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Forgetting Feelings: Opposite Biases in Reports of the Intensity of Past Emotion and Mood

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# Forgetting Feelings: Opposite Biases in Reports of the Intensity of Past Emotion and Mood



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AQ: 2

Memory for feelings is subject to fading and bias over time. In 2 studies, the authors examined whether the magnitude and direction of bias depend on the type of feeling being recalled: emotion or mood. A few days after the U.S. Presidential elections in 2008 and 2012, participants reported how they felt about the election outcome (emotion) and how they felt in general (mood). A month after the elections, participants recalled their feelings. The intensity of past emotion was recalled more accurately than the intensity of past mood. Participants underestimated the intensity of emotion but overestimated the intensity of mood. Participants' appraisals of the importance of the election, which diminished over time, contributed to underestimating the intensity of emotion. In contrast, participants' strong emotional response to the election contributed to overestimating the intensity of mood. These opposing biases have important implications for decision making and clinical assessment.

*Keywords:* memory, bias, emotion, mood, empathy gap

When people remember past experiences, what comes to mind is not merely a dry account of the events that unfolded, but also the feelings associated with those events. This feature of autobiographical memory is tremendously important. People make decisions, ranging from the trivial (which movie to see) to the profound (whether to have children), based on how they remember having felt in related circumstances in the past (Levine, 1997; Levine, Lench, & Safer, 2009). But memory for feelings is subject to fading and bias over time. The present study examined whether the magnitude and direction of bias depend on the type of feeling being remembered: emotion or mood. Memory for emotion and mood directly affect a number of important psychological outcomes such as choices to repeat or avoid an experience (Wirtz, Kruger, Napa Scollon, & Diener, 2003), self-concept formation (Levine et al., 2009), and clinical assessments (Safer & Keuler, 2002), so it is vital to understand the degree and direction of bias when remembering past feelings.

Although debate continues about how to conceptualize different feelings (a term we use to refer to both emotion and mood), investigators have begun to reach consensus about the definitions of emotion versus mood (Eich, Kihlstrom, Bower, Forgas, & Niedenthal, 2000; Lench, Flores, & Bench, 2011; Russell, 2003; Oatley & Johnson-Laird, 1987; Solomon, 2008; Scherer, 2005). These definitions are consistent with the use of these terms by laypeople (Beedie, Terry, & Lane, 2005). Emotions are feelings directed toward a specific object or event, for instance feeling happy, sad, or angry about something. As such, emotions are "intentional states," in the sense of the term used by philosophers, that point outside themselves to something in the world (Neu, 2000; Solomon, 1980, 2008). In contrast, moods, such as feeling cheerful or blue, are general affective states that are not directed toward a specific object or event (Beedie et al., 2005; Whalen, Henker, King, Jamner, & Levine, 2004).

Other distinctions between emotion and mood have been identified, but these distinctions appear to be consequences of the focus of the feeling state rather than defining features. Because emotions are experienced when attention is focused on a specific event or situation, they tend to be both more intense and more fleeting than moods. Moods are not directed toward a specific event and the focus of attention varies. As a result, moods are typically influenced by a wider range of events than emotions, including more mundane and less salient events, and they tend to be milder and have a longer duration (Scherer, 2005; Beedie et al., 2005). This does not mean that moods are not affected by events, or that moods cannot have an identifiable source, but that they do not have a specific event as their object. For example, a student might feel happy about getting a good grade on an exam. Getting a good grade might also leave that student in a cheerful mood, even when

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he or she is not thinking about the grade. In the first instance, the object of the student's emotion is the exam grade, and the student would report feeling a certain intensity of happiness about that outcome. In the second case, the student's happy mood has an identifiable source (the exam grade) but the feeling is not directed toward or "about" the exam grade. Thus the critical distinguishing feature between emotion and mood is whether or not the feeling is directed toward a specific object or event (Frijda, 1986; Solomon, 1980; Nussbaum, 2001).

### Bias in Memory for Feelings

Episodic memory fades over time and is subject to reconstruction based on subsequent experience and knowledge (Bartlett, 1932; Loftus & Palmer, 1974; Schacter, 2001). Memory for feelings also fades over time. Consequently, people increasingly rely on other information to reconstruct how they must have felt in the past (Ross, 1989). When asked to remember their past feelings, people may not retrieve the fleeting feeling itself. Instead they may retrieve a reconstruction of their past feeling based partly or wholly on memory for relevant details concerning the event (episodic knowledge) and beliefs about what they were likely to have felt in that situation (semantic knowledge; Robinson & Clore, 2002a, b). This reconstructive process can result in biased reports of the intensities of past emotion and mood. To the extent that people draw on current knowledge, attitudes, and experiences that differ from the past, their reports of the intensity of past feelings will be inaccurate.

Although the distinction between emotion and mood is a common one in the emotion literature and among laypeople, most investigators studying memory for the intensity of past feelings use the terms *emotion* and *affect* broadly and do not distinguish between remembering emotion versus mood. In this research, both overestimation (Fredrickson, 2000; Thomas & Diener, 1990; Wilson, Meyers, & Gilbert, 2003) and underestimation (Loewenstein, 1996; Nordgren, van der Pligt, & van Harreveld, 2006; Safer, Levine, Drapalski, 2002) in memory for past feelings have been documented. There are empirical and theoretical reasons to suspect that the degree and direction of bias depend on whether people are remembering emotion (feelings about a specific event) or mood (general feelings not about a specific event). Thus, distinguishing between these two features of emotional experience may clarify seemingly contradictory findings.

### Emotion

We hypothesized that reports of the intensity of past emotion would be relatively accurate. This hypothesis is based on the effects of emotional arousal on attention and on the stability of the appraisals that determine emotion intensity. As emotional intensity increases, attention narrows to focus on central features of events at the expense of peripheral features (for reviews, see Compton, 2003; Levine & Edelman, 2009). People also tend to focus on an event's salient features when trying to remember the intensity of past feelings (Morewedge, Gilbert, & Wilson, 2005). As a result, the features of an emotion-eliciting event that are central at the time of experience are also likely to be salient when people are attempting to remember their past emotional reaction to that event, promoting accurate reports of the intensity of past emotion.

