied along this dimension.

⁴ Variation in the degrees of freedom is due to missing data.

of information processing. We examine this possibility in Experiments 2, 3, and 4.

Experiment 2: Emotions Associated With Certainty and Persuasion

A number of investigators have used dual process theories as a lens for examining whether and how affective states affect attitude change. This research has generally demonstrated that positive moods lead to heuristic processing. For example, positive moods lead to increased reliance on heuristic cues such as the expertise of the source. On the other hand, sad and neutral people are more attuned to the quality of arguments than are happy people, and, thus, they appear to be processing more systematically (Bless et al., 1990; Mackie & Worth, 1991; Schwarz et al., 1991). Similar to other studies, Bodenhausen, Sheppard, and Kramer (1994) presented participants with a persuasive message that varied by source cue (in one condition the message came from a professor, and in the other condition from a community college student). However, in their study, they not only induced sadness and happiness but also induced some participants to feel anger. Participants who were induced to feel anger fell prey to the same biases as did people in the happy condition; their response was significantly affected by the source. Participants in the anger condition were more persuaded by the essay written by the professor than by the essay written by the college student. Therefore, incidental anger appears to promote heuristic rather than systematic processing. Earlier explanations of mood effects that have focused on the valence of the mood are difficult, if not impossible, to apply to Bodenhausen, Sheppard, and Kramer's (1994) findings. Our explanation that the certainty-appraisal content of emotions predicts whether an emotion will lead to systematic or heuristic processing is consistent with Bodenhausen, Sheppard, and Kramer's (1994) findings. According to our model, anger should result in heuristic processing because it is associated with certainty. Sadness, on the other hand, is associated with more uncertainty and thus should result in more systematic processing.

Experiment 2 further examines the effects of specific emotions on persuasion, particularly emotions that are characterized either by certainty (contentment, anger) or by uncertainty (worry, surprise) and either by positive valence (contentment, surprise) or by negative valence (anger, worry). Our hypothesis was that the certainty dimension of emotions, not their valence, drives processing effects. We predicted that emotions associated with certainty would result in heuristic processing and emotions associated with uncertainty would result in systematic processing.

In the present experiment, we induced participants to feel one of the four target emotions by having them write about a life event in which they felt the specified emotion. Then, in a supposedly unrelated study, all participants read an essay advocating the end of grade inflation. The essay was presented as having been written by either a distinguished professor or a student from a nearby community college. After reading the essay, the participants were asked to indicate the degree to which they agreed with the positions argued in the essay. If certainty-associated emotions lead to heuristic processing, participants induced to feel contentment or anger should rely on the source cue more than should those who were induced to feel an uncertainty-associated emotion (e.g., worry or surprise). In other words, we expected an interaction

between the certainty level of the emotion and the use of the source cue.

Method

Participants

One hundred sixty-five students (77 women and 88 men) participated in this study in exchange for \$10. Flyers placed around a West Coast campus offered students \$10–15 an hour in exchange for participating in studies. Those interested called the listed phone number and were entered into a database of potential participants. We recruited participants from this list.

Procedure and Materials

When the participants arrived at the laboratory, an experimenter told them that because the current studies were short, they would participate in multiple unrelated studies during the hour. The first experimenter introduced the "first study" on emotional memories, which served as the emotion induction. The procedure was almost identical to the emotion induction used in Experiment 1. This time, the certainty emotions were anger ($n = 49$) and contentment ($n = 35$) and the uncertainty emotions were worry ($n = 34$) and surprise ($n = 47$). Contentment and surprise were the positive valence emotions, and worry and anger were the negative valence emotions. The directions for the writing exercise were explicit about whether the participant should think of a positive or negative event as well as which emotion they should recall.

After writing about the emotional experience, participants filled out a short appraisal questionnaire. As in Study 1, this questionnaire was a shortened version of C. A. Smith and Ellsworth's (1985), and it included both the certainty-appraisal and the pleasantness-appraisal items used in the previous study as manipulation checks. Both measures were internally valid (certainty: $\alpha = .68$; pleasantness: $\alpha = .86$).

Once the emotional memory writing and appraisal ratings were complete, a second experimenter introduced "the second study," which was ostensibly on educational issues. The experimenter explained that the study was a nationwide opinion survey designed to measure the attitude of college students toward several issues facing institutions of higher education. For the study, the participants would read a short essay and answer questions about their attitudes on the essay topic. In the essay, the author asserted that there was too much grade inflation and that to combat this trend, students in college classes should be graded more harshly. Specifically, the author argued that the grades should be normally distributed, with the mean grade being a C. Half of the participants ($n = 83$) were given the student version of this essay. In this version, the author of the essay was presented as a student at a nearby community college, and the essay was formatted to resemble a typical college paper (on regular printer paper, double spaced, centered title, etc.). The other half of the participants ($n = 82$) received the expert version. In this version, the author was presented as a distinguished professor of education, and the essay was formatted to look like a copy of a newspaper editorial (i.e., in column format, justified, etc.). Other than these format differences, the essays were identical. After reading the essay, the participants indicated their agreement with the following statements on a scale ranging from 1 (*completely disagree*) to 11 (*completely agree*): "Grades should always be normally distributed," "A grade of C should be the average grade," "Universities should create grading policies that end grade inflation," and "Grade inflation is a big problem." These items were combined to create a single measure of agreement and, thus, a measure of persuasion ($\alpha = .80$). Participants were then debriefed, paid, and thanked.

Results

Manipulation Checks

Two 2 (certainty) \times 2 (valence) ANOVAs were run on the certainty-appraisal manipulation check and the pleasantness ma-

nipulation check. The analysis on the certainty-appraisal scale showed only a main effect of the certainty of the emotion, $F(1, 161) = 31.32, p < .001$. The certainty emotions ($M = 7.67, SD = 2.01$) were higher in certainty appraisals than were the uncertainty emotions ($M = 6.04, SD = 1.87$). The analysis examining the pleasantness questions found only a main effect for the valence of the emotion, $F(1, 161) = 53.18, p < .001$. The positive emotions resulted in higher ratings on the pleasantness questions ($M = 7.71, SD = 1.76$) than did the negative emotions ($M = 5.82, SD = 1.54$).

