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Immediacy Bias in Emotion Perception: Current Emotions Seem More Intense Than Previous Emotions

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People tend to perceive immediate emotions as more intense than previous emotions. This *immediacy bias* in emotion perception occurred for exposure to emotional but not neutral stimuli (Study 1), when emotional stimuli were separated by both shorter (2 s; Studies 1 and 2) and longer (20 min; Studies 3, 4, and 5) delays, and for emotional reactions to pictures (Studies 1 and 2), films (Studies 3 and 4), and descriptions of terrorist threats (Study 5). The immediacy bias may be partly caused by immediate emotion's salience, and by the greater availability of information about immediate compared with previous emotion. Consistent with emotional salience, when people experienced new emotions, they perceived previous emotions as less intense than they did initially (Studies 3 and 5)—a change in perception that did not occur when people did not experience a new immediate emotion (Study 2). Consistent with emotional availability, reminding people that information about emotions naturally decays from memory reduced the immediacy bias by making previous emotions seem more intense (Study 4). Discussed are implications for psychological theory and other judgments and behaviors.

Keywords: emotion, judgment, heuristic, memory, perception

> Where is it, this present? It has melted in our grasp . . . gone in the instant of becoming.
>
> —William James

Emotion perception is among the more important facets of how the mind perceives itself. An important facet of emotion perception, in turn, is people's perception of the intensity of immediate compared with previous emotions. Citizens and the politicians who serve them care about whether current fears of terrorism and financial crises are more or less intense than previous fears of terrorism and financial meltdown. Clinical clients care about whether current bouts of depression are more or less severe than previous bouts of depression. And public speakers fret about whether current pre-speech anxiety is more or less intense than previous pre-speech anxiety. These cases and others like them call for perceptions of immediate emotional intensity—current fears of terrorism and financial calamity, depression, and social anxiety—compared with previous emotional intensity. Perceptions, that is, of direct, immediate emotional experience compared with indirect, previous emotional experience.

Emotion perception is important because it influences decisions and evaluations (Loewenstein & Schkade, 1999; Mellers, Schwartz, & Ritov, 1999; Wirtz, Kruger, Napa Scollon, & Diener, 2003). The study of emotion perception has typically focused on memories or predictions of isolated emotional events such as remembered distress during past presidential elections (Levine, 1997) or predicted distress during future football losses (Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). Studies of emotion perception have also focused on people's perceptions of what their emotions would be in a qualitatively different situation: When in a relatively neutral situation, people underestimate the behavioral impact (Loewenstein, 1996) and overestimate the intensity of what their emotional reactions would be in emotional situations (Wilson & Gilbert, 2003).

In contrast with previous research's focus on perceptions of isolated, distant emotional experiences, people often perceive emotions as part of a sequence in which immediate emotions are compared with previous emotions, as in the opening examples. Such perceptions are epistemologically challenging because immediate emotions are directly known and experienced, whereas previous emotions are not (Boas, 1882). People *feel* their immediate emotions, whereas they *remember* their previous emotions. Immediate emotions are ephemeral and elusive—"melted in our grasp" in James's words—becoming distant emotions that must be

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retrieved from memory, reconstructed, and estimated (Barrett, Mesquita, Ochsner, & Gross, 2007; Levine, 1997; Levine & Safer, 2002; Robinson & Clore, 2002a). Perceptions of immediate compared with distant emotions thus entail perceptions of objectively similar experiences that are distinctly different in phenomenology (immediate emotion being directly experienced), perception (immediate emotion being immediately perceived vs. remembered), and information (details about immediate information being more plentiful).

These phenomenological, perceptual, and informational differences between immediate and previous emotions may lead people to perceive immediate emotional experience as more intense, all else equal. This pattern, which we refer to as an *immediacy bias* in emotion perception, may occur even when previously experienced emotions occurred relatively recently and were of approximately equal intensity as immediate emotions. Such an immediacy bias is consistent with anecdotal observations, such as colleagues' enthusiastic exclamations ("This is the *best* day of skiing *ever*!") and adolescents' frequent lament of pubescent angst ("This is the *worst* day of my *life*!"). Or, consider the results of a survey we conducted in which the majority of all exercisers from four aerobics classes (25 of 31, 81%, $p < .05$, compared with 50%) indicated that their "feelings during your current workout" were more intense than their feelings during "your average aerobic workout."

Although people may exhibit an immediacy bias in emotion perception for multiple reasons, two processes may be particularly important. First, immediate emotions are more salient than previous emotions, and salient experiences may seem more intense. Second, information about immediate emotions is more cognitively available than information about previous emotions, and people may use the availability of emotional information to perceive emotional intensity.

Emotional Salience

Immediate emotions are more salient than previous emotions. That is, immediate emotions may seem more distinctive and prominent than previous emotions. Immediate emotion's salience is analogous to a bright red object that "pops out" from a visual field of otherwise green objects (Treisman & Gelade, 1980). Because immediate emotions are more salient than memories of previous emotion, immediate emotions may naturally seem more intense given that salient stimuli are seen as more influential than pallid stimuli (Higgins, 1996; Jarvenpaa, 2003; E. R. Smith & Miller, 1979; Stone et al., 2003; Taylor & Fiske, 1978; Treisman & Gelade, 1980; Van Schie & Van der Pligt, 1995). And to the degree that immediate emotions are more salient for reasons unrelated immediate emotion's genuinely greater intensity, immediate emotions may seem more intense than previous emotion even when they are not.

There are at least two reasons why immediate emotions are more salient than previous emotions. One is that immediate emotions tend to capture and hold attention, impairing attention to non-emotional stimuli (Anderson, 2005; Derryberry, 1993; Dijksterhuis & Aarts, 2003; Dolan, 2002; Eastwood, Smilek, & Merikle, 2001; Ledoux, 1996; Vuilleumier, 2005). People detect emotional stimuli more rapidly than neutral stimuli (Ohman, Flykt, & Estevens, 2001). People spend more time looking at emotionally arousing pictures than neutral pictures (Calvo & Lang, 2005; Nummenmaa, Hyona, & Calvo, 2006). People are slower to disengage attention from threatening than from neutral stimuli (Anderson, 2005; Fox, Russo, & Bowles, 2001; Pratto & John, 1991). And negative emotional stimuli can impair attention to subsequent neutral stimuli (Anderson & Phelps, 2001; Fox et al., 2001; Fox, Russo, & Dutton, 2002; Most, Chun, Johnson, & Kiehl, 2005; S. D. Smith, Most, Newsome, & Zald, 2006). These findings indicate that immediate emotional experience may capture and hold attention, impairing attention to previous emotional experience. Experiencing immediate anxiety about an upcoming public presentation, for instance, may direct attention to the immediate anxiety—sweaty palms, tumbling stomach, and feeling flushed—and impair attention to previous anxiety.

Another reason that immediate emotion is more salient than previous emotion is that the direct experience of immediate emotion stands in perceptual contrast with the indirect experience of distant emotion. Just as the contrast between an object's properties such as orientation, motion, color, and luminance all increase that object's visual salience (Blaser, Sperling, & Zhong-Lin, 1999; Koch & Ullman, 1985; Wolfe, 1998), the contrast between direct, immediate emotions versus indirect, previous emotions increases immediate emotion's salience. The direct, immediate experience of anxiety before an imminent speech may stand in perceptual contrast with the indirect, distant experience of previous pre-speech anxiety, which can increase immediate anxiety's salience.

Emotional Availability

Dovetailing with immediate emotion's salience, information about immediate emotion is more cognitively available than information about previous emotion. The greater availability of information about immediate emotion can make immediate emotion seem more intense, given that information availability is a widely used judgmental cue (Kahneman, 2003; Schwarz & Vaughn, 2002; Tversky & Kahneman, 1973). Preliminary evidence that people use availability of information about emotions to judge emotional intensity comes from a study in which people estimated that more intense emotions were experienced by people for whom detailed memories of physiological arousal were ostensibly described as more rather than less cognitively available (Van Boven & White, 2009).