In addition, reports of the intensity of past emotion are likely to be based on appraisals that are relatively stable over time. Appraisals are evaluations of events that reflect an event's relation to an individual's goals. Events appraised as promoting goal attainment elicit positive emotion and events appraised as thwarting goal attainment elicit negative emotion. When people attempt to remember past emotion, they often draw on their current appraisals of the emotion-eliciting event to help them reconstruct how they must have felt (Levine, 1997; Levine et al., 2009; Safer, Bonanno, & Field, 2001). The degree to which people's appraisals have changed over time predicts the degree of bias in remembered emotion, with greater shifts in their appraisals associated with greater differences between experienced and remembered emotion (Levine, Prohaska, Burgess, Rice, & Lauhere, 2001). People's appraisals of the importance of an event for their goals strongly predict the intensity of positive or negative emotion they experience (e.g., Brans & Verduyn, 2014; Carver, 2004; Frijda, Ortony, Sonnemans, & Clore, 1992; Lench, Flores, & Bench, 2011; Levine, 1996). Thus, people would be expected to draw on their current appraisals of an event's importance when attempting to remember their emotional response. People's major life goals remain fairly stable over time (McAdams, & Olson, 2010). This stability in people's appraisals of the importance of events for their goals would contribute to accuracy in their reports of the intensity of past emotions.

To the extent that inaccuracy is observed, people would be expected to underestimate the intensity of past emotion, consistent with findings in several studies that assessed memory for emotional reactions to specific events (e.g., Sayette, Loewenstein, Griffin, & Black, 2008; Safer et al., 2002). Although people's appraisals of the importance of events should remain relatively stable over time, these appraisals do change somewhat as people adjust to and cope with events. For example, after experiencing positive events, people move on to new aspirations and come to view those past event as less important for their current goals (Lyubomirsky, 2001; Sheldon & Lyubomirsky, 2012). Similarly, after experiencing negative events, people often cope by reframing the events in a manner that minimizes their importance for attaining goals (Carver, Lawrence, & Scheier, 1996; Lyubomirsky, 2001; Wrosch, Scheier, Miller, Schulz, & Carver, 2003). Over time, then, people may come to view events as less relevant to their current goals and hence less important. As events come to be appraised as less important over time, drawing on current appraisals of their importance would contribute to people judging their past emotional response as less intense than it actually was.

In summary, we hypothesized that people would be fairly accurate when reporting the intensity of past emotions. To the extent that bias is found, however, we expected people to underestimate emotional intensity. That is, when remembering their emotional reaction to a positive event, people should remember having felt less happy than they reported having felt at the time the event occurred. When remembering their emotional reaction to a negative event, people should remember having felt less unhappy than they reported having felt at the time the event occurred.

### Mood

Just as people are expected to draw on salient information when remembering past emotions, they are expected to draw on salient

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this should say "findings that"

information when remembering past moods. However, the directions of drawing on salient information for the accuracy of reports of emotion versus mood differ dramatically for emotion versus mood. We hypothesized that reports of the intensity of past mood would be relatively inaccurate and biased toward overestimating intensity. This hypothesis was based on findings that people tend to focus on central features of an experience when remembering events and their responses to them (e.g., Levine & Edelstein, 2009; Morewedge et al., 2005; Wirtz et al., 2003). Moods, such as being generally cheerful or glum, are not directed toward a specific event and may be impacted by a number of mundane and easily forgotten events that occur during a given day or time period. As a result of the relatively amorphous nature of the factors that contribute to mood, people may rely on their memory for salient experiences when remembering the intensity of their mood at a later time (Wilson et al., 2003; Schkade & Kahneman, 1998). Thus, people are likely to draw on their memory of the intensity of past emotion, a salient experience tied to a specific event, when attempting to remember past mood. Even if remembered emotional reactions pale slightly in comparison to the actual lived emotional experience, focused emotional reactions still tend to be more intense than moods (Beedie et al., 2005). Thus judging the intensity of past mood by retrieving the intensity of a specific emotional experience would result in inaccuracy and in overestimation of the intensity of past moods. That is, following a positive event, people should remember their mood as more happy than they reported at the time the event occurred. Following a negative event, people should remember their mood as more unhappy than they reported at the time the event occurred.<sup>1</sup>

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In summary, this research is the first to investigate whether the extent and direction of memory bias differ depending on the type of feeling being remembered: emotion (i.e., feelings about a specific event) versus mood (i.e., general feelings that do not have a specific event as their object). In reporting the intensity of past emotion and past mood, people draw on their current knowledge, attitudes, and experience. When both experiencing and remembering emotion, people focus on a specific event and its importance for their goals. We expect this common focus to promote accurate reports of the intensity of past emotion. To the extent that appraisals of the event's importance have decreased over time, underestimation of the intensity of past emotion should be observed. In contrast, when remembering their overall mood following an event, people are likely to focus on their emotional response to the event. Failing to retrieve the range of more mundane concerns that mitigated the impact of a single event on their overall mood should lead to greater inaccuracy, and to overestimation, in reporting the intensity of past moods.

### The Present Research

Participants reported their feelings a few days after the U.S. presidential elections in 2008 and 2012 and recalled their feelings a month later. In 2008, we assessed experienced and remembered feelings of happiness, sadness, and anger. The study used a between-subjects design in which participants reported and later recalled their reports of either how happy, sad, and angry they felt specifically about the election outcome (emotion) or how happy, sad, and angry they felt in general (mood). We assessed whether the degree and direction of bias depended on the type of feeling

or the intensity of past emotion would be more accurate than reports of the intensity of past mood; (b) participants would underestimate in recalling the intensity of their emotional response but overestimate in recalling the intensity of their mood; (c) appraisals of the importance of the election outcome at the time of recall would contribute to underestimating the intensity of past emotion; and (d) the intensity of participants' emotional reaction to the election outcome would contribute to overestimating the intensity of past mood.