Effect of Emotions on Heuristic Cue Use

To examine which conditions resulted in the greater use of heuristic cues, we ran a 2 (certainty vs. uncertainty emotion) \times 2 (positive vs. negative emotion) \times 2 (expert vs. nonexpert source cue) ANOVA on the composite persuasion variable. This analysis showed that both certainty, $F(1, 157) = 7.23, p < .01$, and source cue, $F(1, 157) = 3.94, p < .05$, had a main effect on persuasion but that valence did not ($F < 1$). The certainty main effect occurred because people who were induced to feel certainty-associated emotions were more persuaded ($M = 6.08, SD = 2.04$) than were people who were induced to feel uncertainty-associated emotions ($M = 5.22, SD = 1.72$). In addition, across conditions, people were more persuaded when the author of the essay was a distinguished professor ($M = 5.98, SD = 1.90$) than when the author was a student ($M = 5.35, SD = 1.93$).

Most important, the Certainty \times Source interaction was the only significant two-way interaction, $F(1, 157) = 5.22, p < .05$. Figure 1 shows the means involved in that interaction. Planned paired contrasts indicate that the difference between the expert and non-expert conditions was significant for participants who were induced to feel certainty emotions, $t(161) = 2.78, p < .01$, but not for those who were induced to feel uncertainty emotions ($t < 1$). It is surprising that there was no difference between the two nonexpert conditions ($t < 1$).

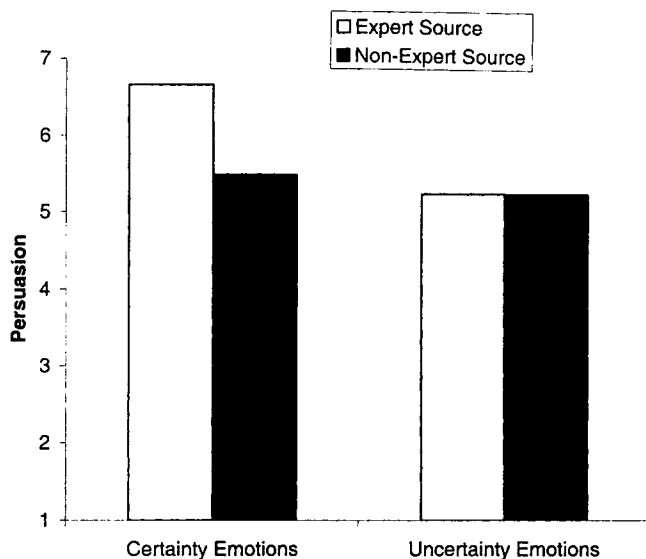


Figure 1. The effect of certainty-associated emotions and source cue on persuasion.

Discussion

In this experiment, participants were more likely to rely on the expertise of the source when induced to feel emotions that are associated with certainty than when induced to feel emotions associated with uncertainty. This is a sign that people experiencing certainty emotions processed more heuristically: They based their judgments on superficial cues in the environment. The results imply that people who feel emotions associated with uncertainty, however, are more systematic in their processing. Their similar responses to the message, regardless of the expertise of the source, imply that they were paying attention to the quality of arguments rather than to the status of the speaker.

Although the main effect for certainty-associated emotions was not predicted, it is understandable. If there were certainty-congruence effects, as we have hypothesized, then the people induced to feel certainty-associated emotions felt subjectively certain while reading the essay. This should result in more agreement in general.

One of the advantages of dual process theories of attitude change is their applicability to a wide range of cognitive phenomena (Chaiken et al., 1989). Not only have they clarified persuasion processes, they are also useful in ascertaining those situations in which people are likely to stereotype (Bodenhausen, 1993; Bodenhausen, Kramer, & Süsner, 1994). Stereotyping is a heuristic process in which a person's group membership is used as a heuristic cue to determine other characteristics of the individual (Bodenhausen & Wyer, 1985; Chaiken et al., 1989). Thus, if the certainty associated with emotions affects processing, it should affect stereotyping as well as persuasion. In Experiment 3, we examine whether emotions that differ in certainty affect reliance on stereotypes. Specifically, we test the hypothesis that a negative emotion that is characterized by certainty will result in more stereotype use than will a negative emotion characterized by uncertainty.

Experiment 3: Negative Emotions and Stereotyping

There is a growing interest in the role of affect and emotion in stereotyping, prejudice, and discrimination (Dijker, 1989; Esses, Haddock, & Zanna, 1993; Esses & Zanna, 1995; Mackie, DeVos, & Smith, 2000; Mackie & Hamilton, 1993; Stephan & Stephan, 1985). Although researchers have taken many approaches to examining how emotions and moods are involved in prejudice, one of the most common has been to study how incidental moods affect the cognitive processes involved in intergroup attitudes. For example, Mackie and her colleagues (Mackie & Hamilton, 1993; Stroessner & Mackie, 1993) have examined the effects of mood on illusory correlation and on perceptions of group variability, and Bodenhausen, Kramer, and Süsner (1994) tested the effect of moods on the use of stereotypes in forming social judgments. As a whole, this work has demonstrated the usual effect: Positive moods result in heuristic processing, but negative moods result in more systematic processing (for an exception, see Krauth-Gruber & Ric, 2000).

However, several researchers have argued that a simple delineation between positive and negative affect may be inadequate to fully understand the affective components of prejudice (Bodenhausen, 1993; Bodenhausen, Kramer, & Süsner, 1994; Dijker, Koomen, van den Heuvel, & Frijda, 1996; Mackie & Hamilton,

1993). It seems especially important to differentiate among negative emotions because a variety of negative emotional states seem to be involved with prejudice and may be involved in different ways (Dijker et al., 1996; E. R. Smith, 1993). Bodenhausen, Kramer, and Süsser (1994) have shown that a more nuanced view of emotions is necessary even when one is considering the relatively simple issue of whether incidental emotions affect cognitive stereotyping processes. In their work, anger and sadness had quite different effects on how much participants relied on stereotypes. Specifically, participants who were induced to feel anger relied on stereotypes more than did people induced to feel sadness.

The goal of Experiment 3 was to examine how two emotions that differ in their certainty content affect stereotype use. To do this, we compared the effects of fear and disgust. Fear is associated with a great deal of uncertainty, whereas disgust is associated with being quite certain. Further, it seems likely that both emotions play multiple roles in stereotyping and prejudice. We predicted that the experience of disgust would increase reliance on stereotypes, as compared with the experience of fear.

In this experiment, we induced emotions using film clips rather than through the writing exercise used in Experiments 1 and 2 and in Bodenhausen's (1993) work. This multimethod approach was used to increase generalizability. To more fully test our model, we made an additional methodological change from Experiment 2: In this study we measured participants' certainty both about the emotional event (the film) and about the subsequent task.

Method

Participants

Ninety-five people (55 men and 40 women) participated in this experiment in exchange for \$10. The participants were recruited in the same fashion as they were in Experiment 2.

Materials and Procedure

Participants came to the lab individually. They were told that they would be engaged in a number of different tasks because of the short nature of each task. The first experimenter introduced the first task, which was the emotion induction. A second experimenter introduced the second task, which was the stereotyping task. Finally, participants completed an emotion manipulation check questionnaire.