People may believe that emotions about which information is more available are more intense largely because information about more intense emotions tends to be more available than information about less intense emotions. That is, the availability of information about emotions may be an ecologically valid cue (Brunswik, 1955; Gigerenzer, Todd, & the ABC Research Group, 1999; Hammond, 1999) to emotional intensity. More intense emotions usually leave stronger memory traces than less intense emotions (Christianson, Loftus, Hoffmann, & Loftus, 1991; Dewhurst & Parry, 2000; Kensinger & Corkin, 2003b; Kensinger, Garoff-Eaton, & Schacter, 2006; Kitayama, 1990; Mather & Knight, 2005). Emotional arousal can sometimes enhance memory for central and peripheral details of emotional episodes (Dolan, 2002; Hamann, 2001; Kensinger & Corkin, 2003a, 2004; Kensinger et al., 2006; Mather & Nesmith, 2008; Sharot & Phelps, 2004). And immediate emotion's tendency, described earlier, to capture and hold attention may render information about immediate emotion relatively more available.

All else equal, then, using availability to perceive emotional intensity might typically yield accurate perceptions of emotional intensity.

All else is not equal, however, in the case of immediate versus previous emotions. This is because information about immediate emotions is likely to be more available than information about previous emotions simply because immediate emotions are more recent (Neath, 1993; Ward, 1937) and have decayed less from memory (Crovitz & Shiffman, 1974; Levine, 1997; Robinson & Clore, 2002a, 2002b; Rubin & Wenzel, 1996). Furthermore, the qualia of emotional experience may not even be directly stored in memory (Galin, 1994; Robinson & Clore, 2002b). Immediate emotion may also cause people to forget details about previous emotions (Mather et al., 2006; K. J. Mitchell, Mather, Johnson, Raye, & Greene, 2006; Strange, Hurlemann, & Dolan, 2003). Information about immediate emotions is therefore likely to be more available than information about previous emotions, even when immediate emotions are actually equally intense as previous emotions. The greater availability of information about immediate emotions may lead people to perceive their immediate emotions as more intense even when they are not.

The use of information availability to perceive emotional intensity may fit hand in glove with emotional salience. Immediate emotion's salience can make information about immediate emotion more available, and the greater availability of information about immediate emotion can make immediate emotion more salient. Because the perception that immediate emotion is more intense arises from naturally occurring, complementary processes of salience and availability, people may be highly confident in their perceptions because they occur with subjective ease (Alter, Oppenheimer, Epley, & Eyre, 2007; Simmons & Nelson, 2006).

Overview of Studies

In five studies, we tested the hypothesis that people would report their immediate emotions to be more intense than their previous emotions. In the first two studies, people were exposed to a relatively rapid succession of emotional pictures. We expected people to report their immediate emotions to be more intense than their previous (but recent) emotions, and we expected this pattern would be pronounced for negative and positive stimuli compared with relatively neutral stimuli (Study 1). We also expected people to perceive their previous reactions to an emotionally evocative picture as less intense when they were immediately exposed to a new emotionally evocative picture than when they were not immediately exposed to an emotional picture (Study 2).

Broadening the investigation from perceived emotional reactions to static pictures, we also examined whether people would exhibit an immediacy bias in perceived emotional reactions to longer, potentially more involving film clips that were separated by a relatively longer delay (approximately 20 min; Study 3). We expected people to perceive their immediate emotional reactions as more intense than their previous emotional reactions and to perceive their initial emotional reactions as less intense than they initially reported (Study 3), demonstrating a within-persons change in perceived emotional intensity. To examine people's use of availability to perceive emotional intensity, we reminded people (in Study 4) that the availability of emotional information naturally decays over time, thereby undermining availability's diagnosticity, which we expected to diminish the immediacy bias. Finally, we examined whether the immediacy bias in emotion perception might influence people's perceptions of different emotionally laden terrorist threats (Study 5; Slovic, 1987; Slovic, Finucane, Peters, & MacGregor, 2002). We also examined whether the immediacy bias would diminish over time after emotional arousal subsides.

Study 1

In an initial study, we examined whether people would perceive their immediate emotions as comparatively more intense than previous emotions when they were exposed to a relatively rapid sequence of emotional pictures. Participants viewed sets of four pictures from the International Affective Picture System (Ito, Cacioppo, & Lang, 1998). Each set contained positive, negative, or neutral pictures, with only a few seconds' delay between each picture. Participants reported the intensity of their emotional reactions to the immediately viewed picture compared with the intensity of their emotional reactions to each previously viewed picture.

Emotional salience and emotional availability imply that people would perceive their emotional reactions to the immediately presented picture as more intense than their emotional reactions to previously presented pictures. Because emotionally influenced salience and availability are thought to contribute to the immediacy bias, the tendency to perceive immediate reactions as more intense should be greater for perceived reactions to emotionally evocative (positive and negative) pictures than to neutral pictures.

Method

Participants and procedure. Twenty-two undergraduate students (9 women, 13 men) participating in exchange for course credit were escorted to isolated rooms and seated in front of a computer upon which they completed the experiment. After introductory instructions, participants completed a practice trial to familiarize themselves with the procedure. Participants then completed six experimental trials.

Samples of screens, timing, stimuli, and instructions are displayed in Figure 1. Within each of the six experimental trials, the sequence was as follows. Participants first viewed a blank screen for 2 s. A fixation cross (5.5 cm $\times$ 5.5 cm) then appeared center-screen for 2 s. The first picture (17.5 cm wide $\times$ 12.5 cm tall) then appeared for 5 s with its serial position (#1) displayed to the left side of the picture. A blank screen then replaced the picture (2 s) before the fixation cross again appeared (2 s). The second picture and its serial position (#2) then appeared, exactly as the first picture.

After the second picture was displayed for 5 s, instructions appeared on the bottom of the screen asking participants to report the intensity of their emotional reactions to the second picture compared with the intensity of their emotional reactions to the first picture. Participants made this rating on a non-numeric 4-point scale (later assigned the values presented in parenthesis for data analysis): *much less intense for picture #2 than picture #1* (–1.5), *moderately less intense for picture #2 than picture #1* (–.5), *moderately more intense for picture #2 than picture #1* (+.5), and *much more intense for picture #2 than picture #1* (+1.5). Higher numbers thus indicated that emotional reactions to the immediately presented picture (#2) were perceived as relatively more intense than emotional reactions to the previously presented picture (#1).

Once participants rated the comparative intensity of their emotions, the second picture was removed, followed by a blank screen

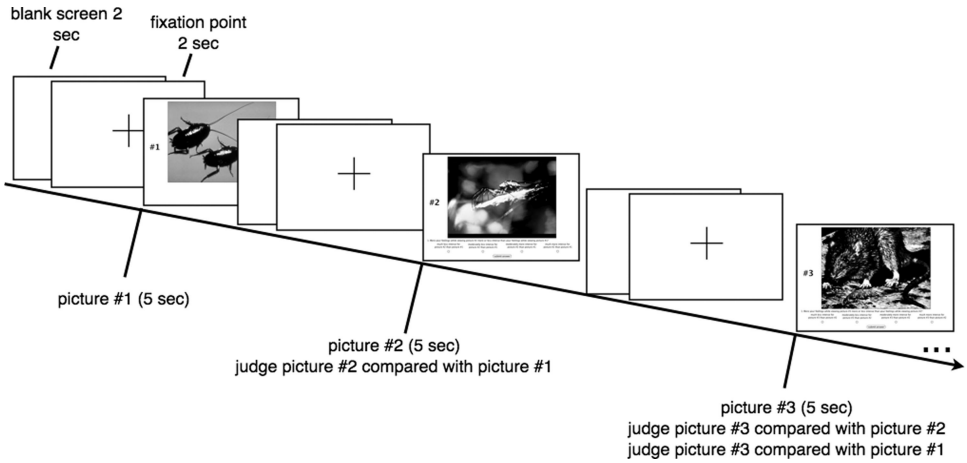

Figure 1. Study 1: Sample screen shots and timing of the first three (of four) stimuli presented to participants for a trial with emotionally negative stimuli.