### Study 1: The 2008 Election

#### Method

**Participants.** Undergraduates in California, Texas, and Washington, DC ( $N = 183$ ), recruited through university research subject pools, were emailed a link to an online questionnaire a few days after, and about a month after, the 2008 U.S. presidential election. The measures included in this report were part of a larger investigation, which also assessed forecast feelings about the election and measures related to forecast feelings. The current study included participants who reported their experienced and recalled feelings, and only measures related to those time points are reported here (see Levine, Lench, Kaplan, & Safer, 2012, for other measures). Students who signed up for the study were emailed a link to an online questionnaire the day after, and about a month after, the 2008 U.S. presidential election. They were given 5 days to complete each questionnaire. After completion of the questionnaires, they received partial course credit. Of the included participants, 108 voted for Barack Obama and 75 voted for John McCain (85% women;  $M_{age} = 19.15$  years, range = 18–32 years). Individuals who did not vote ( $n = 70$ ) or voted for another candidate ( $n = 3$ ) were excluded from analyses. Analyzing data from participants who had voted ensured that the election was of some importance and indicated whether the outcome was positive or negative for them.

**Time 1: Experienced feelings.** Days after the election, participants completed an online questionnaire about their feelings of happiness, sadness, and anger. Participants were randomly assigned to report either their emotional reaction to the election ( $n = 91$ ) or their general mood ( $n = 92$ ). In assessing emotional reactions, we were interested in participants' emotions rather than

<sup>1</sup> In prior research, we found that overestimation in predicting future moods is due in part to participants misinterpreting requests to predict how they will feel in general as asking how they will feel about a specific event (Levine et al., 2012). Question misinterpretation may also contribute to overestimation in recall but this has not yet been demonstrated. Predicted feelings tend to be more abstract than recalled feelings which are constrained by what has already occurred (Van Boven & Ashworth, 2007). Thus, the processes leading to overestimation in recalling moods may overlap with, but may also be somewhat distinct from, those involved in predicting moods. Future research should investigate whether misinterpretation of the type of feeling being assessed contributes to overestimation when people recall past moods.

their attitudes, so we specified, “By reaction, we mean the emotion that you are experiencing right now in response to the election. How [happy/sad/angry] do you feel about Barack Obama being elected President?” To assess general mood following the election, participants were asked, “In general, how [happy/sad/angry] are you feeling these days?” All participants reported the intensities of happiness, sadness, and anger in that order. All feelings were rated on a scale ranging from 1 (*not happy/sad/angry*) to 9 (*very happy/sad/angry*). Participants also indicated the candidate for whom they had voted and answered demographic questions. One participant did not report experienced sad emotion. As a result, degrees of freedom differ slightly for analyses of experienced negative emotion.

**Time 2: Remembered feelings.** About a month after the election, the same participants completed a second questionnaire that asked them to recall how they had felt. Participants were told that the purpose of the survey was to assess their memory for their past feelings:

The following questions will ask you to remember how you were feeling in the days right after the Presidential election. We want to know how you were feeling at that time, not how you are feeling now. Before you click to go on to the next page, please take a moment to try to recall what you were feeling in the days right after the election. Click to go on after you have recalled what you were feeling then.

All participants recalled their emotional response to the election outcome (“In the days right after the election, how [happy/sad/angry] did you feel about Barack Obama being elected president?”) and their mood (“In the days right after the election, how [happy/sad/angry] were you feeling in general?”). All participants recalled the intensities of happiness, sadness, and anger in that order. The order in which participants recalled their mood and emotional response was counterbalanced. Preliminary analyses showed that order did not significantly affect intensity ratings for either mood or emotion, both  $ps > .07$ . For subsequent analyses, we analyzed only the recalled feeling that corresponded to the question participants completed at Time 1.

## Results and Discussion

**Preliminary analyses.** Across all participants, experienced feelings of anger and sadness were highly related (Cronbach’s  $\alpha = .89$ ), and remembered feelings of anger and sadness were highly related (Cronbach’s  $\alpha = .93$ ). Therefore, subsequent analyses of negative feelings were conducted using the mean of the sadness and anger ratings for each participant.

**Memory accuracy.** We first compared the accuracy with which participants recalled emotion versus mood. For positive feelings (i.e., ratings of happiness), a significant  $z$  value indicated that the correlation between experienced and recalled positive emotion,  $r(90) = .95$ ,  $p < .001$ , was significantly greater than the correlation between experienced and recalled positive mood,  $r(91) = .56$ ,  $p < .001$ ;  $z = 7.98$ ,  $p < .001$ . Similarly, the correlation between experienced and recalled negative emotion,  $r(89) = .95$ ,  $p < .001$ , was significantly greater than the correlation between experienced and recalled negative mood,  $r(91) = .43$ ,  $p < .001$ ;  $z = 9.13$ ,  $p < .001$ . We also assessed memory accuracy by comparing the absolute value of the difference between experienced and recalled emotion versus mood. For positive feelings,

the absolute value of the difference between experienced and recalled emotion ( $M = 0.59$ ,  $SD = 0.86$ ) was less than half of the absolute value of the difference between experienced and recalled mood ( $M = 1.27$ ,  $SD = 1.21$ ),  $t(181) = 4.36$ ,  $p < .001$ ,  $d = 0.65$ . For negative feelings, the absolute value of the difference between experienced and recalled emotion ( $M = 0.47$ ,  $SD = 0.86$ ) was less than half of the absolute value of the difference between experienced and recalled mood ( $M = 1.48$ ,  $SD = 1.19$ ),  $t(180) = 6.55$ ,  $p < .001$ ,  $d = .97$ . Thus, participants were more accurate in reporting the intensity of past emotion than past mood.

**Direction of memory bias for emotion versus mood.** To assess the direction of memory bias for emotion versus mood, we first examined feelings of happiness for all participants. For ease of interpretation, feelings of happiness (experienced and recalled emotion and mood) were reverse coded for McCain supporters. Thus, higher ratings represented more extreme happiness for Obama supporters, and more extreme unhappiness for McCain supporters. We conducted a mixed-model analysis of variance (ANOVA) on intensity ratings with time (experience, recall) as the within-subject variable, and with candidate preference (Obama, McCain) and feeling type (emotion, mood) as between-subjects variables.