Emotion induction. The experimenter explained to the participant that we were examining the impact of various stimuli that might be used in future studies. The experimenter then showed the participant one of two film clips. In the fear condition, a segment from the feature film *The Shining* was shown ($n = 54$). The clip was 1 min 22 s long, and previous studies have shown that this clip reliably induces fear (Gross & Levenson, 1995). In the disgust condition, a clip from the movie *Maria's Lovers* was shown ($n = 41$). In this clip, a rat crawls inside a man's mouth. The clip lasted 1 min 10 s, and previous research has shown that it induces feelings of disgust (Rosenberg & Ekman, 1994). After watching the film clip, the participants filled out a short appraisal questionnaire. Concerned that too many questions about certainty would raise the suspicion of the participants, we reduced the certainty manipulation check measure to one question, which read, "How certain are you about what will happen next in the film?" (1 = *not at all*, 11 = *extremely*). Although we did not manipulate pleasantness in this experiment as we had in the previous experiments, we also assessed participants' sense of the pleasantness of the experience with a question that read, "How pleasant was it to watch the film?" (1 = *not at all*, 11 = *extremely*). In addition, we asked participants to rate how much

they paid attention to the film (1 = *not at all*, 11 = *completely*). Again, we did not intend to manipulate their attention, but we were concerned that the films might result in differential levels of attention because of either their content or the emotional state they produced. If there were differences in the amount of attention the participants dedicated to the film, it could affect the degree to which they experienced the intended emotion or the amount of processing in the subsequent task.

Stereotyping task. A second experimenter told the participant that the second study was on educational attitudes. The participants were told about a recent dispute regarding the way that colleges and universities respond to students' infringements of the law and other ethical issues involving students. Some universities have defended their policies by arguing that these policies reflect the general population's view of what should be done in these cases. The stated purpose of the study was to determine whether the universities' actions actually corresponded to students' views of the appropriate action in various situations. The experimenter told the participants they would read about one such instance and then would make judgments about whether the student was guilty or innocent of the accusation. If they believed the student was guilty, they would need to indicate how he should be punished. Before reading the specific details of the case, the participants were asked to indicate how certain they were that they would be able to determine the most appropriate outcome for the situation. This question was rated on an 11-point scale ranging from 1 (*with no certainty*) to 11 (*with complete certainty*).

The experimenter then gave the participant the case, which described a situation in which a professor accused a student of cheating. Specifically, the professor believed that the student had added a section to his essay exam after the graded exam had been returned. The student argued that the teaching assistant who graded the exam had overlooked that portion of the response and thus had unfairly marked him down. The student and the professor each had evidence supporting their view. For half the participants ($n = 48$) the student in the case was described as "a well-known athlete on the basketball team"; the version given to the other half of the participants ($n = 47$) did not contain this phrase. After reading the case, the participants indicated how likely it was that the student was lying about the situation, how likely it was that the student had added the section after the exam had been graded, and how dishonest the student was on 11-point scales ranging from 1 (*not at all*) to 11 (*extremely*). These three items were combined into a single scale ($\alpha = .88$). Participants also indicated what action they thought the school should take.

Emotion manipulation check. Finally, the participants rated themselves on the degree to which they felt enjoyment, anger, disgust, and fear (1 = *not at all*, 11 = *extremely*) while watching the movie earlier in the session. After completing this questionnaire, the participants were debriefed, paid, thanked, and dismissed.

Results

Manipulation Checks

Participants who saw the disgust clip rated themselves as feeling more disgust ($M = 7.32$, $SD = 2.76$) than did those who saw the fear clip ($M = 2.85$, $SD = 2.41$), $F(1, 93) = 70.42$, $p < .001$. Participants in the fear condition rated themselves as feeling more fear ($M = 6.74$, $SD = 2.94$) in response to the film clip than did those in the disgust condition ($M = 4.34$, $SD = 2.08$), $F(1, 93) = 19.69$, $p < .001$. There was no difference between the two conditions in ratings of anger, $F(1, 93) = 1.87$, $p > .10$. In addition, the disgust clip elicited more certainty ($M = 6.18$, $SD = 3.28$) than did the fear clip ($M = 4.05$, $SD = 2.25$), $F(1, 93) = 12.78$, $p < .01$.

We also checked whether there were differences in the pleasantness (valence) of the disgust and fear experiences. Even though we had not predicted differences in valence, we were concerned

about the possibility that the certainty emotion (disgust) would also be more pleasant than the uncertainty emotion (fear), in which case it would be difficult to determine whether it was certainty or valence that was responsible for any effects. There was no difference between the fear and disgust conditions on the pleasantness appraisal questions ($t < 1$). However, there was a difference in how much the participants said they enjoyed watching the films, $t(93) = 4.08, p < .01$. The participants who watched the fear film found it more enjoyable ($M = 4.27, SD = 3.17$) than did those who watched the disgust clip ($M = 2.05, SD = 1.69$). This pattern makes this study an even better test of our hypotheses than originally expected. Our approach predicts that the experience associated with greater certainty (disgust) should result in more stereotyping, but valence approaches suggest that the experience associated with greater enjoyment (fear) should result in more stereotyping. Thus, our examination of the effects of disgust and fear on stereotyping actually allows us to pit our approach against a valence approach.

In addition, we tested for differences in the amount of attention directed at each of the films, but there was no difference between the conditions ($t < 1$). In both conditions, the attention rating was well above the midpoint (disgust: $M = 8.71$, fear: $M = 8.87$), indicating that participants in both conditions were engaged in the emotion induction procedure.

Certainty About the Task

Immediately after the participants heard about the stereotyping task, they were asked to rate how certain they were that they would be able to identify the most appropriate outcome in the task. After watching the disgust clip, the participants were more certain ($M = 6.02, SD = 2.62$) than they were after watching the fear clip ($M = 4.89, SD = 1.84$), $F(1, 93) = 6.15, p < .05$. Further, the degree to which people were certain about the task was related to the degree to which they felt certain about what would happen next in the film. This relationship was positive, as expected, but did not reach traditional levels of significance ($r = .20, n = 95, p = .06$).

Stereotype Use

Each participant rated the likelihood that the student had added the essay section to his exam, the likelihood that the student was lying, and the likelihood that the student was generally dishonest. These ratings were combined to create a measure of how much the participant thought the student had cheated. Because there is a stereotype that athletes are more likely to cheat than others are (Bodenhausen, Kramer, & Süsner, 1994), we can infer that stereotype use is the result of a particular emotion if, within that emotion condition, people were more likely to find the athlete guilty of cheating than the unidentified student. Thus, we predicted an interaction between emotion and student type such that participants in the disgust condition would be affected by the athlete label more than would participants in the fear condition.