(2 s), a fixation cross (2 s), and a third picture. After the third picture was displayed for 5 s, participants were asked to judge the intensity of their emotional reactions to the third picture compared with the intensity of their reactions to the second picture and to the first picture. This procedure repeated for the presentation and measured perceptions of emotional reactions to a fourth picture compared with reactions to the three previous pictures. After presentation and measurement of perceived emotional reactions to the set of four pictures, participants completed simple math problems for 2 min, which served as relatively neutral distracter task. Participants were thanked and debriefed after completing all six trials.

Stimuli. Participants completed a total of six trials in which they viewed sets of four pictures: two sets of negative pictures (e.g., roaches, rats, and spiders), two sets of positive pictures (e.g., puppies, ponies, and kittens), and two sets of neutral pictures (e.g., tables, spoons, and books). The pictures were culled from the International Affective Picture System and have been previously normed on valence and arousal (Ito et al., 1998). Pictures of negative and positive stimuli (descriptive statistics refer to normed picture ratings) were approximately matched on arousal (negative: $M = 4.90$, 49th percentile; positive: $M = 4.64$, 43rd percentile) and were substantially more arousing than pictures of neutral stimuli ($M = 2.66$, 4th percentile). Negative pictures were of substantially lower valence ($M = 3.93$, 31st percentile) than neutral pictures ($M = 5.03$, 47th percentile), which were of lower valence than positive pictures ($M = 7.88$, 98th percentile). The six experimental trials were counterbalanced with the constraint that the two trials of the same valence were presented adjacently.

Results and Discussion

We averaged into three indices participants' 12 ratings (six for both sets of four pictures) of how intense their emotions were while viewing the currently presented picture compared with how intense their emotions were while viewing each previously viewed picture (positive $\alpha = .64$, negative $\alpha = .55$, and neutral $\alpha = .71$). This index included, for instance, participants' judgments directly after viewing the third picture of how intense their feelings were while viewing the third versus the second picture and while viewing the third versus the first picture.

As predicted, participants exhibited an immediacy bias for emotionally evocative pictures, but not for neutral pictures (see Figure 2), as reflected by a one-way (negative vs. positive vs. neutral pictures) repeated-measures analysis of variance (ANOVA) on participants' comparative rating index, $\eta_p^2 = .447$, $F(2, 20) = 8.09$, $p < .005$. For sets of both negative pictures ($M = 0.29$, $SD = 0.38$), $d = 1.53$, $t(21) = 3.51$, $p < .005$, and positive pictures ($M = 0.16$, $SD = 0.37$), $d = 0.91$, $t(21) = 2.08$, $p = .05$, participants' comparative ratings were significantly greater than zero, indicating that immediate emotional reactions were perceived as more intense than previous emotional reactions. The comparative ratings of negative and positive stimuli were not significantly different, $d = 0.67$, $t(21) = -1.53$, *ns*. For neutral pictures, participants did not

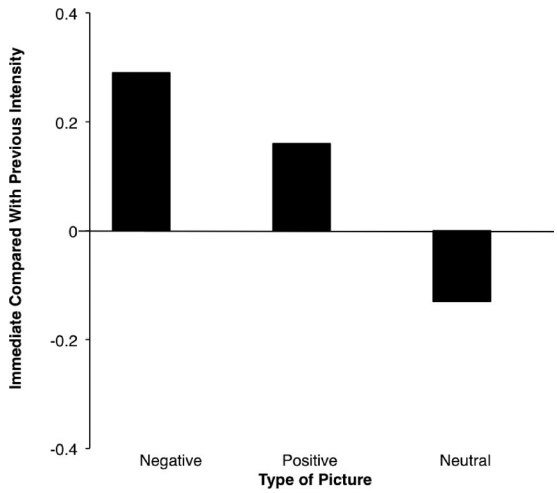

Figure 2. Study 1: Participants' perceived intensity of emotional reactions to immediate compared with previous emotional reactions to sets of four negative, positive, and neutral pictures. Zero indicates immediate emotional reactions are equally intense as previous emotional reactions.

report their emotions while viewing the currently presented pictures as more intense compared with their feelings while viewing the previously presented pictures ($M = -0.13$, $SD = 0.40$), $d = 0.64$, $t(21) = -1.46$, *ns*.

There was no evidence that participants perceived their emotions as increasingly intense over the course of four pictures presented within each trial. If, within a trial, participants experienced more intense emotional reactions during the later than earlier pictures, the comparative ratings should be higher for pictures later rather than earlier in the set. This was not the case, as tested by a main effect of judgment timing in a 2 (positive vs. negative) × 3 (judgments following second vs. third vs. fourth picture) repeated-measures ANOVA, $F < 1$.[1] As will be seen throughout the article, none of our studies indicate increased perceptions of intensity over sequences of emotional experience.

These results indicate that people perceived their immediate emotional reactions to be more intense than their previous emotional reactions from just a few seconds earlier. These results cast doubt on two possible, non-emotional alternative interpretations of the immediacy bias. One is that the immediacy bias might be due to simple recency effects in judgment such that reactions to whichever stimuli are presented more recently are perceived as relatively more intense (Bartlett, 1939; Hellstrom, 1985; Neath, 1993; Needham, 1935; Peak, 1940; Pratt, 1933; Ward, 1937). Another is that immediate emotions are the target rather than the referent of comparisons and are therefore weighed more heavily in comparative judgment (Tversky, 1977). Neither explanation implies nor explains why people would exhibit a larger immediacy bias in perceived emotional reactions to emotional compared with neutral stimuli.

Study 2

In Study 2, we tested whether immediate emotional experience is sufficient to make recent, previous emotional experience seem less intense than it would have following an uninterrupted short delay. As discussed earlier, immediate emotion tends to capture and hold attention, impairing attention to and memory for previous emotion. These attentional influences may increase immediate emotion's salience and make information about immediate emotion more cognitively available than information about previous emotion. Emotional salience and availability thus imply that immediate emotion should make previous emotion seem less intense after a brief delay than it would have otherwise.

We tested this prediction by asking participants to view negative pictures and to report the intensity of their emotional reactions on absolute rating scales. Half of the trials contained two pictures: Participants viewed two pictures separated by a short delay before reporting the intensity of their emotional reactions to each picture. The other trials contained a single picture: Participants viewed a single picture and reported the intensity of their emotional reactions after a short delay that was equal to the duration of the dual picture trials.

We had two predictions. First, we predicted that participants would exhibit an immediacy bias when they were exposed to two pictures, perceiving their immediate emotional reactions as more intense than their previous emotional reactions to the previously presented picture. This finding would conceptually replicate the immediacy bias demonstrated in Study 1, but with absolute rather than comparative judgments.

Second, we predicted that participants would perceive their previous emotional reactions to the first of two pictures in the two pictures trials as less intense than they would perceive their emotional reactions to the single picture. That is, exposure to a new emotional picture should cause participants to perceive their previous emotional reactions as less intense than they would have if they had simply reported their emotional reactions following a brief delay. Such a pattern would rule out the possibility that the immediacy bias is due simply to memory decay following a brief delay.

Method

Participants and procedure. Thirty-five undergraduate students (22 women, 13 men) participating in exchange for $10 were escorted to separate rooms and seated in front of a computer upon which the experiment was administered. After introductory instructions, participants completed four practice trials, two each of dual and single picture trials. They then completed, in counterbalanced order, a block of 10 dual picture trials and a block of 10 single picture trials.

The sequence for dual picture trials was as follows. A blank screen was presented (2 s) before the first picture (17.5 cm wide × 12.5 cm tall) was presented (2 s). A blank screen was then presented again (2 s) before a second picture was presented. After the second picture had been presented for a brief time (2 s), and with the picture still displayed, participants reported, in counterbalanced order, how intense their emotions were while viewing the first (previously presented) picture and while viewing the second (currently presented) picture, each on 14-point scales (1 = *not very intense at all*, 14 = *extremely intense*). Question order did not influence participants' responses and is not discussed further.

In each single picture trial, participants reported their emotional reactions to the picture after the same delay that they reported their emotional reaction to the first picture in the dual picture trial, but without exposure to a new picture. The sequence was as follows. A blank screen was presented (2 s) before an emotional picture was presented (2 s). A blank screen was then presented again for the same time that the blank screen and the second picture were presented in the dual picture trials (4 s). Participants then reported how intense their emotions were while viewing the picture on a 14-point absolute scale (1 = *not very intense at all*, 14 = *extremely intense*). Participants were thanked and debriefed after completing all 20 trials (10 single picture trials and 10 dual picture trials).