Importantly, the results showed the predicted interaction between feeling type and time,  $F(1, 179) = 30.12$ ,  $MSE = 0.91$ ,  $p < .001$ ,  $\eta_p^2 = 0.14$ . As Figure 1 (left side) shows, participants underestimated the intensity of past emotion (experienced:  $M = 8.42$ ,  $SD = 0.92$ ; recalled:  $M = 7.96$ ,  $SD = 1.28$ ),  $t(90) = -4.71$ ,  $p < .001$ ,  $d = -0.41$ , and overestimated the intensity of past mood (experienced:  $M = 5.55$ ,  $SD = 2.30$ ; recalled:  $M = 6.15$ ,  $SD = 1.98$ ),  $t(91) = 3.46$ ,  $p < .001$ ,  $d = 0.28$ . The results also showed significant main effects for feeling type,  $F(1, 179) = 158.22$ ,  $MSE = 3.26$ ,  $p < .001$ ,  $\eta_p^2 = 0.47$ , and candidate preference,  $F(1, 179) = 51.60$ ,  $MSE = 3.26$ ,  $p < .001$ ,  $\eta_p^2 = 0.22$ , and a significant interaction between feeling type and candidate preference,  $F(1, 179) = 41.00$ ,  $MSE = 3.26$ ,  $p < .001$ ,  $\eta_p^2 = 0.19$ . This occurred

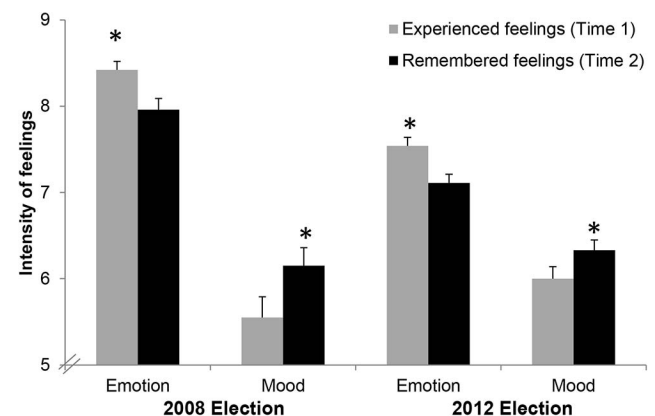


Figure 1. Mean intensities and standard errors of experienced and remembered emotion and mood. Ratings of happiness were reverse coded for McCain and Romney supporters; higher values represent more extreme happiness for Obama supporters and more extreme unhappiness for McCain and Romney supporters. After both the 2008 election and the 2012 election, participants underestimated in remembering the intensity of past emotion but overestimated in remembering the intensity of past mood.

because participants rated mood as less intense than emotion. In addition, McCain supporters rated their mood as less intense than other feeling types by either group. No other significant effects were found.<sup>2</sup>

We repeated this mixed-model ANOVA to examine the direction of memory bias for the dominant feeling expressed by each group: positive feelings (happiness) for Obama supporters and negative feelings (mean ratings of sadness and anger) for McCain supporters. Higher ratings represented more extreme feelings for both groups. The results again showed the predicted interaction between feeling type and time,  $F(1, 178) = 11.80, MSE = 0.96, p < .001, \eta_p^2 = 0.06$ . Participants underestimated the intensity of past emotion (experienced:  $M = 7.82, SD = 1.60$ ; recalled:  $M = 7.46, SD = 1.57$ ),  $t(89) = -3.34, p = .001, d = -0.23$ , but overestimated the intensity of past mood (experienced:  $M = 5.33, SD = 2.37$ ; recalled:  $M = 5.69, SD = 2.34$ ),  $t(91) = 2.08, p = .04, d = 0.15$ . The results also showed significant main effects for feeling type,  $F(1, 178) = 98.26, MSE = 3.63, p < .001, \eta_p^2 = 0.36$ , and candidate preference,  $F(1, 178) = 153.01, MSE = 3.63, p < .001, \eta_p^2 = 0.46$ , and a significant interaction between feeling type and candidate preference,  $F(1, 178) = 16.77, MSE = 3.63, p < .001, \eta_p^2 = 0.09$ . This occurred because participants rated mood as less intense than emotion, and McCain supporters rated their mood as less intense than other feeling types by either group. No other significant effects were found.<sup>3</sup> In summary, participants underestimated in recalling the intensity of their emotional response but overestimated in recalling the intensity of their mood. These results were found both for positive and negative feelings.

## Study 2: The 2012 Election

Study 1 demonstrated that the degree and direction of bias depended on whether people recalled their emotion or mood. Study 2 assessed potential mechanisms underlying these differences. Participants reported, and later recalled, their emotional response to the 2012 U.S. presidential election and their mood. They also rated the importance of the election outcome at both time points. The study used a within-subject design, allowing us to compare the magnitude and direction of bias when the same participants remembered different features of their emotional experience. Further, because participants reported emotion about the election outcome as well as mood, we were able to test the hypothesis that people overestimate in remembering their mood because they focus on their emotional response to a specific event. To avoid repetitive questioning, given the within subject design, participants were asked to report only feelings of happiness, and not sadness and anger.

## Method

**Participants.** Undergraduates in California ( $N = 202$ ) completed online questionnaires up to a week after, and about a month after, the 2012 U.S. presidential election. Participants were recruited through the undergraduate Social Sciences subject pool. Those who signed up for the study were emailed a link to an online questionnaire the day after, and about a month after, the election. They were given a week to complete each questionnaire. This study was part of a larger investigation that also included measures designed to assess forecast feelings about the election. The current

study included participants who reported their experienced and recalled feelings, and only measures related to those time points are reported here. Of the individuals who completed questionnaires, a larger percentage did not vote in the 2012 election (42%) than in the 2008 election (28%). We therefore used a less stringent criterion and included all participants who indicated that they favored Obama ( $n = 174$ ) or Romney ( $n = 28$ ); (82% women;  $M_{age} = 19.59$  years, range = 18–40 years). Participants who reported that they had no preference were excluded ( $n = 33$ ).<sup>4</sup>

**Procedure.** At Time 1, participants were asked, “In general, how happy are you feeling these days,” followed by “How happy do you feel about Barack Obama being reelected President,” using a scale ranging from 1 (*not happy*) to 9 (*very happy*). At Time 2, participants were instructed to think back to the days following Obama’s reelection, and recall their mood, “In general, how happy did you feel,” and their emotional response, “How happy did you feel about Barack Obama being reelected president?” Participants also rated their appraisals of the importance of the election out-