A 2 (disgust vs. fear) \times 2 (athlete vs. unidentified student) ANOVA showed a trend for student type, $F(1, 91) = 3.19, p < .10$, and the predicted interaction between emotion and student type, $F(1, 91) = 5.36, p < .05$. Although the athlete was considered more likely to have cheated ($M = 6.06, SD = 1.98$) than the unidentified student ($M = 5.43, SD = 2.02$), this was only true in

the disgust condition (see Figure 2). Planned paired contrasts indicate that participants in the disgust condition judged the athlete more likely to have cheated than the unidentified student, $t(91) = 2.72, p < .01$, but participants in the fear condition did not demonstrate the same difference ($t < 1$). This result indicates that participants in the disgust condition were affected by the social category of the student but those in the fear condition were not.

Mediational Analyses

We have suggested that the effect of emotions on processing is a result of certainty-appraisal-congruent judgments. If certainty congruence plays this role, then the certainty the participants had about the task should statistically mediate the relationship between the emotion and the processing effects.

Our approach suggests that disgust should result in higher levels of task certainty than should fear. Further, we argue that when participants experience task certainty and are exposed to information that the accused is an athlete, the participants will rely on their stereotypes of athletes. Thus, the participants will more strongly believe that the student athlete was guilty of cheating on the exam. Of course, this effect of disgust and the mediation of task certainty should only exist in the athlete condition. No matter how certain or uncertain participants feel in the unidentified student condition, there is no opportunity for them to stereotype. Therefore, the proposed mediation is relevant to the athlete condition only.

If task certainty about the stereotyping task mediates the relationship between emotion and stereotype use, then when both emotion and task certainty are simultaneously used as predictors for the belief that the athlete had cheated, only the coefficient for the ratings of task certainty should be significant (Baron & Kenny, 1986).

A series of regression analyses provide support for our approach (see Figure 3). Using only the data from the athlete condition, we found that emotion (0 = fear, 1 = disgust) predicted task certainty ($\beta = .46, p < .01$). We also found that emotion predicted the belief that the athlete had cheated ($\beta = .39, p < .01$) and that task certainty predicted the belief that the athlete had cheated ($\beta = .50, p < .001$). A final analysis showed that when both emotion and

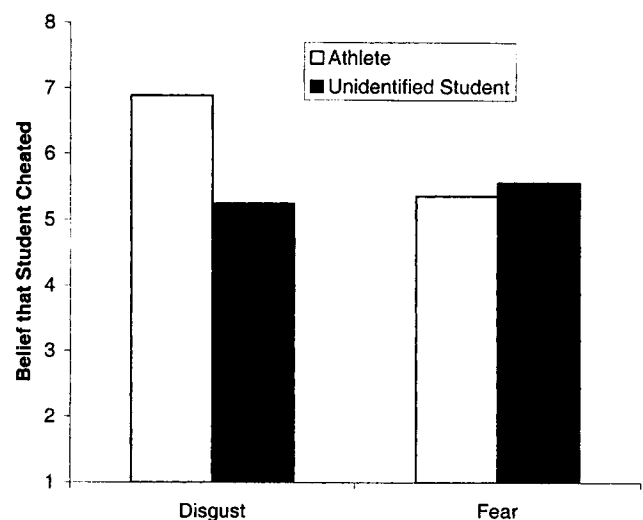


Figure 2. The effect of disgust and fear on stereotype use.

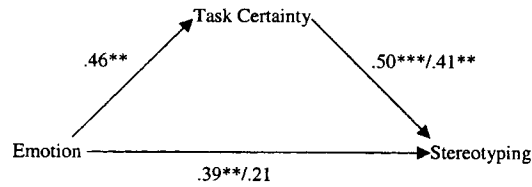


Figure 3. Mediation of task certainty. Emotion was scored 0 = fear, 1 = disgust. ** $p < .01$. *** $p < .001$.

task certainty were simultaneously entered as predictors for belief that the athlete had cheated, emotion was no longer a significant predictor ($\beta = .21, p > .15$) but task certainty remained a significant predictor ($\beta = .41, p < .01$). Finally, we used Kenny, Kashy, and Bolger's (1998) revision of the Sobel test to examine the difference between the effect of emotion when used as an individual predictor and its effect when used in conjunction with task certainty. This test showed that, indeed, the effect of emotion significantly decreased when task certainty was included ($Z = 2.63, p < .01$).

Although the mediational analysis supports our approach, there remains the possibility that some other aspect of the films created the stereotyping effects. Because the fear film clip led to greater feelings of enjoyment than did the disgust film clip but the disgust film clip led to more stereotyping, it is not viable that the effects uncovered in this experiment are yet another example of more positive experiences resulting in more heuristic processing. Another possibility, however, is that our effects are due to differences in the intensity of the emotional experience. Perhaps more intense emotional experiences lead to more heuristic processing. After all, participants in the disgust condition reported stronger feelings of disgust than participants in the fear condition reported feelings of fear.⁵ To examine this alternative explanation, we created an emotional intensity variable that was simply the emotion rating for the intended emotion (i.e., disgust ratings in the disgust condition and fear ratings in the fear condition). We then examined whether this variable mediated the effects of emotion on judgments. Intensity did not predict judgments that the student cheated ($\beta = .04, p > .80$), and thus an important criterion of mediation was not met.

Discussion

This experiment serves two important goals. First, it replicates the findings of the second experiment. Once again, an emotion that was associated with certainty resulted in a greater reliance on general knowledge structures, or less thorough processing. When feeling a certainty-associated emotion, participants were more likely to rely on a heuristic cue both in a persuasion situation and in a situation in which stereotypes were available. These findings may explain the differences between anger and sadness in stereotype use that Bodenhausen, Kramer, and Süsner (1994) documented. Anger is associated with certainty, so our approach predicts that anger will result in heuristic processing and thus in a greater reliance on stereotypes. Sadness is associated with relatively more uncertainty and therefore should result in more systematic processing.

This study also provides a direct measure of the mediating process we proposed. Specifically, we argue throughout this article that the certainty associated with an emotional experience influ-

ences the degree of certainty one feels in subsequent situations. We argue that certainty-appraisal congruence is responsible for the emotion effects that we found and for at least some of the mood effects found by previous researchers. In this experiment, we had a direct measure of subsequent certainty, and we were able to examine its relationship to reliance on the heuristic cue (i.e., the stereotype). As predicted, we found that this relationship was significant and that certainty-appraisal congruence (or task certainty) statistically mediated the processing effect.