Stimuli. The stimuli consisted of 30 negative pictures from the International Affective Picture System (M arousal = 5.67, 72nd

[1] The fact that serial position did not influence participants' responses also mitigates concerns that people perceived the intensity of their emotional reactions to the immediately presented picture as relatively more intense because they viewed that picture for slightly longer while providing judgments about that picture. An influence of these short duration increases on perceived emotional intensity would have serially increased perceived emotional reactions, which it did not. Furthermore, the results of Studies 3, 4, and 5 in which stimulus duration was orthogonal to serial position should assuage any concerns that might linger about the influence of slightly different durations.

percentile; *M* valence = 2.22, 8th percentile). There were 18 pictures of injured and disfigured human faces, 6 pictures of injured and disfigured human bodies, and 6 pictures of slaughtered and injured animals. (Because of the pictures' graphic nature, we took care during the informed consent period to present participants with sample stimuli and then offered them an opportunity to withdraw from the experiment. None did.) Within each trial block, pictures were presented randomly without replacement, with three stipulations: (a) that both pictures within the dual picture trials be of the same content category, (b) that pictures were presented in proportion to their relative frequency in the overall picture set (6 faces, 2 bodies, and 2 animals in the single picture trials; 12 faces, 4 bodies, and 4 animals in the dual stimuli trail blocks), and (c) that within blocks, pictures of a given type were presented adjacently (e.g., pictures of animals were presented adjacently).

Results and Discussion

Each participant's ratings of emotional intensity were averaged into three indices of six ratings each: reported emotional reactions to the single picture ($\alpha = .91$), reported emotional reactions to the first picture in the dual picture trials ($\alpha = .91$), and reported emotional reactions to the second picture in the dual picture trials ($\alpha = .90$).

Our two key predictions were supported. First, participants exhibited an immediacy bias in the dual picture trials, conceptually replicating Study 1, but with absolute rather than comparative judgments (see Figure 3). Participants perceived their emotional reactions to the currently presented (second) picture to be more intense ($M = 8.74$, $SD = 2.67$) than their reactions to the previously presented (first) picture ($M = 7.94$, $SD = 2.78$), as reflected in an analysis of covariance (ANCOVA), controlling for trial block order, $\eta_p^2 = .450$, $F(1, 33) = 26.97$, $p < .001$.[2] Second, participants perceived their previous emotional reaction to the first picture in the dual picture trials to be less intense ($M = 7.94$, $SD = 2.78$) than their previous emotional reactions to the single picture ($M = 8.41$, $SD = 2.70$), as reflected in an ANCOVA controlling for trial block order, $\eta_p^2 = .113$, $F(1, 33) = 4.21$, $p < .05$.

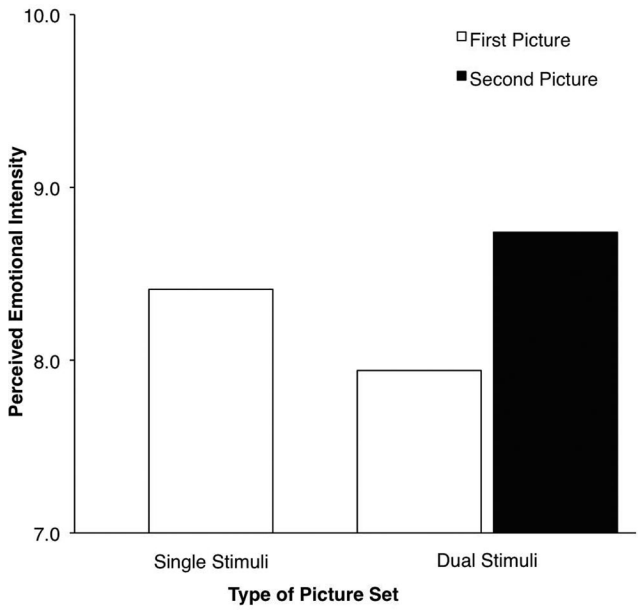

Figure 3. Study 2: Participants' perceived intensity of emotional reactions to a single emotional picture (reported after a 4-s delay), the first of two emotional pictures (reported after a 4-s delay), or the second of two emotional pictures (reported after no delay).

Finally, as in Study 1, there was no evidence that people's emotional reactions became more intense as they viewed multiple pictures. If participants reacted more intensely to the second picture than to the first picture, they should report more intense reactions to the second picture in the dual picture trials than to the picture in the single picture trials. This was not the case, as reflected by an ANCOVA, controlling for trial block order, $\eta_p^2 = .052$, $F(1, 33) = 1.82$, *ns*.

These results thus indicate that being immediately exposed to an emotionally arousing stimulus makes previous emotional reactions seem less intense than they would have if participants had simply reported their emotional reactions following a brief delay. These results also conceptually replicate the immediacy bias with absolute rather than comparative judgments, indicating that the immediacy bias is not due to explicit comparative judgments.

Study 3

We next sought to conceptually replicate and extend the immediacy bias in emotion perception in two ways. First, participants reported their perceived emotional reactions to short films rather than pictures. Compared with emotionally evocative pictures, films are longer, more dynamic, and represent prototypic emotional situations. The more episodic nature of films—with an extended, more easily rehearsed story line—may provide additional memory cues that facilitate memory for emotional intensity compared with the static, rapidly presented pictures from Studies 1 and 2. The films were also separated by a longer delay (20 min) compared with the relatively rapidly presented pictures in Studies 1 and 2. The use of films rather than pictures, with only two stimuli in an experimental session, may provide a more conservative test of the immediacy bias.

Second, we tested whether people's initial perceptions of the intensity of emotional reactions to a film would change after people experienced a new emotion while viewing a new film. Such a within-persons change in perceived emotional intensity would dovetail conceptually with Study 2's results indicating that currently experienced emotions make previous emotions seem less intense. Demonstrating a within-persons change in perceived emotional intensity would also attest to the immediacy bias's robustness given that rendering a summary judgment of an initial emotional experience can minimize sequence effects in reactions to emotional stimuli (Sanbonmatsu, Kardes, & Gibson, 1991), presumably because summary judgments can be retrieved from memory more easily than episodic information about an emotion (Levine, 1997; Robinson & Clore, 2002b).

Participants watched a scary film clip and immediately reported the intensity of their emotional reaction. Following a 20-min delay

[2] In this and subsequent studies, excluding stimulus order from the analysis does not significantly alter the pattern of results.

filled with unemotional tasks, participants watched a second scary film clip. Participants then reported the intensity of their emotional reaction to the second film, and, for a second time, the intensity of their reactions to the first film. Participants also directly compared the intensity of their emotional reactions to the second and first films, as in Study 1.

We expected participants to exhibit an immediacy bias in perceived emotional reactions, measured in both absolute and comparative judgments. That is, we expected participants to perceive their immediate emotional reactions to the second film as more intense than their previous reactions to the first film. Importantly, we also expected participants' perceived emotional reactions to the first film to change over time, becoming less intense after viewing the second film. That is, we expected participants to remember less intense emotional reactions to the first film than they initially reported.

Method

One hundred university students (62 women, 38 men) participated in exchange for course credit. Upon arriving at the lab, participants were asked to spend 2 min relaxing and "clearing your head of all thoughts and feelings" to place them in an emotionally neutral state. Participants were then shown one of two randomly selected short films, each approximately 2 min long, that have been shown to arouse fear and anxiety (Gross & Levenson, 1995; Rottenberg, Ray, & Gross, 2007). One film clip was from *The Shining* the other was from *Silence of the Lambs*. Immediately after viewing the first film, participants were asked to report the intensity of their emotional reactions to the film (1 = *not intense*, 7 = *very intense*).

Participants next spent approximately 20 min completing unrelated, unemotional questionnaires. They were then asked again to spend 2 min "clearing your head" to place them in a neutral state. Participants were then shown whichever of the two scary films they had not seen earlier.