<sup>2</sup> Participants rated emotion as more intense than mood, and some rated experienced happiness at the ceiling (9 for Obama supporters) or floor (1 for McCain supporters) of the 9-point scale. We conducted an additional analysis to find out if ceiling or floor effects accounted for participants’ greater accuracy in remembering emotion than mood, or accounted for underestimation in remembering emotion. We took the recommended step (Austin & Brunner, 2003) of omitting participants who rated emotion or mood at the ceiling or floor of the 9-point intensity scale, leaving 113 participants who were not subject to ceiling/floor effects. For this subsample, the correlation between experienced and remembered emotion,  $r(33) = .88, p < .001$ , was significantly greater than the correlation between experienced and remembered mood,  $r(78) = .50, p = .001; z = 3.80, p < .001$ . We also examined the direction of bias in this subsample, with happiness ratings reverse-coded for McCain supporters. Participants underestimated in recalling emotion (experienced:  $M = 7.44, SD = 0.86$ ; recalled:  $M = 7.00, SD = 1.37$ ),  $t(33) = -2.27, p = .03, d = -0.38$ , but overestimated in recalling mood (experienced:  $M = 5.39, SD = 1.92$ ; recalled:  $M = 6.09, SD = 1.85$ ),  $t(78) = 3.80, p < .001, d = 0.37$ . Thus, excluding participants who rated experienced emotion or mood at the top or bottom extreme of the scale did not change the findings.

<sup>3</sup> In Study 1, participants reported their feelings one to five days after the election (November 5–9, 2008). In principle, participants who completed the questionnaire closer in time to Election Day might have reported more extreme emotion if the impact of the election decreased over time. On the other hand, those who completed the questionnaire closer in time to Election Day might have reported less extreme mood if they interpreted the request to rate how happy they were feeling “these days” as including days prior to the election. To test this, we examined the correlations between reporting day and experienced happiness (reverse-coded for McCain supporters) for emotion and for mood. No significant association was found between reporting day and experienced emotion,  $r(91) = .09, p = .38$ , or between reporting day and experienced mood,  $r(91) = .05, p = .65$ . We also included reporting day as a covariate in the two ANOVAs that examined the direction of memory bias. No significant effect of reporting day was found and including this variable did not change the pattern of statistically significant results reported in the text. Similarly, in Study 2, participants reported their feelings one to six days after the election (November 7–12, 2012). No significant association was found between reporting day and the intensity of experienced mood,  $r(201) = -.08, p = .24$ , but the intensity of experienced emotion decreased over the course of the week,  $r(201) = -.25, p < .001$ . Including reporting day as a covariate in the ANOVA that examined the direction of memory bias did not change the pattern of statistically significant results reported in the text.

<sup>4</sup> The pattern of results is identical if participants are limited to those who voted for the Democratic or Republican presidential candidate, as in Study 1.

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come at both time points using a scale ranging from 1 (*not at all*) to 9 (*very*).

## Results and Discussion

**Association between emotion and mood.** We first assessed the correlation between participants' ratings of emotion and mood, both at Time 1 (experience) and at Time 2 (recall). We used Pearson-Filon  $z$  ( $ZPF$ ) to compare these nonoverlapping correlations from the same sample. The correlation between emotion and mood was relatively low when participants rated their experienced feelings,  $r(201) = .13, p = .06$ , but was significantly greater when participants rated their remembered feelings,  $r(201) = .54, p < .001, ZPF = 4.81, p < .001$ .

**Memory accuracy.** Next, we assessed the accuracy with which participants recalled emotion versus mood. The correlation between experienced and remembered emotion,  $r(201) = .86, p < .001$ , was significantly greater than the correlation between experienced and remembered mood,  $r(201) = .52, p < .001; ZPF = 6.11, p < .001$ . In addition, the absolute value of the difference between experienced and remembered emotion ( $M = 0.79, SD = 0.88$ ) was significantly less than the absolute value of the difference between experienced and remembered mood ( $M = 1.07, SD = 1.16$ ),  $t(201) = 2.85, p = .004, d = 0.27$ . Thus, the results of the 2012 election study replicated those of the 2008 election study. Participants were more accurate in reporting the intensity of past emotion than past mood.

**Direction of memory bias.** Next we examined the direction of bias for reports of past emotion versus mood. For ease of interpretation in subsequent analyses, feelings of happiness for Romney supporters were reverse coded. Thus, higher ratings represent more extreme happiness for Obama supporters, and more extreme unhappiness for Romney supporters. To assess the direction of bias, we conducted a mixed-model ANOVA on intensity ratings with feeling type (emotion, mood) and time (experience, recall) as within-subject variables, and with candidate preference (Obama, Romney) as the between-subjects variable. The hypothesized interaction was found between time and feeling type,  $F(1, 200) = 24.99, MSE = 0.79, p < .001, \eta^2_p = 0.11$ . As Figure 1 (right side) shows, participants underestimated in recalling the intensity of emotion (experienced:  $M = 7.54, SD = 1.41$ ; recalled:  $M = 7.11, SD = 1.45$ ),  $t(200) = -5.47, p < .001, d = -0.30$ , and overestimated in recalling the intensity of mood (experienced:  $M = 6.00, SD = 1.97$ ; recalled:  $M = 6.33, SD = 1.66$ ),  $t(201) = 3.04, p = .003, d = 0.18$ .

The results also showed significant main effects for feeling type,  $F(1, 200) = 163.72, MSE = 2.05, p < .001, \eta^2_p = 0.45$ , candidate preference,  $F(1, 200) = 44.57, MSE = 5.27, p < .001, \eta^2_p = 0.18$ , and time,  $F(1, 200) = 7.15, MSE = 0.95, p < .001, \eta^2_p = 0.03$ , as well as significant interactions between feeling type and candidate preference,  $F(1, 200) = 91.57, MSE = 2.05, p < .001, \eta^2_p = 0.18$ , and time and candidate preference,  $F(1, 200) = 18.98, MSE = 0.95, p < .001, \eta^2_p = 0.09$ . This occurred because participants rated emotion as more intense than mood, Obama supporters rated their mood as more intense than did Romney supporters, and Obama supporters exaggerated less in remembering their feelings.