Experiment 4

The previous two experiments indicate that some of the effects of affective states on cognitive processing may be due to the certainty-appraisal content of the emotion rather than to the valence, as was previously thought. At the core of our criticism of past work that has highlighted valence is a methodological issue. When participants are induced to feel a particular mood or emotion, it may be impossible to be assured that nothing other than valence differs between the two conditions. We have suggested that in previous studies, not only did valence differ but certainty likely differed as well. However, the same methodological issue is also a concern in the experiments presented in this article. In Experiments 1–3, we chose emotional states that have been found to be related to certainty or uncertainty (and our manipulation checks affirmed that this was also true in these studies), but these emotions might have differed in other ways as well. Thus, the best test of our hypothesis involves a comparison between an emotional state characterized by uncertainty and the same emotional state under conditions of certainty. In the fourth experiment we make that comparison.

In Experiments 1–3 we chose emotions that are strong representatives of each side of the certainty–uncertainty dimension and avoided emotions located in the middle of that dimension. However, emotions located in the middle of the certainty dimension provide an interesting possibility for examining our hypotheses. Specifically, because these emotions sometimes co-occur with a certainty appraisal and sometimes do not, they allow us to compare the effects of an emotion when it is associated with certainty with the effects of that same emotion associated with uncertainty. This comparison provides a cleaner test of the hypotheses, as presumably more is constant across the certainty and uncertainty conditions than when two entirely different emotions are used. Our perspective suggests that the effects of these emotions on cognitive processing should depend on whether they were accompanied by a sense of certainty or a sense of uncertainty at the time in question.

In Experiment 4, we chose to examine sadness because sadness has been used as the prototypic negative emotion by many of the mood researchers. Earlier in this article we suggested that the effects of sadness on information processing may be due to its relationship with uncertainty appraisals rather than to the negativity associated with it. Sadness is experienced with more uncertainty than are neutrality or happiness (the states with which it is usually compared) but with less uncertainty than is fear, one of the states we have used as representative of uncertainty. In C. A. Smith and Ellsworth's (1985) multidimensional analysis, sadness was on the uncertainty side of the uncertainty–certainty dimension, but it

⁵ We are indebted to an anonymous reviewer for raising this possibility.

was near the middle. Ellsworth and Smith (1988) argued that the middle location of sadness on this dimension suggests that certainty is not central for sadness and that the relationship between sadness and certainty appraisals may be more malleable. People may sometimes feel sad and uncertain but at other times feel sad and certain. Our approach suggests that it is only when sadness is accompanied by uncertainty that it leads to more systematic processing. When it is accompanied by a sense of certainty about what has happened and what will happen, it should result in more heuristic processing.

Overview

In the final experiment, participants were assigned to one of four emotion conditions. Three of these conditions were sadness inductions, and one was a neutral condition. In all three of the sadness conditions, participants wrote about an instance in which they had experienced sadness, but these conditions varied in terms of the instructions participants were given about certainty. In the sad/uncertainty-appraisal (sad/UA) condition participants were told to think of a time when they felt sad and uncertain, in the sad/certainty-appraisal (sad/CA) condition they wrote about a time when they felt sad and certain, and in the final sad condition they were not given any instructions pertaining to certainty (sad/NA condition). This last sadness condition was meant to replicate sadness inductions in previous mood and processing research. Because the appraisal literature suggests that uncertainty is often part of sadness and because we have argued that this uncertainty affects processing, we hypothesized that the results of the sad/NA condition would be similar to those of the sad/UA condition and that both would result in relatively systematic processing compared with the sad/CA condition, which we expected to evoke more heuristic processing.

Neutral conditions are often included in studies of emotion and mood as control conditions. Although it is clear that they are useful conditions from a valence perspective, they are a less obvious choice from an appraisal perspective of emotions. Even though neutral conditions are free of valence, they are not necessarily free from the other dimensions highlighted by appraisal theories. Specifically, depending on how neutrality is induced, it might be accompanied by more or less of a sense of certainty. Nonetheless, because we wanted the results from our sadness conditions to be comparable to previous research on the effects of sadness, we included a neutral condition. Participants in the neutral condition were asked to write a brief essay about the events of the previous day. This is a typical control procedure (Strack et al., 1985). Because participants typically report on their daily routine, we expected this version of neutrality to be accompanied by a fair amount of certainty and therefore to result in less systematic processing than the sad/UA and sad/NA conditions.

In this experiment, we returned to a persuasion paradigm. Participants were exposed to either a weak or a strong form of a persuasive message. When people process systematically, they should find weak messages less convincing than strong messages, whereas when they process in a heuristic manner, they should be less attentive to the strength of the argument and be equally persuaded by these messages (Eagly & Chaiken, 1993; Petty & Cacioppo, 1986). In addition, in this experiment we collected

cognitive responses as further evidence of the depth of processing. Thus, we had three goals for this experiment: (a) we wanted to hold emotion constant while varying certainty, (b) we wanted to examine sadness because it has played such an important role in previous work on affect and cognition, and (c) we wanted to collect more direct measures of processing than we had in the previous experiments to bolster our argument that processing is affected by the certainty-appraisal content of emotions.

Method

Participants

One hundred forty-six people (86 women and 60 men) participated in this experiment in exchange for payment. They were recruited in the same fashion as in the previous experiments.

Materials and Procedure

Emotion induction. The writing exercise used in Experiments 1 and 2 was again used in this experiment. However, this time participants were given instructions to write about a time when they felt sad and certain about what was happening and what would happen (the sad/CA condition; $n = 50$), a time when they felt sad and uncertain about what was happening and what would happen (the sad/UA condition; $n = 37$), a time when they felt sad (the sad/NA condition; $n = 19$), or to describe the minor details of the previous day, which was used as a neutral condition ($n = 40$).

Persuasive message. After completing the emotion induction procedure, participants were given the materials for the persuasion component of the experiment. These materials were presented as a separate study on a new product—a camcorder that the manufacturer was considering releasing soon. Ostensibly, this manufacturer was doing some market research about how potential consumers would respond to the product if it was released. Participants were given one of two descriptions of the product; both communicated that the product was a good product, superior to competitor models, and one that the participant should consider buying. In the strong argument condition ($n = 68$), the attributes that were listed as superior about this camcorder were attributes that previous research has shown to be more important features (i.e., color accuracy, picture quality, battery time). In the weak condition ($n = 78$), the attributes were less important features (i.e., color selection for the tote bag, cloth lens wipe, length of the extension cord). These stimulus materials were adapted from those used by Aaker and Maheswaran (1997), who pretested them and used them in their research as a way of representing strong versus weak arguments.