Immediately after viewing the second film, participants were asked to report, on separate scales, the how intense their emotional reactions were to each of the first and second films (1 = *not intense*, 7 = *very intense*). Participants were also asked to compare directly the intensity of their reactions to the two films (1 = *feelings more intense during the first film*, 4 = *feelings equally intense during both films*, 7 = *feelings more intense during the second film*). Participants were then thanked and debriefed.

Results and Discussion

Participants exhibited the predicted immediacy bias, reporting their immediate emotional reactions to the second film as more intense than their emotional reactions to the first film (see Figure 4). An ANCOVA, controlling for film order, indicated that participants reported their immediate emotional reactions to the second film to be significantly more intense ($M = 4.89$, $SD = 1.47$) than their previous emotional reactions to the first film ($M = 4.48$, $SD = 1.49$), $\eta_p^2 = .042$, $F(1, 98) = 4.27$, $p < .05$. In direct comparisons, participants similarly reported that their emotions during the second film were more intense than during the first film ($M = 4.43$, $SD = 1.66$), as indicated by the fact that the comparative judgments were significantly higher than the scale midpoint, controlling for film order, $d = 0.52$, $t(98) = 2.55$, $p < .025$. These results thus conceptually replicate with both absolute and comparative judgments the immediacy bias in perceived emotional reactions to longer emotional stimuli separated by a longer delay.

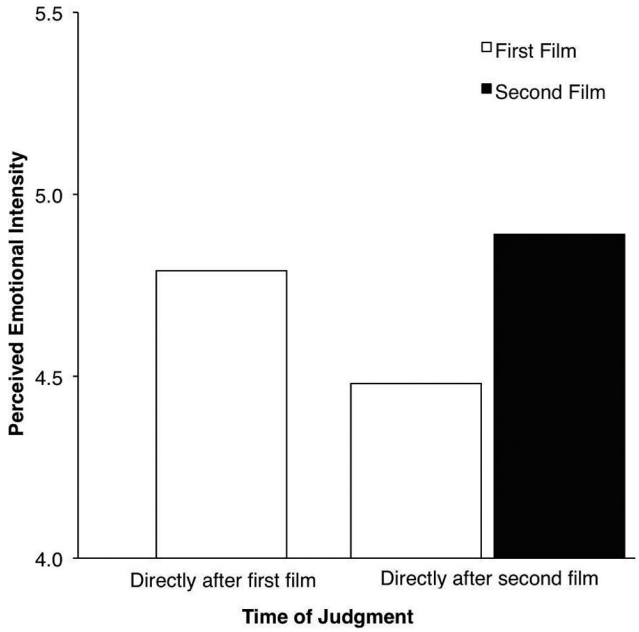

Figure 4. Study 3: Participants' perceived intensity of their emotional reactions to the first and second of two upsetting films, reported directly after viewing the first film and directly after viewing the second film.

Also as predicted, after viewing the second film, participants reported that their emotional reactions to the first film were less intense ($M = 4.48$, $SD = 1.49$) than they had initially reported ($M = 4.79$, $SD = 1.26$), controlling for film order, $\eta_p^2 = .090$, $F(1, 98) = 9.53$, $p < .005$. This finding extends Study 2's finding, demonstrating in a within-persons manner that perceived emotional reactions decrease after participants experience a new emotion. With Study 2, this finding suggests that immediate emotional arousal can lead people to misremember the intensity of previously perceived emotions.

Finally, there was again no evidence that participants perceived their emotional reactions to the second film as more intense ($M = 4.89$, $SD = 1.47$) than they initially perceived their emotional reactions to the first film ($M = 4.79$, $SD = 1.26$), controlling for film order, $\eta_p^2 = .004$, $F < 1$, *ns*. Following a similar pattern as in Studies 1 and 2, this null effect casts further doubt on the possibility that people's emotions genuinely become more intense over a sequence of emotions.

One question is whether the results of Study 3 (and of Studies 1 and 2, for that matter) might be partly attributed to people's intuitive theories about how emotional reactions change over time when people are exposed to a sequence of emotionally evocative stimuli (Varey & Kahneman, 1992). These intuitive theories could influence people's memory of previous emotional reactions (McFarland, Ross, & DeCourville, 1989; Ross, 1989). To examine whether people might intuitively believe that people perceive immediate emotions as more intense than previous emotions—and, by implication, that such intuitions might artifactually produce an

immediacy bias—89 university students read a detailed summary of Study 3's procedures, including detailed descriptions of the films. These participants were asked to estimate the comparative judgments made by participants who actually participated in Study 3. These predictions were lower than the actual comparative judgments from Study 3 ($M = 3.78$, $SD = 1.79$) and were significantly lower than the midpoint of the scale, as indicated in a regression controlling for film order, $d = 0.54$, $t(88) = 2.95$, $p < .005$. Participants did not, therefore, intuitively believe that people would perceive immediate emotions as more intense than previous emotions. In fact, participants appeared to intuitively believe that people perceive initial, previous emotions to be more intense than later, immediate emotions.

Study 4

We sought in Study 4 to examine the role of availability in the immediacy bias. The use of availability to perceive emotional intensity, and the greater availability of information about immediate emotions, implies that leading people to question availability's validity should diminish the immediacy bias. In other domains, calling to question availability's validity by, for instance providing people with alternative explanations for information availability reduces availability's influence on judgment (Schwarz & Clore, 1988; Wilson & Brekke, 1994). Applying similar reasoning, we tested whether undermining availability's diagnosticity would reduce the immediacy bias.

Participants viewed two upsetting films about genocidal atrocities separated by a delay, conceptually replicating Study 3's procedure. After viewing the second film, participants were asked to report the intensity of their emotional reactions to each film. Before reporting their emotional intensity, some participants were reminded that the availability of information about emotions naturally decays over time. This reminder thus implies that naturally occurring memory decay explains why information about immediate emotion is more available than information about previous emotion, thereby casting doubt on the possibility that immediate emotion's greater availability is indicative of greater emotional intensity. We therefore expected that participants reminded that memory naturally decays over time would exhibit a smaller immediacy bias than participants in a control condition who read nothing about memory decay.

Method

Fifty-two university students (36 women, 16 men) participated in exchange for course credit.[3] Participants were escorted to separate rooms, seated at a computer, and asked to spend "one minute sitting in silence, clearing your mind of thoughts, feelings, and memories" to put them into a neutral state. Participants were then shown one of two randomly selected short films depicting genocidal atrocities. Participants were either shown a film clip from *Schindler's List* portraying Nazi soldiers piling dead bodies in a concentration camp or a film clip from *Hotel Rwanda* portraying the protagonist discovering massacred Tutsi bodies. Both films were approximately 2 min long and were shown in a pre-test to arouse moderately intense negative emotions.

After viewing the film, participants spent 20 min completing unrelated, unemotional questionnaires before again spending 1 min "clearing your mind" to return them to a neutral state. Participants were then shown whichever upsetting film they had not seen earlier.

After viewing the second film, participants randomly assigned to the control condition ($n = 28$) read, "the purpose of this experiment is to examine how people react to various films," and were asked to report the intensity of their emotional reactions to each film (1 = *not intense*, 7 = *extremely intense*). Participants randomly assigned to the memory decay reminder condition ($n = 24$) also reported the intensity of their emotional reactions after reading that the purpose of the experiment was to examine whether such reports "are influenced by the fact that memories for the details of emotional experiences tend to fade over time." By highlighting naturally occurring memory decay, this statement thus undermined the diagnosticity of the relatively greater availability of information about immediate emotions.

We conducted a funnel debriefing procedure (Bargh & Chartrand, 2000) in which participants were asked increasingly specific questions to probe for suspicion and to probe participants' intuitions about the experimenters' hypothesis. None expressed suspicion or identified the experimenters' hypothesis without being explicitly told. Participants were then thanked and debriefed.