In summary, with respect to the direction of bias, the results of the 2012 election study replicated the results of the 2008 election

study. Participants underestimated in reporting the intensity of their past emotional response but overestimated in reporting the intensity of their past mood.<sup>5</sup>

**Predictors of memory bias.** Finally, we examined potential predictors of memory bias. As memory for feelings fades, people often draw on salient information in order to reconstruct how they must have felt (e.g., Levine, 1997). One salient feature that contributes to the intensity of people's emotional reaction to an event is the importance of that event for their goals. However, events initially appraised as important may decline in importance over time as people adjust to them (Lyubomirsky, 2001; Sheldon & Lyubomirsky, 2012; Worsch et al., 2003). This was the case for the 2012 election outcome. Participants rated the election outcome as significantly less important after a month ( $M_{T2} = 6.25, SD = 2.07$ ) than they had in the days immediately following the election ( $M_{T1} = 6.49, SD = 2.05$ ),  $t(200) = 2.51, p = .03, d = 0.12$ . We hypothesized that appraising the election as less important at the time of recall would contribute to underestimating the intensity of past emotion. In contrast, we hypothesized that focusing on salient feelings specifically about the election (i.e., emotion) would contribute to overestimating the intensity of past mood.

To test this, we conducted separate hierarchical regression analyses on remembered emotion and remembered mood, with happiness ratings reverse-coded for Romney supporters. Both analyses included the same four predictors. At Step 1, we included the following Time 1 variables: (a) Time 1 experienced emotion, (b) Time 1 experienced mood, and (c) Time 1 appraised importance. At Step 2, we added (d) Time 2 appraised importance. The rationale for including these predictors was as follows: To test our hypothesis that participants' appraisals of the importance of the election outcome at Time 2 (which had decreased over time) contributed to underestimating the intensity of emotion, we included appraised importance shortly after the election and appraised importance at the time of recall as predictors. To test our hypothesis that people overestimate the intensity of past mood because they focus on their emotional response to a specific event, we included both experienced emotion and experienced mood in the models. Although we did not expect experienced mood to contribute to remembered emotion, we included experienced mood in the model predicting remembered emotion for consistency.

The results for remembered emotion are shown on the left side of Table 1. At Step 1, the three predictor model accounted for 56% of the variance. At Step 2, the four predictor model accounted for 61% of the variance. This improvement in the fit of the model was

<sup>5</sup> To find out if ceiling or floor effects accounted for the findings of Study 2, we omitted participants who rated either emotion or mood at the top or bottom of the 9-point intensity scale, leaving 122 participants. In this subsample, as found in the complete sample, the correlation between experienced and remembered emotion,  $r(121) = .74, p < .001$ , was significantly greater than the correlation between experienced and remembered mood,  $r(121) = .47, p = .002; ZPF = 3.31, p = .001$ . We also examined the direction of bias, with happiness ratings reverse-coded for Romney supporters. As found in the complete sample, participants in this subsample underestimated the intensity of past emotion (experienced:  $M = 6.71, SD = 1.09$ ; recalled:  $M = 6.38, SD = 1.25$ ),  $t(121) = 3.18, p = .002, d = -0.28$ . Participants in this subsample showed a nonsignificant tendency to overestimate the intensity of past mood (experienced:  $M = 5.63, SD = 1.70$ ; recalled:  $M = 5.84, SD = 1.47$ ),  $t(121) = 1.70, p = .09, d = 0.13$ , consistent with the direction of bias shown in the complete sample.

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Table 1

Summary of Hierarchical Regression Analyses for Variables Predicting the Intensity of Remembered Emotion and Remembered Mood in the 2012 Presidential Election ( $N = 201$ )

Variable	Recalled emotion				Recalled mood			
	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>
Step 1								
Time 1 experienced emotion	.48	.07	.47	7.21***	.21	.08	.18	2.67**
Time 1 experienced mood	.04	.04	.06	1.11	.48	.04	.57	10.83***
Time 1 appraised importance	.24	.04	.34	5.46***	.16	.05	.19	3.03**
Step 2								
Time 1 experienced emotion	.40	.06	.39	6.19***	.22	.08	.19	2.76**
Time 1 experienced mood	.04	.03	.05	1.14	.48	.04	.57	10.82***
Time 1 appraised importance	.06	.05	.08	1.11	.19	.07	.23	2.75**
Time 2 appraised importance	.27	.05	.38	5.15***	-.05	.07	-.06	-.69

Note. For the model predicting remembered emotion, at Step 1,  $F(3, 197) = 82.24$ ,  $MSE = .95$ ,  $p < .001$ ,  $R^2 = .56$ . At Step 2,  $F(4, 196) = 76.28$ ,  $MSE = .84$ ,  $p < .001$ ,  $R^2 = .61$ , and  $\Delta R^2 = .05$ ,  $F(1, 196) = 26.48$ ,  $p < .001$ . For the model predicting remembered mood, at Step 1,  $F(3, 197) = 72.53$ ,  $MSE = 1.33$ ,  $p < .001$ ,  $R^2 = .52$ . At Step 2,  $F(4, 196) = 54.37$ ,  $MSE = 1.33$ ,  $p < .001$ ,  $R^2 = .53$ , and  $\Delta R^2 = .00$ ,  $F(1, 196) = .47$ ,  $p = .49$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

significant,  $\Delta R^2 = 0.05$ ,  $F(1, 196) = 26.48$ ,  $p < .001$ . At Step 2, Time 1 experienced emotion was the strongest predictor of Time 2 remembered emotion. As hypothesized, however, participants' appraisal of the importance of the election at Time 2 also predicted Time 2 remembered emotion. Once Time 2 appraised importance was added to the model, Time 1 appraised importance was no longer a significant predictor of remembered emotion. Time 1 mood also was not a significant predictor of remembered emotion. Thus, the intensity of emotion that participants experienced predicted the intensity of emotion they remembered. However, after adjusting for experienced emotion and initial appraised importance, participants' current appraisal of the importance of the election predicted the intensity of emotion they remembered. In other words, appraising the election as less important at the time of recall was associated with remembering less intense emotion.

