The Feeling of Uncertainty Intensifies Affective Reactions
Yoav Bar-Anan and Timothy D. Wilson
University of Virginia

Uncertainty has been defined as a lack of information about an event and has been characterized as an aversive state that people are motivated to reduce (e.g., Harlow, 1982; Inglis, 2000). Consequently, uncertainty is generally viewed as a negative drive that organisms are motivated to reduce (e.g., Loewenstein, 1994). The state of curiosity, for example, in which people desire more information about something in their environment, has been viewed as a negative drive that organisms are motivated to reduce (e.g., Inglis, 2000). Consequently, uncertainty is generally viewed as an aversive state that organisms are motivated to reduce (e.g., Loewenstein, 1994).

This might occur. We also sought to refine the definition and operationalization component (a deficit in knowledge) and a subjective emotional component (a deficit in experienced well-being).

In contrast, the uncertainty intensification hypothesis is concerned with the effects of “online” uncertainty during an emotional event. This is an important distinction, because in everyday life it is common to be in a state of uncertainty while experiencing an emotional event. In contrast, the uncertainty intensification hypothesis is concerned with the effects of “online” uncertainty during an emotional event. This is an important distinction, because in everyday life it is common to be in a state of uncertainty while experiencing an emotional event.

One possibility is that uncertainty heightens people’s attention to an emotional event, so that they become more emotionally engaged with it. That is, people may pay equal attention to an emotional event, but those who are uncertain may be more curious about it (as prevailing theories suggest) but also makes pleasant events more pleasant (contrary to what prevailing theories suggest). There is empirical support for the first part of this hypothesis; namely, that uncertainty intensifies affective reactions to negative events (Harlow, & Meyer, 1950; Loewenstein, 1994). In contrast, we propose an uncertainty intensification hypothesis, whereby uncertainty during an emotional event makes unpleasant events more unpleasant and makes pleasant events less pleasant (as prevailing theories suggest).

Related evidence comes from research on affective adaptation, uncertainty, and curiosity. Affective adaptation is the tendency to experience an event as less pleasurable or more aversive than it actually is (e.g., Inglis, 2000). There have been several studies showing that uncertainty intensifies affective reactions to ongoing positive and negative events. In one study, participants watched a series of film clips and then rated their affective reactions to the clips. Participants who saw film clips in which they were uncertain about what was going to happen to the main character after the movie was made were in a bad mood for significantly longer than participants who were told either that the first or second account was true.

In the Wilson et al. (2005) studies, participants experienced a manipulation of the feeling of not knowing whether they knew what happened to the main character after the movie ended; thus, the manipulation could not have influenced people’s initial reactions to the positive event. Wilson, Centerbar, Kermer, and Gilbert (2005) found support for this hypothesis with positive events. In one study, participants watched a series of film clips and then rated their affective reactions to the clips. Participants who saw film clips in which they were uncertain about what happened to the main character after the movie was made were in a good mood for significantly longer than participants who were told either that the first or second account was true.

By having people repeat phrases connoting certainty or uncertainty while watching the films. As this might occur. We also sought to refine the definition and operationalization component (a deficit in knowledge) and a subjective emotional component (a deficit in experienced well-being).

Uncertainty refers to the state of an organism that lacks information about an event and has been characterized as an aversive state that organisms are motivated to reduce. The authors propose an uncertainty intensification hypothesis, whereby uncertainty during an emotional event makes unpleasant events more unpleasant and makes pleasant events less pleasant. This hypothesis is supported by research showing that uncertainty intensifies affective reactions to ongoing positive and negative events. In one study, participants watched a series of film clips and then rated their affective reactions to the clips. Participants who saw film clips in which they were uncertain about what happened to the main character after the movie was made were in a good mood for significantly longer than participants who were told either that the first or second account was true.
In Study 1, participants watched a positive clip from either "Dark Days" (Singer, 2000) about homeless people in New York City. In Study 2, all participants watched an unpleasant clip from the movie "Sleepless in Seattle" (1981). In Study 3, participants were randomly assigned to see a positive or negative film clip; thus, in Study 3, we used a 2 (certainty) \times 2 (valence of film) design. The main dependent measures were participants' ratings of how much the film made them feel. In Study 3, we also asked how confusing and perplexing the clip was, how much participants felt they understood what was happening in the clip, and how curious the film made them feel. In Study 3, we also asked how confusing and perplexing the clip was, how much participants felt they understood what was happening in the clip, and how curious the film made them feel.