Results and Discussion

As predicted, participants who were reminded that the availability of emotional information naturally decays over time exhibited a significantly smaller immediacy bias compared with participants in the control condition (see Figure 5), as reflected by the significant interaction in a 2 (first vs. second film) × 2 (control vs. memory decay reminder condition) ANCOVA with repeated measures on the first factor, controlling for film order, $\eta_p^2 = .102$, $F(1, 49) = 5.57$, $p < .001$. Participants in the control condition exhibited an immediacy bias, conceptually replicating the first three studies, reporting their immediate emotional reactions (to the second film) as significantly more intense ($M = 5.51$, $SD = 1.58$) than their previous emotional reactions (to the first film, $M = 4.51$, $SD = 1.73$), $\eta_p^2 = .404$, $F(1, 26) = 17.60$, $p < .001$. In contrast, participants who were reminded that availability of emotional information naturally decays over time did not report that their immediate emotional reactions were significantly more intense ($M = 5.45$, $SD = 1.58$) than their previous emotional reactions ($M = 5.28$, $SD = 1.73$), $\eta_p^2 = .018$, $F < 1$, *ns*.

These results suggest that undermining the diagnosticity of emotional information's availability reduces the immediacy bias in emotion perception, as implied by the hypothesis that the availability of information about emotions influences perceptions of emotional intensity. Because information about immediate emotions is typically more available than information about previous emotions, people typically perceive their immediate emotions as relatively more intense than past emotions. This tendency is reduced, however, when people are reminded that naturally occurring memory decay could explain the greater availability of information about immediate emotion.

[3] Data from 3 additional participants were excluded from the experiment before data analysis because an experimenter who was blind to both condition and hypothesis identified these participants as not understanding or following instructions.

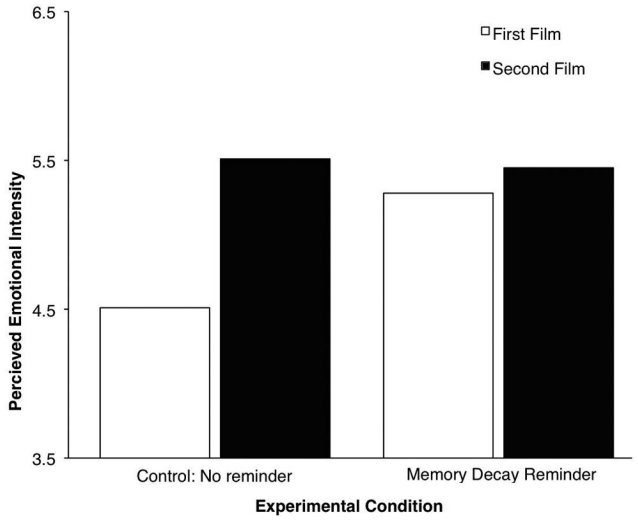

Figure 5. Study 4: Participants' perceived intensity of their immediate and previous emotional reactions to two scary films, contingent on whether they were first reminded that information about emotion experience naturally decays from memory over time.

Importantly, the reminder about naturally occurring memory decay reduced the immediacy bias primarily by increasing the perceived intensity of previous emotion rather than by decreasing the perceived intensity of immediate emotion. This pattern implies that people correct for memory decay in recalling previous emotional intensity. This pattern also implies that people reminded of memory decay believe their immediate emotion perceptions are veridical and recognize that their memories for previous emotional intensity are prone to distortion due to memory decay.

One potential concern about these findings is that they might be attributable to experimental demand. That is, even though the study used a fully between-persons design, participants who were reminded that the availability of emotional information naturally decays over time might have guessed (correctly) that the experimenters hypothesized the manipulation would reduce the immediacy bias and behaved accordingly. That no participant correctly identified the hypothesis in the funnel debriefing suggests that demand characteristics were unlikely. Nevertheless, we conducted a follow-up study to directly examine people's beliefs about the experimenters' hypotheses, and hence of the viability of experimental demand.

Eighty university students read a detailed summary of the study, including either the instructions read by participants in the control condition or the instructions read by participants in the memory decay reminder condition. Participants were than asked, "How do you think the experimenters expected participants to respond?" which they answered by providing two predictions, one for each film, of how intense (1 = *not intense*, 7 = *extremely intense*) participants were expected to report their emotional intensity. A 2 (first vs. second film) × 2 (control vs. memory decay reminder) ANCOVA with repeated measures on the first factor revealed only a main effect of instruction, $\eta_p^2 = .063$, $F(1, 77) = 5.18$, $p < .05$, reflecting that participants thought the experimenters expected the memory decay reminder to reduce perceived emotional intensity (*M*s = 5.76 and 6.19 for the reminder and control conditions, respectively). Critically, the analysis did not reveal a significant interaction, $\eta_p^2 = .002$, $F < 1$, *ns*, suggesting that people did not think the experimenters expected the memory decay reminder to reduce the immediacy bias. These results suggest that people did not intuit our hypothesis, which casts further doubt on the possibility that the results of the primary study were attributable to experimental demand.

Study 5

In our final study, we sought to extend examination of the immediacy bias in two ways. One was by broadening the investigation from perceived emotional reactions to perceived risks of terrorism. Risk perceptions are strongly influenced by the emotion associated with risky outcomes, independent of the objective probability or severity of those outcomes (Loewenstein, Weber, Hsee, & Welch, 2001; Slovic, 1987; Slovic et al., 2002). For instance, people may perceive terrorist attacks as more risky than more mundane dangers such as influenza—even though influenza kills vastly more people than terrorism—because terrorism is, well, terrorizing (Slovic, Finucane, Peters, & MacGregor, 2004; Sunstein, 2004). That terrorism risk perceptions are influenced by emotion perceptions implies that people may exhibit an immediacy bias in perceiving different terrorist risks they are exposed to over time, even if the sequence in which they learn about terrorist risks contains no probative information about those risks.

We tested this prediction by asking participants to read two (genuine) travel warnings issued by the United States Department of State that described terrorist activities in different regions of the world. Participants read these two descriptions in a randomly determined order, separated by a delay of about 20 min. After reading the second description, participants reported their perceived risk of each terrorist threat. An extension of the immediacy bias in emotion perception to terrorist risk perceptions implies that participants would perceive the terrorist threat they had just learned about as more risky compared with the terrorist threat they previously learned about.

We also tested the hypothesis that the immediacy bias would decline over time, diminishing after immediate emotions were no longer aroused. Such a pattern would implicate the role of transient emotional arousal in the immediacy bias. Participants were asked following a day's delay after learning about the terrorist threats to report how risky they perceived the two threats. Because immediate emotion's salience and availability should be diminished after a day's delay, participants should be less inclined to perceive whichever threat happened to be second as more risky than the first threat.

Method

One-hundred thirteen university students (65 women, 48 men) participated in exchange for course credit. Upon arriving at the lab, participants were seated at a computer where they were asked to spend 1 min relaxing by closing their eyes and breathing deeply to place them in a neutral state.

Participants were then directed to one of two randomly selected screens where they read instructions asking them to imagine that for work purposes they had traveled to either Bali or Kenya. The screen displayed a (genuine) travel warning issued by the United

States Department of State regarding terrorist threats in that location. For example, the warning about terrorist activities in Bali stated that "terrorists are planning attacks across a variety of targets" such as "where Americans and other Westerners live, congregate, shop or visit, including hotels, clubs, restaurants, shopping centers, identifiably Western businesses, housing compounds, transportation systems, places of worship, schools, or public recreation events." The screen also displayed a summary from popular news coverage of a previous terrorist bombing, as well as color pictures (obtained from the Associated Press) of previous terrorist bombings in the region.

After reading about the terrorist threat, participants were asked to imagine that they had traveled to the particular region when a terrorist attack occurred close by, and to describe what their thoughts and feelings would be in that situation. After writing this description, 54 randomly selected participants were asked, in ways described shortly, to report their perceived risks of subsequent terrorist attacks in the region. Measuring risk perceptions directly after learning about the first threat allowed for an examination of whether perceived terrorist risks would change over time, as they did in Study 3. These risk perceptions were measured for only a subset of participants to allow a test of whether reporting risks directly after learning about them forestalls a subsequent immediacy bias, given that summary judgments can facilitate recall (Sanbonmatsu et al., 1991).