The results for remembered mood are shown on the right side of Table 1. At Step 1, the three predictor model accounted for 52.5% of the variance. At Step 2, the four predictor model accounted for 52.6% of the variance,  $\Delta R^2 = 0.00$ ,  $F(1, 196) = 0.47$ ,  $p = .49$ . At Step 2, Time 1 experienced mood was the strongest predictor of Time 2 remembered mood. As hypothesized, however, Time 1 experienced emotion also predicted Time 2 remembered mood. Time 1 appraised importance also predicted Time 2 remembered mood. Time 2 current appraised importance was not a significant predictor. Thus, experienced mood predicted remembered mood. However, experienced emotion and initial appraisal of the importance of the election also predicted remembered mood.

In summary, Study 2 permitted us to examine contributors to bias in reports of past emotion and mood. Participants had underestimated in remembering their past emotion. The intensity of emotion they remembered was predicted by the current appraised importance of the election outcome, which had declined over time. In contrast, participants overestimated in remembering their past mood. The intensity of mood they remembered was predicted by their initial appraisal of, and emotional reaction to, the election outcome. This suggests that focusing on past salient events and their emotional impact contributes to overestimating the intensity of past mood.

## General Discussion

Remembering is a reconstructive process. People's representations of past events may be partly or wholly comprised of current knowledge, attitudes, and experiences (e.g., Bartlett, 1932; Loftus & Palmer, 1974; Schacter, 2001). Similarly, as memory for past feelings becomes inaccessible over time, people rely on salient information to reconstruct how they must have felt (Robinson & Clore, 2002a, 2002b; Ross, 1989; Levine, 1997). We proposed that the magnitude and direction of bias in reports of the intensity of past feelings depends on whether people are remembering emotion (feelings about a specific event) or mood (feelings that are not about a specific event). To test this, a few days after the 2008 and 2012 U.S. presidential elections, participants reported their feelings about the outcome of the election (emotion) and how they were feeling in general (mood). A month after the elections, participants recalled their feelings.

## Differing Levels of Accuracy in Reports of Past Emotion Versus Mood

Participants' reports of past emotion were more accurate (i.e., more similar to their reported experience) than their reports of past mood. The correlation between experienced and remembered mood was in the .50 range, consistent with past estimates (Levine, Safer, & Lench, 2006), whereas the correlation between experienced and remembered emotion was in the .90 range. Two features of emotion likely contributed to greater accuracy in reports of past emotion than mood. First, people tend to focus on central, salient features of events both when experiencing (Compton, 2003) and when remembering (Levine & Edelstein, 2009) emotional reactions to events. Focusing on salient information at the time of recall would contribute to accuracy for reports of past emotions, which are directed toward specific events. In contrast, focusing on salient information at the time of recall would contribute to inaccuracy in memory for moods, which are not directed toward specific events and may be influenced by a number of mundane and less salient events. Second, the intensity of emotion people experience about events depends greatly on their appraisals of the



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importance of those events for their goals (e.g., Brans & Verduyn, 2014; Fridja et al., 1992). People's life goals remain fairly stable over time (McAdams & Olson, 2010), so consistency in their appraisals of the importance of events for their goals would contribute to accuracy in reports of the intensity of past emotion.

### Opposite Biases in Reports of Past Emotion and Mood

Past research provides conflicting results concerning whether people over- or underestimate in remembering the intensity of their past feelings. Some studies have shown overestimation of past feelings (Fredrickson, 2000; Thomas & Diener, 1990; Wilson et al., 2003), whereas others have shown underestimation (Loewenstein, 1996; Nordgren et al., 2006; Safer et al., 2002). We found that the direction of bias depended on whether participants were asked to remember emotion or mood. Participants underestimated the intensity of their past emotional reaction to Obama's victory but overestimated the intensity of their past mood. These opposite biases were found using a between subject design in which participants reported only emotion or only mood (Study 1), and using a within subject design in which participants reported both emotion and mood (Study 2). Against the backdrop of greater accuracy in their reports of past emotion, then, the direction of bias differed depending on whether participants were remembering emotion or mood.

In Study 2, we also assessed predictors of bias. Despite the stability of important life goals (McAdams & Olson, 2010), people often come to see specific past positive and negative events as less important and relevant to their goals over time (e.g., Carver et al., 1996; Lyubomirsky, 2001; Wrosch et al., 2003). Similarly, participants appraised Obama's 2012 reelection as less important a month after the election than they had in the days immediately following the election. Regression analyses showed that, after adjusting for initial emotion and initial appraisals, remembered emotion was predicted by participants' current appraisals of the importance of the election. Thus, drawing on current appraisals of the importance of emotion-eliciting events contributed to underestimating past emotion. In contrast, remembered mood was predicted by participants' initial emotion and initial appraisal of the importance of the election. These findings reveal that the remembered intensity of both emotion and mood are predicted by greater appraisals of importance, consistent with previous findings that the importance of an event relates to the intensity of people's reactions to that event (e.g., Brans & Verduyn, 2014; Carver, 2004; Frijda et al., 1992). However, remembered emotion was predicted by changes in appraised importance over time, whereas remembered mood was predicted by initial appraised importance. Although we had no specific predictions concerning the contribution of appraised importance to remembered mood, this finding is consistent with our theoretical argument that focusing too much on initial reactions to a salient past event contributes to overestimating the intensity of past mood (Schkade & Kahneman, 1998; Wilson et al., 2003). In summary, distinguishing between two types of emotional experience, emotion versus mood, and identifying predictors of bias helps clarify seemingly contradictory findings in the literature with respect to the direction of bias in remembering past feelings.