Dependent Variables

Following the persuasive message, participants received a questionnaire with the persuasion-related dependent measures, including both a measure of the target attitude and directions for the thought-listing procedure.

Attitude. After reading about the camcorder, participants rated whether they would consider buying it on a scale ranging from -4 (*would definitely not consider buying it*) to 4 (*would definitely consider buying it*). This rating was used as the measure of whether the participant had been persuaded by the message.

Cognitive responses. Participants were also asked to write down any thoughts that occurred to them while reading the description of the product (see Petty & Cacioppo, 1986). Then, they were directed to return to their list of thoughts and indicate whether the thought was positive, negative, or neutral by writing a "+," "-", or "0" next to each thought. We used these

responses to further examine the degree to which participants were processing carefully or superficially during the persuasion task (Petty & Cacioppo, 1986).

Manipulation checks. Finally, participants completed the manipulation check questionnaires. There were manipulation checks both for the message strength variable and for the emotion induction procedure. Participants were given a list of camcorder features that included those from both versions. They rated how important each feature would be to them on a scale that ranged from -4 (*not at all important*) to 4 (*extremely important*).

Once participants had completed all the materials pertaining to the camcorder, they completed the emotion induction manipulation checks. They were asked to think back to the earlier study in which they had written an essay about an event or events from their lives and try to remember what they had experienced while writing the essay. They then rated the degree to which they had felt happy and sad while they completed the writing component of the first study.

On this form, the participants also rated the appraisals they recalled having while experiencing the event they described in the written essay. We collected data on appraisal dimensions, including certainty, pleasantness, situational agency, effort, and attention. Certainty was measured using the same three items as in Experiments 1 and 2. The other appraisals were measured with single items. The pleasantness item was "How pleasant was the event?" The situational agency item was "To what extent was the event beyond anyone's control?" The effort item was "How much effort did the situation require?" Finally, the attention item was "How much attention did the situation require?" Each of these appraisals was rated on a scale that ranged from 1 (*not at all*) to 11 (*extremely*). The wording for these questions was based on the wording used by C. A. Smith and Ellsworth (1985). We intended to manipulate only certainty appraisals, but we thought it was important to gauge these other dimensions as well. As in the previous experiments, pleasantness was included because of the possibility that valence is involved. We included situational agency because Ellsworth and Smith (1988) argued that situational agency is the appraisal most central to sadness. Because we hoped that the three sadness

conditions would create equivalent levels of sadness but were not sure they would, we included this item as a check for the similarity of experience across these conditions. Effort and attention appraisals were included because as appraisals that are obviously similar to certainty and dimensions that have also been discussed extensively in processing literature, they seemed like potential alternatives to certainty.

After all the materials had been completed, participants were debriefed, paid, and thanked.

Results

Manipulation Checks

Emotion. Both of the emotion ratings were submitted to a one-way ANOVA in which emotion condition was a four-level independent variable. There was a significant omnibus effect for sadness, $F(3, 142) = 29.19, p < .001$, and happiness, $F(3, 142) = 15.25, p < .01$. Table 1 provides the means, standard deviations, and results of planned paired comparisons for these ratings. It is important to note that the three sadness conditions produced equivalent levels of sadness and that there was greater sadness in all of these conditions than in the neutral condition. The three sadness conditions also did not differ in terms of the amount of happiness they produced, but, again, the sadness conditions differed from the neutral condition on this variable. People in the neutral condition felt more happy when they wrote their essays than did people in the sadness conditions.

Appraisals. The three certainty items were combined into a single measure to assess certainty appraisals ($\alpha = .67$). This measure was submitted to a one-way ANOVA, $F(3, 140) = 16.55$,

Table 1
Means, Standard Deviations, and Other Results From Experiment 4

Dependent measures	Sad/NA	Sad/UA	Sad/CA	Neutral
Emotions				
Sad	7.47 _a (2.55)	6.68 _a (3.01)	6.96 _a (2.69)	2.50 _b (1.93)
Happy	2.89 _a (2.10)	3.08 _a (1.96)	2.56 _a (1.51)	5.35 _b (2.64)
Appraisals				
Certainty	5.03 _a (2.43)	5.17 _a (1.70)	7.46 _b (2.15)	7.62 _b (1.84)
Pleasantness	1.89 _a (1.59)	1.43 _a (0.87)	1.54 _a (0.93)	5.95 _b (1.85)
Situational responsibility	7.53 _a (3.44)	7.19 _a (3.32)	7.46 _a (3.62)	3.82 _b (2.60)
Effort required	7.32 (2.73)	7.32 (2.58)	6.94 (2.75)	6.38 (2.79)
Attention required	7.79 (2.59)	8.05 (2.62)	7.94 (2.40)	7.85 (2.16)
Persuasion				
Attitude				
Weak version	-0.36 (2.16)	-0.78 (2.68)	0.31 (2.39)	-0.21 (2.19)
Strong version	2.62 _a (0.92)	2.50 _a (1.23)	0.90 _b (2.53)	1.00 _b (2.64)
<i>t</i> (138)	2.98**	3.96***	0.96	1.58
Favorability index				
Weak version	-0.52 (0.36)	-0.47 (0.30)	-0.56 (0.38)	-0.51 (0.42)
Strong version	0.15 _a (0.61)	0.14 _a (0.51)	-0.39 (0.46)	-0.20 _b (0.59)
<i>t</i> (138)	3.18**	3.52**	1.27	1.90†
Correlation between favorability index and attitude	.55* _{ab}	.58** _a	.11 _b	.27† _{ab}

Note. The results of planned paired comparisons between emotion conditions are indicated by subscripts. Values in the same row with different subscripts represent differences at $p < .05$. Standard deviations are in parentheses. NA = no appraisal directions; UA = uncertainty appraisals; CA = certainty appraisals.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

$p < .001$,⁶ and the predicted pattern was observed. As shown in Table 1, planned paired comparisons indicated that there was less certainty in the sad/NA condition and the sad/UA condition than in the sad/CA condition or the neutral condition.

The one-way ANOVA performed on the pleasantness item also showed an omnibus effect, $F(3, 141) = 105.50, p < .001$, which planned paired comparisons indicated was due to the neutral condition leading to higher pleasantness ratings than did any of the sad conditions. None of the sad conditions differed from one another. Similarly, there was a significant omnibus value for the situational responsibility item, $F(3, 141) = 11.29, p < .001$. This, too, was due to the differences between the neutral condition and the sad conditions. The neutral induction resulted in significantly less situational responsibility than did any of the sad conditions. Again, the sad conditions did not differ from one another. Examination of the effort-appraisal and attention-appraisal items showed that there were no differences along these dimensions; for effort, $F(3, 141) = 0.91$, and for attention, $F(3, 141) = 0.07$.