All participants next completed unrelated questionnaires for approximately 15 min, at which time they were again asked to relax and clear their minds to put them into a neutral state. Participants were then directed to a second screen displaying a second travel warning, pictures, and descriptions of terrorist threats in whichever region they had not read about earlier. As before, participants were asked to imagine that they had traveled to the region and to describe what their thoughts and feelings would be if a terrorist attack occurred nearby.

Directly after reading about the second terrorist threat, participants were asked to consider each terrorist threat they had learned about. They were asked how risky it would be to travel to the region (1 = *not risky at all*, 7 = *very risky*), how dangerous it was in the region (1 = *not dangerous at all*, 7 = *very dangerous*), and how concerned they would be about terrorist attacks if they were in the region (1 = *not concerned at all*, 7 = *very concerned*). Finally, to test the hypothesis that the immediacy bias would diminish over time, participants returned to the lab the following day and were given brief reminders of the two terrorist threats. They then judged the subjective risks of each threat using the same measures described earlier. After completing these measures, participants were thanked and debriefed.

Results and Discussion

We averaged participants' three risk reports into five indices of perceived terrorist risks. One index was for perceived terrorist risks directly after learning about the first threat (for the 54 participants who completed those measures, $\alpha = .82$). Two indices were for perceived terrorist risks made directly after learning about the second threat (αs = .89 and .88, for the first and second threats, respectively). And two indices were for perceived terrorist risks about each of the two threats made 1 day after learning about the two threats (αs = .90 and .89, for the first and second threats, respectively).

Participants exhibited the predicted immediacy bias in terrorist risk perception. Immediately after learning about the second terrorist threat, participants perceived the second threat to be riskier ($M = 4.59$, $SD = 1.24$) than the first threat ($M = 4.32$, $SD = 1.35$), as reflected in an ANCOVA controlling for the order of the two threats, $\eta_p^2 = .057$, $F(1, 110) = 6.61$, $p < .025$ (see Figure 6). These findings conceptually replicate the immediacy bias and extend it to people's perceptions of terrorist threats.

The immediacy bias in terrorist risk perception, measured directly after learning about the second terrorist threat, was not reduced when participants had previously reported the risk associated with the first threat directly after learning about that threat. This immediacy bias remained significant, $\eta_p^2 = .055$, $F(1, 109) = 6.40$, $p < .025$, and was not significantly moderated, $\eta_p^2 = .021$, $F(1, 109) = 2.34$, *ns*, by including, as a factor in the analysis just reported, whether participants had reported their perceived risks of the first threat directly after learning about it.

Conceptually replicating the results of Study 3, participants perceived the first terrorist threat to be riskier directly after learning about it ($M = 4.63$, $SD = 1.18$) than they did after learning about the second terrorist threat ($M = 4.39$, $SD = 1.38$), controlling for threat order, $\eta_p^2 = .117$, $F(1, 52) = 6.87$, $p < .025$. Participants' risk perceptions of the initial threat thus decreased over time, as participants perceived an initial threat as less risky than they had before being exposed to a new threat.

Replicating the other studies in this article, participants did not initially perceive the first terrorist threat they learned about to be significantly less risky ($M = 4.63$, $SD = 1.18$) than they initially perceived the second threat to be ($M = 4.49$, $SD = 1.38$), controlling for threat order, $\eta_p^2 = .019$, $F(1, 52) = 1.03$, *ns*.[4] The immediacy bias was not, therefore, associated with an increase over time in perceived terrorist threats.

Finally, the immediacy bias in terrorist risk perceptions diminished over time. A 2 (first vs. second threat) × 2 (perceived risks reported directly after the second threat vs. after 1 day) repeated-measures ANCOVA, controlling for the threat order, yielded a significant interaction, $\eta_p^2 = .089$, $F(1, 105) = 10.27$, $p < .005$, reflecting that the immediacy bias diminished over time. Indeed, after a day's delay, participants did not perceive the second threat they learned about to be significantly riskier ($M = 4.02$, $SD = 1.24$) than the first threat they learned about ($M = 4.07$, $SD = 1.19$), $\eta_p^2 = .003$, $F < 1$, *ns*, in contrast with their perceived risks directly after learning about the second threat (see Figure 6).

These results conceptually replicate the immediacy bias, extending the findings to terrorist risk perceptions, which previous research indicates are closely associated with emotion (Slovic et al., 2004; Sunstein, 2004). These results also replicate people's tendency to decrease their perceived emotion over time, such that they initially report a terrorist threat as more risky than they did after later being exposed to information about a different terrorist threat. Finally, these results highlight the transient nature of the immedi-

[4] Because these analyses include data from only those 54 participants who judged the risks of the first threat directly after learning about it, they yield slightly different means, degrees of freedom, and error terms than analyses of this study reported elsewhere.

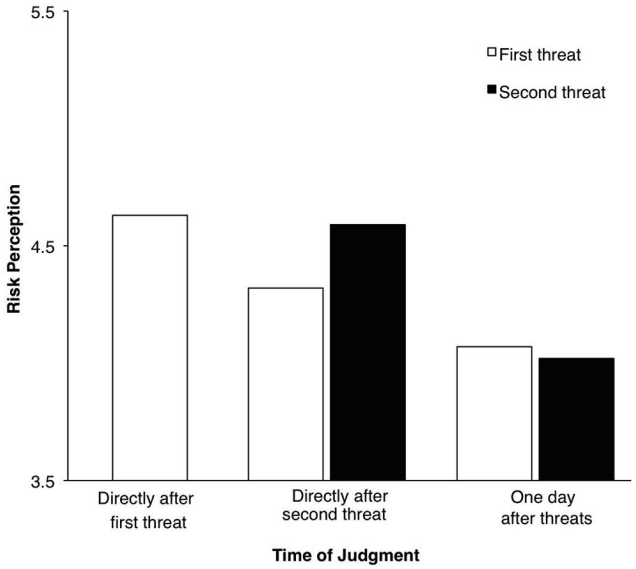

Figure 6. Study 5: Participants' perceived risk of two terrorist threats, reported directly after learning about the first threat, directly after learning about the second threat, and one day after learning about both threats.

acy bias, demonstrating that the immediacy bias diminishes after emotions have subsided. It is possible, of course, the immediacy bias may diminish after a much shorter delay than 1 day. Nevertheless, the transient nature of the immediacy bias is important because it implies one simple means of avoiding the bias: wait.

General Discussion

People tend to perceive their immediate emotions as more intense than their previous emotions. This immediacy bias in emotion perception emerged across different materials, procedures, and emotions. People who were exposed to sequences of pictures (Studies 1 and 2), films (Studies 3 and 4), and descriptions of terrorist threats (Study 5) reported that immediate emotions were more intense than previous emotions. The immediacy bias occurred for both positive and negative but not neutral stimuli (Study 1). The immediacy bias was not associated with an increase over time in people's perceptions of emotional intensity (Studies 2, 3, and 5). The immediacy bias was, however, associated with a change over time in people's perceptions of how intense their prior emotions were (Studies 3 and 5), with people perceiving their previous emotions as less intense than they did initially.

Underlying Mechanisms

Although the immediacy bias in emotion perception is doubtless multiply determined, the present studies implicate two complementary processes. First, immediate emotions are more salient than previous emotions. Immediate emotions capture and hold attention, and the direct experience of immediate emotion contrasts with the indirect experience of previous emotion. Consistent with immediate emotion's salience, participants exhibited an immediacy bias even when emotional stimuli were presented in close succession (separated by 2 s; Studies 1 and 2) and exposure to immediately arousing emotional stimuli made recent (2 s ago) emotional reactions seem less intense than they would have simply with time's (brief) passage (Study 2).

Second, along with immediate emotion's salience, information about immediate emotion is more cognitively available than information about previous emotion. To the degree that people use the availability of information about emotion to perceive emotional intensity, the greater availability of information about immediate emotions makes them seem more intense. Consistent with this analysis, reminding people that information about emotions naturally decays over time—which can explain why information about immediate emotion is more available than information about previous emotion—diminished the immediacy bias (Study 4). Further, the reminder led people to increase the perceived intensity of previous emotional reactions rather than decreasing the perceived intensity of immediate emotion, consistent with the pattern of information availability due to memory decay.