### Distinctions Between Emotion and Mood

Emotion and mood are distinct but overlapping constructs (Alpert & Rosen, 1990). People's moods can modulate the intensity of their emotional reactions to events. Emotions directed toward specific events can impact people's mood even after their attention shifts away from those events. Despite this acknowledged overlap, researchers have long distinguished between emotions and moods (e.g., Alpert & Rosen, 1990; Beedie et al., 2005; Scherer, 2005; Whalen et al., 2004). In the present investigation, we focused on the critical distinguishing feature that emotions are about an event whereas moods are not directed toward a specific event. Researchers and nonacademics have been shown to distinguish between emotion and mood in a manner consistent with this definition (Beedie et al., 2005). For instance, when asked to describe the difference between moods and emotions, the response identified as most typical among nonacademics was, "Moods are general, background feeling states, with no specific cause or direction. Emotions have a specific cause and are directed at a specific object" (Beedie et al., 2005, p. 863). One implication of our findings is that, consistent with past research, people do distinguish between feelings about events (emotion) and feelings in general (mood). Across both studies, participants rated emotion as more intense than mood. In Study 2, the correlation between emotion and mood was relatively low and did not reach statistical significance. Differences were also found in the predictors of the intensity of past emotion versus past mood.

A second implication of our findings is that, although people draw on salient information when attempting to remember both emotion and mood, this common process contributes to accuracy in reports of past emotion and to inaccuracy in reports of past mood. When people experience an emotional response to an event, their attention often narrows to salient, central features of the event (Compton, 2003). People also tend to rely on salient, central features of past events when remembering their past emotional reaction (Levine & Edelstein, 2008; Wirtz et al., 2003). In contrast, moods are less tied to specific, salient events that are easy to remember and may be influenced by a number of amorphous experiences during a given day or time period (Beedie et al., 2005). Thus, one source of the difference in accuracy in reports of emotion versus mood is that, for emotion, there is a match between the situation the person has in mind at the time of experience and at the time of recall that should promote accuracy. For mood there is often a mismatch.

Another source of greater accuracy in remembering emotion than mood is the presence of well-defined retrieval cues. Because emotions are about a specific event, that event can serve as a retrieval cue when attempting to remember the intensity of past emotion. For example, participants likely had a fairly rich network of experiences that they could draw on when attempting to remember emotion, including episodic information about the election and the activities they engaged in at that time. In contrast, moods are not about a specific event and may be influenced by a wider range of events and experiences in a given time period. As a result, there may be no clearly defined cues to aid retrieval of information relevant to the intensity of mood. Our results suggest that, instead, participants tended to consider information about the election, including their emotional reaction to the election and the impor-



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tance of the election outcome, when attempting to report the intensity of their past mood.

### Limitations and Future Research Directions

The present research provides valuable insights regarding sources of accuracy and bias in reports of past emotion versus mood, but limitations should be noted. First, some participants rated the intensity of experienced emotion at the top or bottom of the scale, leaving no room for overestimation in remembering the extremity of their response. Follow-up analyses omitting these participants indicated that, even participants without such extreme ratings remembered emotion more accurately than mood, and underestimated the intensity of past emotion, consistent with the results for the complete sample. This suggests that our results reflect processes involved in retrieving and reconstructing past emotional experience rather than ceiling or floor effects in assessing emotion. However, future research should assess memory for emotion and mood in a manner that avoids having participants rate emotional intensity at the ceiling or floor of the scale.

Second, participants reported their mood up to 5 days after the 2008 election, and up to 6 days after the 2012 election. In principle, those who reported their mood closer in time to the election might have reported less extreme mood if they interpreted the request to rate how happy they were feeling “these days” as including days prior to the election. Later, participants were asked to recall how they were feeling in general in the days after the election, resulting in a possible mismatch in reporting periods. Follow-up analyses showed, however, that the intensity of participants’ experienced mood was not correlated with reporting day. In addition, including reporting day as a covariate in analyses did not change the finding that participants overestimated the intensity of past mood. In future research, however, it will be important to ensure that participants have precisely the same time period in mind when rating experienced and remembered mood.

Third, although researchers and laypeople agree about the distinctions between emotions and mood (Beedie et al., 2005), there is overlap between the two constructs. Distinctions between mood and emotion become increasingly blurry over time as memory fades. As noted above, in Study 2, the association between emotion and mood was significantly greater at the time of recall than at the time participants first reported their feelings. In the days after the election, emotional reactions to events unrelated to the election (such as an argument with a friend) may have influenced participants’ reports of their experienced mood but such events might have been unlikely to come to mind later when they tried to remember their mood.

Finally, participants appraised the outcome of the 2012 presidential election as less important over time. The decrease in appraised importance was small, however, as was the effect size for the association between recalled emotion and current appraised importance. Initial, but not current, importance predicted remembered mood. In future research, it would be useful to examine memory for emotional responses to events associated with more pronounced changes in appraisals. These might include events that elicit relatively strong attempts to cope and reappraise events, such as serious illnesses (e.g., Carver et al., 1996). It would also be useful for future investigations to further explore the specific types of appraisals people draw on when reconstructing their past feel-

ings, how these appraisals change over time, and the conditions under which initial and current appraisals are accessible in memory.

### Conclusions

In conclusion, this research is the first to demonstrate that the manner in which memory diverges from experience depends on whether people are remembering feelings about an event or feelings in general. Our findings show that people remember past emotion more accurately than mood. Moreover, they underestimate the intensity of past emotion but overestimate the intensity of past mood. These biases have important implications for decision-making because remembered feelings help people prepare for the future and make decisions about whether to repeat or avoid experiences (Wirtz et al., 2003). Underestimating the intensity of their emotional responses to past events leaves people unprepared and ill-equipped to cope with future events that evoke powerful feelings and behavioral impulses (Lench, Safer, & Levine, 2011; Loewenstein, 1996). Overestimating changes in mood can also be problematic for decision making (Wilson & Gilbert, 2005). Exaggerating how much positive events buoyed overall mood can lead to poor decisions and disappointment as people strive to repeat those experiences only to find the outcome less enthralling than they remembered. Exaggerating the effect that negative events had on their overall mood can render people risk averse. People may invest more effort and resources than is optimal in attaining or avoiding future outcomes because they falsely believe those outcomes had a large impact on their overall mood and wellbeing in the past. Memory for past moods also informs people’s self-concepts concerning whether they are a cheerful or unhappy person (Levine & Safer, 2002). Bias limits the accuracy of clinical assessments which rely heavily on people’s memories of their past mood states (Safer & Keuler, 2002). In future research, it will be important to distinguish between emotion and mood and to examine situations in which people remember these different types of feelings in their everyday lives.

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