In sum, the neutral condition varied from the other conditions on a number of dimensions. This likely has been true in other studies that have included neutral conditions, and this also makes it difficult to know what the sources of processing differences between the neutral condition and other conditions are. In contrast, the sad/CA condition differed from the other conditions only along one of the measured dimensions (certainty) and therefore provides a superior comparison to the sad/UA and sad/NA conditions. Thus, the comparison between the sad/CA condition and the sad/UA condition provides the best test of our hypotheses.

Argument strength. As a check of our manipulation of argument strength, we examined the participants' ratings of the importance of the camcorder characteristics. The ratings of importance of color accuracy, battery time, and picture quality were averaged together, and the ratings of the importance of colors of tote bag, lens cover, and length of the extension cord were averaged. A paired samples t test indicated that participants thought that the characteristics listed in the strong version were more important ($M = 3.27, SD = 0.85$) than the characteristics listed in the weak version ($M = -0.96, SD = 1.59$), $t(145) = 31.67, p < .001$.

Persuasion

Participants' ratings of whether they would consider buying the camcorder were analyzed with a 2 (argument strength) \times 4 (emotion) ANOVA. In this analysis, there was no main effect for emotion but there was a main effect for argument quality, $F(1, 138) = 24.47, p < .001$. Participants said they would consider buying the camcorder more if they received the strong argument version ($M = 1.78, SD = 2.07$) than if they received the weak argument version ($M = -0.10, SD = 2.30$). This main effect was qualified by an interaction with emotion, $F(3, 138) = 2.96, p < .05$. Table 1 shows the means, standard deviations, and planned paired comparisons for the attitude item in all the conditions. The results also show that the differences among conditions were primarily due to differences in the responses to the strong argument because there were no significant differences in responses to the weak version across conditions. However, more important, the responses to the strong and weak conditions were significantly different in the sad/NA condition, $t(138) = 2.98, p < .01$, and in the sad/UA condition, $t(138) = 3.96, p < .001$, but not in the

sad/CA condition, $t(138) = 0.96, p > .30$, or in the neutral condition, $t(138) = 1.58, p > .10$. The difference between the sad/NA condition and the neutral condition replicates other findings, such as those of Bless et al. (1990) and Bless, Mackie, and Schwarz (1992). The difference between the sad/UA and the sad/CA conditions provides direct support for our focus on the certainty-appraisal content of the emotional state.

To further examine the processing of participants, we analyzed their thought protocols. Following the procedure of Wegener et al. (1995), we created a favorability index in which the number of negative thoughts was subtracted from the number of positive thoughts. That difference was then divided by the total number of thoughts. The favorability index was analyzed with a 2 (argument strength) \times 4 (emotion) ANOVA. There was a main effect for argument strength, $F(1, 138) = 26.21, p < .001$, because people had more favorable thoughts following a strong argument ($M = -0.07, SD = 0.56$) than following a weak argument ($M = -0.52, SD = 0.36$). There was also a main effect of emotion, $F(3, 138) = 3.48, p < .05$. This main effect occurred because people had fewer favorable thoughts in the sad/CA condition ($M = -0.49, SD = 0.42$) and the neutral condition ($M = -0.42, SD = 0.48$) than in the sad/UA condition ($M = 0.00, SD = 0.53$) and the sad/NA condition ($M = -0.24, SD = 0.57$). An examination of all the cells (see Table 1) suggests that this main effect was due to variance across conditions in response to the strong argument version. Indeed, the main effects were qualified by a marginally significant interaction, $F(3, 138) = 2.21, p = .09$. Planned paired comparisons between the strong and weak argument versions for each emotion condition showed significant differences in the sad/NA condition, $t(138) = 3.18, p < .01$, and in the sad/UA condition, $t(138) = 3.52, p < .01$, but no difference in the sad/CA condition, $t(138) = 1.27, p > .2$, and a marginal difference in the neutral condition, $t(138) = 1.90, p = .06$.

Like other researchers (e.g., Wegener et al., 1995), we examined the relationship of the favorability index to the attitude as further evidence of processing. Specifically, dual process researchers have argued that a positive correlation between the favorability index and attitude is suggestive of thorough processing because it indicates that the attitude is based on thoughts. A less positive or near-zero correlation is suggestive of less thorough processing because it means the attitude and the thoughts are not related (Petty & Cacioppo, 1979). In the two conditions in which we predicted thorough processing (sad/NA and sad/UA), the correlations between the favorability index and the attitude were positive ($r = .55, n = 19, p < .05$, and $r = .58, n = 37, p < .01$, respectively). In the neutral condition, the correlation was only marginally significant ($r = .27, n = 40, p < .10$), and in sad/CA condition, the correlation was not different from zero ($r = .11, n = 50, p = .43$). Fisher's r -to- z transformations showed that the correlation for the sad/CA condition was significantly different from that for the sad/UA condition ($Z = 2.45, p = .01$) and marginally different from that for the sad/NA condition ($Z = 1.75, p = .08$). The correlation for the neutral condition was marginally different from the correlation for the sad/UA condition ($Z = 1.65, p = .10$) but did not differ from other conditions.

⁶ Variation in the degrees of freedom is due to missing data.

Discussion

This experiment replicates the findings of Experiments 2 and 3. Once again, certainty-associated emotions led to less substantive processing than did emotions associated with uncertainty, which produced more thorough processing. This experiment has the additional advantage that the conditions were more similar to one another than in the previous studies. In all of the sadness conditions, the participants felt equally sad, but they differed in the degree to which they felt certain. Those who felt sad and certain distinguished between the weak and strong arguments less than did those who felt sad and uncertain or those who were induced to feel sad without appraisal directions.

The present experiment also included conditions that allow the results to be more comparable to previous research on affective states and processing. The sad/NA condition had effects that were very similar to those of the sad/UA condition, which supports our contention that the state usually induced in studies of sadness and processing is characterized by uncertainty. This experiment also included a neutral condition. The results from this condition were a bit ambiguous, which is not surprising given the number of dimensions on which it differed from the other conditions. Yet, overall, it appears that, similar to previous research on sadness and processing, the sad/NA condition resulted in more systematic processing than did the neutral condition. The sad/UA condition was different than the neutral condition on most processing indicators. Whether the sad/CA condition and the neutral condition differed is debatable. The attitude about buying the camcorder was not different for strong and weak arguments in either the neutral or the sad/CA condition, but in the neutral condition there was a marginal difference in the favorability index depending on argument strength and a marginal correlation between the favorability index and the attitude; neither of these tests was anywhere near significant in the sad/CA condition. Also, the correlations between the favorability index and the attitude did not differ between these conditions. Therefore, there is some evidence, though it is not strong, that the sad/CA condition might have resulted in even more heuristic processing than did the neutral condition, but clearly, future research will have to investigate this possibility further. This is an important issue for future research because it raises the question of whether emotion is an important component of these effects. If a neutral state and an emotional certain state do not differ, then one may wonder whether emotion itself plays any role in processing effects.