Remaining Questions

Several important questions remain about the nature of the immediacy bias in emotion perception and its constraints in everyday life. First, to what extent is the immediacy bias in emotion perception attributable to processes unrelated to emotional salience and availability? People might sometimes perceive immediate emotions as more intense than previous emotions because (a) of simple recency effects in judgments and psychophysics such as the "time order error" (Bartlett, 1939; Fechner, 1860; Hellstrom, 1985; Köhler, 1923; Needham, 1935; Pratt, 1933; Peak, 1940), (b) people might intuitively believe their emotional experiences become more intense over sequences of emotions (McFarland et al., 1989; Ross, 1989; Varey & Kahneman, 1992), and (c) immediate emotions might receive greater weight in comparative judgments simply because they are more likely to be the target rather than the referent of comparison (Bruine de Bruin & Keren, 2003; Houston & Sherman, 1989, 1995; Sanbonmatsu et al., 1991; Tversky, 1977). Although these three processes might contribute to an immediacy bias in everyday life, we suspect they played relatively minor roles in the present studies. None of the alternative processes explain why the immediacy bias emerged for emotional but not neutral stimuli (Study 1), why exposure to an emotional stimulus would make previous emotional reactions seem less intense than they would have otherwise (Study 2), why reminding people that emotional information naturally decays would reduce the immediacy bias (Study 4), or why the immediacy bias diminished over time (Study 5). Further, when asked directly, a separate group of participants (in a follow-up to Study 3) did not expect others to exhibit an immediacy bias, casting doubt on the role of intuitive theories.

Second, is immediate emotional arousal necessary to make previous emotions seem less intense than they would have otherwise? Might any novel focus of attention, even a non-emotional focus, make previous emotion seem less intense? Although our findings (Study 2, in particular) suggest that immediate emotion is sufficient to make previous emotion seem less intense than it would have simply with time's passage, immediate emotion may not be necessary to make previous emotions seem less intense. On the one hand, the processes of salience and availability imply that any novel, non-emotional stimulus that captures and holds atten-

tion might make previous emotions seem less intense, as implied by research indicating that distraction reduces emotional intensity (Miron, Duncan, & Bushnell, 1989; Ochsner & Gross, 2005; Richards & Gross, 2000; Tracey et al., 2002). And some researchers have suggested that emotional stimuli's attentional influences are sometimes attributable to non-emotional distinctiveness rather than to emotionality (Christianson & Loftus, 1987; K. J. Mitchell, Livosky, & Mather, 1998; Pickel, 1998, 2004; Schmidt, 1991, 2006). On the other hand, many researchers (e.g., Dolan, 2002; Fox et al., 2002; Ohman et al., 2001) have argued that emotional relative to non-emotional stimuli uniquely capture and hold attention. An important question for future research is therefore whether immediate emotional stimuli are both sufficient (as demonstrated by the present studies) and necessary to make previous emotions seem less intense.

Finally, what factors might constrain the immediacy bias in everyday life? The results of Study 5 demonstrate that the immediacy bias is transient, diminishing after emotions have subsided. People's intuitions about the intensity of emotional reactions aroused by different stimuli might also constrain the immediacy bias. For instance, if people intuitively believe that certain stimuli (such as menstruation) elicit more intense emotions than they actually do (McFarland et al., 1989), they may perceive immediate emotions as less intense than previous emotions (e.g., they may perceive current menstruation as less intense than previous menstruation). Time delay, intuitive theories, and other potential constraints on the immediacy bias are worthy topics for future research.

Theoretical Implications

The immediacy bias in emotion perception has theoretical implications for at least three areas of research on cognition and emotion. First, the immediacy bias complements and extends research indicating that current appraisals of past emotional events influence memory for past emotions (Levine, 1997; Levine & Bluck, 1997; Levine, Prohaska, Burgess, Rice, & Laulhere, 2001; Levine & Safer, 2002). For instance, people who appraise an ex-romantic partner as less kind and loving than they previously thought may misremember their romantic feelings as less intense than they originally reported. The present studies imply that immediate emotional experience operates somewhat like current appraisals, changing the perceived intensity of previous emotions.

Second, the immediacy bias extends previous findings that people sometimes overestimate the intensity of previous emotions (Larsen, Diener, & Emmons, 1985; T. R. Mitchell, Thompson, Peterson, & Cronk, 1997; Wilson, Meyers, & Gilbert, 2001; Wirtz et al., 2003). Once they have returned from their spring vacation, for example, people remember having enjoyed their vacation more than they reported enjoying it in the moment. However, whereas previous research focused on people's memories (when in a relatively neutral state) of previous emotional intensity, the present studies indicate that *immediately experienced* emotions cause people to perceive previous emotions as relatively less intense. The present studies thus imply that immediate emotional experience can moderate whether people over- or underestimate previous emotional experience. When in the midst of a joyous spring vacation, people may remember their previous spring vacation as less enjoyable than they initially reported.

Finally, the immediacy bias in emotion perception may moderate the "negativity bias" in emotion perception. That is, the tendency to report more intense emotional reactions to negative than to positive stimuli (Baumeister, Bratslavsky, & Finkenauer, 2001; Rozin & Royzman, 2001) might be mitigated when positive stimuli arouse immediate emotions. In one preliminary study, participants viewed one sad and one amusing film, separated by a delay and in counterbalanced order (Van Boven & Huber, 2009). Participants' tendency to perceive their emotional reactions to the sad film as more intense than their reactions to the amusing film was significantly reduced when participants experienced immediate emotional reactions to the amusing film (and distant emotional reactions to the sad film).

Behavioral and Judgmental Implications

The immediacy bias in emotion perception also has implications for at least three types of related behavior and judgment. First, the psychological processes that make immediate emotions seem more intense than past emotions may make one's own immediate emotions seem more intense than other people's immediate emotions (Chambers & Suls, 2006). Just as immediate emotions are more salient and available than previous emotions, immediate emotions experienced by the self are more salient and available than immediate emotions experienced by other people (Miller & McFarland, 1987). Indeed, we have found that people perceive their own immediate, but not their previous, emotional reactions as more intense than others' emotional reactions to such varied events as the Columbia space shuttle disaster, Hurricane Katrina, and the terrorist attacks of September 11, 2001 (White, Van Boven, & Kruger, 2009).

Second, the immediacy bias may lead people to predict that their future emotional reactions to stimuli that arouse immediate emotions may be more intense than their future reactions to stimuli that aroused previous emotions (Kassam, Gilbert, Boston, & Wilson, 2008). Given that decisions about future outcomes are based on predictions about future emotional experiences (Mellers et al., 1999; Wilson & Gilbert, 2003), an immediacy bias in predictions about future experiences might accordingly influence decisions about which experiences to repeat in the future. In one study, when participants "previewed" two films of stand-up comics, separated by a delay, they predicted they would more enjoy viewing whichever film happened to arouse their immediate emotions, and these predictions mirrored participants' memory for how much they enjoyed the two previews (White & Van Boven, 2009). The immediacy bias in emotion perception may thus help explain why people tend to choose the last in a series of choice alternatives (Bruine de Bruin & Keren, 2003; Houston & Sherman, 1989, 1995; Sanbonmatsu et al., 1991).

Finally, the immediacy bias may help explain why people tend to act on emotions in the "heat of the moment" (Loewenstein, 1996; Loewenstein, O'Donoghue, & Rabin, 2003; Metcalfe & Mischel, 1999). The tendency to perceive immediate emotions as uniquely more intense than previous emotions may engender decisions to act on immediate emotions—decisions that people might avoid in more cool-headed states. For instance, the same lovers who decide in the midst of heated romance to spend their lives together because they perceive themselves as more infatuated with their partner than they have ever been with anyone else may

subsequently decide in the midst of a heated argument to end their relationship because they perceive themselves as more infuriated at their partner than they have ever been at anyone else.

Conclusion

The present research indicates that people perceive immediate emotions as more intense, all else equal, than prior emotions, even when those emotions occurred very recently and were of approximately equal intensity. This immediacy bias in emotion perception thus reflects a temporal "kink" in people's perception of their emotional lives over time. Emotional life in the "here and now" seems systematically different than emotional life in the past—gone in the instant of becoming.

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