Method

Participants. Participants were undergraduate students enrolled in psychology courses who had not seen the movie shown in their condition of the study. There were 51 participants in Study 1, 52 in Study 2 (38 women), and 100 (65 women) in Study 3. We eliminated from the analyses participants who did not score, happiness (reversed scored), sadness, and intensity, and we tested the hypothesis that uncertainty increased the intensity of ratings to both positive and negative films.

Results and Discussion

The main dependent measures were participants' ratings of how much the film made them feel. In the present studies, we developed a technique to manipulate uncertainty in movie watching. In the positive film clip condition, some of the participants repeated phrases connoting certainty (e.g., "I see," "I understand," and "I see what's happening."). The lines, "I see," "I understand," and "I see what's happening." Those assigned to the certain condition received the lines, "I see," "I understand," and "I see what's happening." Those assigned to the certain condition received the certain phrases, whereas in Studies 2 and 3, they received the uncertain phrases. The uncertain phrases increased positive reactions in the positive film clip condition and negative reactions in the negative film clip condition. As seen in Figure 1, the effect of the certainty manipulation was in the predicted direction but was not significant (with no interaction) on the measure of intensity, reflecting the fact that uttering the uncertain phrases increased positive reactions in the positive film clip condition and negative reactions in the negative film clip condition. The Valence of Film interaction was significant, with no significant difference between the certain and uncertain phrases. The means and significance levels are summarized in Figure 1. In Study 3, the Certain Phrase condition rated the positive films more positively and the negative films more negatively than did participants in the Uncertain Phrase condition. The main dependent measures were participants' ratings of how much the film made them feel.

The main dependent measures were participants' ratings of how much the film made them feel. In the positive film clip condition, some of the participants repeated phrases connoting certainty (e.g., "I see," "I understand," and "I see what's happening."). The lines, "I see," "I understand," and "I see what's happening." Those assigned to the certain condition received the lines, "I see," "I understand," and "I see what's happening." Those assigned to the certain condition received the certain phrases, whereas in Studies 2 and 3, they received the uncertain phrases. The uncertain phrases increased positive reactions in the positive film clip condition and negative reactions in the negative film clip condition. As seen in Figure 1, the effect of the certainty manipulation was in the predicted direction but was not significant (with no interaction) on the measure of intensity, reflecting the fact that uttering the uncertain phrases increased positive reactions in the positive film clip condition and negative reactions in the negative film clip condition. The Valence of Film interaction was significant, with no significant difference between the certain and uncertain phrases. The means and significance levels are summarized in Figure 1. In Study 3, the Certain Phrase condition rated the positive films more positively and the negative films more negatively than did participants in the Uncertain Phrase condition. The main dependent measures were participants' ratings of how much the film made them feel.

The main dependent measures were participants' ratings of how much the film made them feel. In the positive film clip condition, some of the participants repeated phrases connoting certainty (e.g., "I see," "I understand," and "I see what's happening."). The lines, "I see," "I understand," and "I see what's happening." Those assigned to the certain condition received the lines, "I see," "I understand," and "I see what's happening." Those assigned to the certain condition received the certain phrases, whereas in Studies 2 and 3, they received the uncertain phrases. The uncertain phrases increased positive reactions in the positive film clip condition and negative reactions in the negative film clip condition. As seen in Figure 1, the effect of the certainty manipulation was in the predicted direction but was not significant (with no interaction) on the measure of intensity, reflecting the fact that uttering the uncertain phrases increased positive reactions in the positive film clip condition and negative reactions in the negative film clip condition. The Valence of Film interaction was significant, with no significant difference between the certain and uncertain phrases. The means and significance levels are summarized in Figure 1. In Study 3, the Certain Phrase condition rated the positive films more positively and the negative films more negatively than did participants in the Uncertain Phrase condition. The main dependent measures were participants' ratings of how much the film made them feel.
One possible explanation of these findings is that uttering the certainty phrases made people tune out and pay less attention to the films, thus reducing their impact. However, we found no support for this “tuning-out” hypothesis. In Study 3, the main effect of the certainty manipulation failed to reach significance on any of the seven questions assessing attention (e.g., how closely they paid attention to the clip), $p > .05$. In Study 2, there was a hint of support for an alternative hypothesis, namely that uttering the uncertain phrases made people more curious about the films, $t(46) = 1.81, p = .08, d = 0.52$. However, the effect of the certainty manipulation on reported curiosity was not significant in Studies 1 or 3. Study 4 allowed a more sensitive test of the curiosity hypothesis with the use a within-participant design. This study examined only positive affect, the novel contribution of this research.