General Discussion

The present research examines the effects of incidental emotion and suggests that appraisal components of emotion, specifically certainty appraisals, affect both the content and the processing of judgments. The findings from these experiments suggest that certainty in one experience can lead to congruent judgments in subsequent situations (Experiments 1 and 3) and can affect the depth of processing (Experiments 2–4). When people feel emotions that are accompanied by certainty appraisals, they are more likely to feel certain in subsequent situations than when they feel emotions accompanied by uncertainty appraisals, which produce more uncertainty in subsequent situations. Thus, these data contribute additional evidence to the body of work that links the

appraisal content of emotions to congruent subsequent judgments (Johnson & Tversky, 1983; Keltner et al., 1993; Lerner et al., 1998; Lerner & Keltner, 2000, 2001).

We extend the appraisal congruency work by showing how certainty appraisals have important implications for cognitive processing. Certainty-associated emotions result in more heuristic processing than do uncertainty-associated emotions, which promote systematic processing. Our focus on the appraisal content of emotions, specifically on certainty, can elucidate some heretofore unexplained differences in the effects of negative emotional states (e.g., Bodenhausen, Sheppard, & Kramer, 1994; Tiedens, *in press*), and our model can also be used to predict the processing effects of other emotions. Overall, this work underscores the importance of considering specific emotional states and appraisal dimensions in addition to global affect or valence in examining relationships between feelings and thinking.

Future Directions

Although this research contributes to the literature on congruency effects and processing effects, many questions about the role of certainty appraisals in these effects remain. For example, the nature of the continuing sense of certainty deserves more attention. Future research could examine whether this sense of certainty is better described as feeling correct, perceiving less ambiguity, being certain about causes, thinking that the future is predictable, or some combination of these experiences. In addition, it is necessary to understand the boundary conditions of appraisal congruency.

Important questions also remain about the processing effects. Most critically, future research needs to determine why the sense of certainty affects processing. Models of affect and cognition may be useful in considering this question because although this research has probably been too quick to identify valence as the most important factor, it has done an impressive job identifying the mechanisms involved in the effects of these states. For example, the desire for positive emotional experiences (Clark & Isen, 1982; Wegener & Petty, 1994), affect as information (Schwarz, 1990), affect as input (Martin et al., 1993), and cognitive capacity (Mackie & Worth, 1989) have been suggested as underlying the effects of emotion on processing. The approach advocated here neither directly supports nor contradicts these proposed mechanisms. Indeed, many of these accounts could be applied to the effects of certainty versus uncertainty.

Hedonic preferences and informational functions seem particularly likely mechanisms. Just as people prefer positively valenced states, people might also find certainty more desirable and thus seek to resolve uncertainty in hopes of attaining certainty. They may be loathe to disturb any sense of certainty they have, making them unlikely to focus on something that might create greater uncertainty. Another possibility is that people use their sense of certainty as information about their surroundings. Feeling uncertain may suggest to the individual that he or she does not have adequate information or that the situation is complex. Thus, if accuracy is the ultimate goal, the individual will need to rely on more thoughtful processes to confidently achieve this state. Although less compelling to us, a cognitive capacity account is also possible. Perhaps certainty is cognitively linked to more information and thus limits capacity. Clearly, as is the case with the affect

and processing literature, both motivational and cognitive explanations are possible.

Researchers have found intriguing ways of disentangling these mechanisms as they relate to valence, such as by manipulating awareness of the source of the state (Hirt, Levine, McDonald, Melton, & Martin, 1997; Schwarz & Clore, 1983, 1988; Sinclair, Mark, & Clore, 1994), manipulating the goal of processing (i.e., enjoyment vs. accuracy; Hirt et al., 1996; Martin et al., 1993), and manipulating the expectations of the consequences of processing the stimuli (Wegener et al., 1995). These approaches could be used to understand why the certainty-appraisal dimension affects processing.

Limitations

Much of the recent work on mood effects has been dedicated to finding and explaining limitations of processing effects of moods and emotional states (Forgas, 1995; Schwarz, 1990). For example, if the judgment is predetermined, if the person is highly motivated to be accurate, or if the person is highly aware of the source of his or her affective state, mood and emotion effects are limited. We suspect that these boundary conditions are relevant here as well. At the same time, we believe that certainty congruence can affect the degree to which one believes a judgment is predetermined and intervenes with the motivation to be accurate. Additionally, the sense of feeling certain or uncertain may be more difficult than valence for people to identify as being caused by an external and unrelated event, making it more likely to be misattributed.

It is also important to note that emotions are not just a combination of valence and certainty. Other appraisal dimensions, such as effort, control, risk, and agency, all vary with emotions, as do levels and types of physiological arousal and expressions (Ekman, 1993; Levenson, 1992; Roseman, 1984; Scherer, 1982; C. A. Smith & Ellsworth, 1985). Emotions can also vary from situation to situation in terms of their intensity and appropriateness. These dimensions of emotion might also influence the way individuals process information. We examined some of these dimensions in Experiments 3 and 4 and did not find that the other dimensions we measured could explain the processing effects we observed. Yet our experiments were simply meant to rule out these dimensions as alternatives for certainty. Studies designed specifically to test other dimensions' independent effects on processing might find that they, too, can influence people's processing. The larger point remains, however. Components of emotions other than valence may be just as important as valence. These other components can inform the individual of relevant aspects of the situation and motivate him or her toward more desirable states. Thus, they can affect an individual's psychological approach to the situation. At the same time, we think that certainty is of particular interest because of the important role that certainty and uncertainty have played in the study of social cognition and information processing (Eagly & Chaiken, 1993; Kahneman, Slovic, & Tversky, 1999; Sorrentino, Holmes, Hanna, & Sharp, 1995; Weary & Jacobson, 1997).

Conclusions

Past findings support the view that emotions can affect what people think about as well as how they process information. In this

work, we show that feeling certain or uncertain influences judgments of certainty in a subsequent situation. Additionally, we demonstrate that by measuring the certainty content of emotions, our approach can guide an understanding of how specific emotions affect processing. This work underscores the importance of understanding links between cognitive and emotional processing and demonstrates the interdependence between the two.

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