**Study 4**

**Method**

Participants were 31 students (16 women, 15 men) from undergraduate psychology courses. The procedure was identical to Studies 1–3 except for these changes: Participants spoke the uncertain lines during one positive film clip and the certain lines during another in counterbalanced order. Between the two positive films, participants viewed a neutral clip and spoke lines unrelated to certainty/uncertain (“my phone rings,” “I'm in a movie,” “I will call you later”). The two positive movie clips were the same 5-min excerpt from *Chariots of Fire* used in Study 1 and a 5-min clip from *An Officer and a Gentleman* (Elfand, Stewart, & Hackford, 1982) shown in counterbalanced order. The neutral clip was from *On the Set of “Elephant”: Rolling Through Time* (Van Sant, Wolf, & Andrew, 2004). The lines spoken in the certainty and uncertainty conditions were slightly different from those used in Study 1: “I wonder,” “Huh?” and “I don't get it” in the uncertainty condition; and “I see,” “That makes sense,” and “Of course” in the certainty condition.

We simplified the dependent measures by asking people to rate their positive feelings (1 = least positive to 9 = most positive) and curiosity (1 = least curious to 9 = most curious) toward each clip immediately after watching it. We also included some filler questions that were not used in the analyses (e.g., ratings of boredom and anger caused by the clip) aimed to cover our main interest. We asked participants to rate their feelings and curiosity toward each of the three clips again after performing a 7-min filler task to determine whether any effects of condition persisted over time. Finally, we tested participants' memory with five questions about each positive clip.

**Results and Discussion**

Two participants were clearly distracted by noise outside the lab; thus, their data were eliminated from the analyses. We conducted a 2 (certainty condition: certainty vs. uncertainty lines) $\times$ 2 (time of measurement: immediately after the clip vs. after 7 min) mixed ANOVA on ratings of positive affect (Positivity, Happiness, Sadness) and intensity. There was a main effect of certainty, $F(1, 29) = 4.30, p = .05, g = 0.40$. The certainty condition led to more extreme and intense reactions than the uncertainty condition. There were no significant effects of time or interactions. The novel contribution of this research is the examination of the relationship between certainty and curiosity in positive affect.
One interpretation of the results is that uttering the uncertain phrases made people pay more attention to the films. However, there were no significant differences in people's recall of the clips. Although these are null findings, they suggest that people who uttered the certain phrases identified more with the characters and became more involved in the films in the uncertain condition. As Hebb (1955) and Berlyne (1960) argued, however, there may be a curvilinear relationship for example, suggested that people are most interested in (i.e., curious about) stimuli that they find both novel and comprehensible. Uncertainty can have other effects besides intensifying affective reactions. Clarkson, Tormala, and Rucker (2008), for example, argued that uncertainty intensifies affective reactions independent of the effects of certainty on affective reactions to positive and negative events in the same study. The studies also demonstrated that uncertainty intensifies affective reactions to pleasurable events, as documented here.

In short, these results indicate that the effect of certainty condition on positive feelings beyond the effect of certainty condition on curiosity (Judd et al., 2001) for testing mediation in within-participant designs. We regressed the difference between positive feelings to the uncertainty condition on curiosity ratings. As predicted, there was a main effect of certainty condition, C uncertain – C certain, F(1, 25) = 23.65, p < .001. The difference in curiosity ratings did not predict the difference in positive feelings, F(1, 25) = 3.17, p = .08. We tested whether people's ratings of curiosity mediated the effects of the certainty condition on positivity ratings was completely mediated by the effects of condition on curiosity (Judd et al., 2001) for testing mediation in within-participant designs. There was no significant difference in participants' recall for the two clips, C uncertain – C certain, F(1, 25) = 0.53, p = .48. There was no significant difference in people's recall of the clips. Although these are null findings, they suggest that people who uttered the certain phrases identified more with the characters and became more involved in the films. However, there were no significant differences on questions designed to measure people's level of attention (e.g., how closely they paid attention). Furthermore, in Study 4, there were no significant differences in people's recall of the clips. Although these are null findings, they suggest that people who uttered the certain phrases identified more with the characters and became more involved in the films. However, there were no significant differences on questions designed to measure people's level of attention (e.g., how closely they paid attention). Furthermore, in Study 4, there were no significant differences on questions designed to measure people's level of attention (e.g., how closely they paid attention).


Received June 2, 2008
Revision received October 6, 2008
Accepted October 8, 2008