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Why Don't We Learn to Accurately Forecast Feelings? How Misremembering Our Predictions Blinds Us to Past Forecasting Errors

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Why do affective forecasting errors persist in the face of repeated disconfirming evidence? Five studies demonstrate that people misremember their forecasts as consistent with their experience and thus fail to perceive the extent of their forecasting error. As a result, people do not learn from past forecasting errors and fail to adjust subsequent forecasts. In the context of a Super Bowl loss (Study 1), a presidential election (Studies 2 and 3), an important purchase (Study 4), and the consumption of candies (Study 5), individuals mispredicted their affective reactions to these experiences and subsequently misremembered their predictions as more accurate than they actually had been. The findings indicate that this recall error results from people's tendency to anchor on their current affective state when trying to recall their affective forecasts. Further, those who showed larger recall errors were less likely to learn to adjust their subsequent forecasts and reminding people of their actual forecasts enhanced learning. These results suggest that a failure to accurately recall one's past predictions contributes to the perpetuation of forecasting errors.

Keywords: learning, memory, biased recall, affective forecasting

People often try to anticipate the affective consequences of their decisions. For example, junior faculty may spend long nights in the office because they anticipate lifelong misery if they fail to achieve tenure. Similarly, diners may select a less appealing restaurant for today's meal because they anticipate that it will make tomorrow's fancy dinner even more enjoyable.

Despite people's extensive experience with these types of forecasts, a growing body of research has documented that people make systematic errors when predicting the affective consequences of their experiences. For example, people tend to overestimate the lasting impact of future events on their feelings, a phenomenon known as the "impact bias" (Wilson & Gilbert, 2005). Untenured faculty incorrectly assume that being denied tenure will lead to lasting emotional distress (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998), and college football fans mistakenly predict that the performance of their favorite team will still affect their happiness several days after the game (Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). The impact bias is partly the consequence of people's tendency to focus too much on the event in question while ignoring the affective consequences of other future events, a tendency known as *focalism* (Wilson et al., 2000). For negative outcomes, the impact bias can also result from *immune neglect*, people's tendency to underappreciate their ability to recover from adverse circumstances (Gilbert et al., 1998).

Prior research has documented numerous other systematic errors that people make when predicting their future feelings. For example, people overestimate the extent to which their enjoyment of a current experience will be contrasted against a preceding experience (Novemsky & Ratner, 2003) and underestimate the extent to which they will adapt to repeated samplings of the same product (Kahneman & Snell, 1992). People also fail to appreciate how much happier they will be if they make a decision that is irreversible (Gilbert & Ebert, 2002), overestimate the impact of close counterfactuals on experienced regret (Gilbert, Morewedge, Risen, & Wilson, 2004), and do not realize that they will derive more pleasure from experiences than from material possessions (Van Boven & Gilovich, 2003).

The tendency to make affective forecasting errors persists despite abundant opportunities for people to learn from their previous forecasting errors in similar situations. Why do people fail to learn that their past forecasts were erroneous? One reason suggested by previous research is that people recall a past experience as more consistent with their original prediction than it had actually been. For example, vacationers who overestimated the enjoyment they would derive from a bicycle trip later reported that their enjoyment during the trip was consistent with the high levels of enjoyment that they had anticipated (Mitchell, Thompson, Peterson, & Cronk, 1997). Likewise, although George W. Bush and Al Gore supporters substantially

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overestimated the impact of the 2000 presidential elections on their general happiness, they later remembered their postelection feelings as being consistent with their extreme predictions (Wilson, Meyers, & Gilbert, 2003). Thus people's failure to learn from past misforecasts can be due to their tendency to remember their experience as consistent with their forecast.

However, previous research suggests that even when individuals' recollection of an actual experience is accurate, they sometimes fail to generalize from that experience to a future experience (Novemsky & Ratner, 2003; Wilson, Meyers, & Gilbert, 2001). For example, in one study, participants experienced firsthand that their enjoyment of a target item (a jelly bean) did not vary depending on the (better or worse) flavor they had consumed immediately before it. However, even though they could accurately recall their experience with jelly beans, they anticipated that their enjoyment of other items (i.e., ice cream, songs) would vary depending on what they consumed previously (Novemsky & Ratner, 2003). These results suggest that even when people are able to accurately recall their affective experiences, they often fail to adjust their intuitive theories to reflect those experiences and revert back to their initial intuitive theories when making subsequent forecasts.

In this article, we explore why people might fail to learn from experience, even when the experience itself has not been forgotten. We propose that, aside from a failure to accurately recall their *experience*, people also persist in their forecasting errors because they misremember their initial *forecast*. Specifically, we posit that a bias to recall their affective forecast as consistent with their actual experience obscures people's forecasting error. As a result, they are unlikely to realize the need to update their affective forecasting strategies and continue to rely on those same strategies for subsequent forecasts. For instance, people may overestimate how upset they would be following a loss by their favorite team but later mistakenly remember that they predicted they would feel fine. This failure to accurately recall their forecast would obscure their forecasting error and prevent them from second-guessing their affective forecasting intuitions. Consequently, they would fail to adjust their forecasting strategies and persist in their belief that subsequent events will have lasting affective consequences.

Thus, we propose that if people predict *X* but then experience *Y*, then erroneously remembering that they had predicted *Y* would make them more likely to predict *X* again in the future (see Figure 1). This hypothesis, although counterintuitive at first blush, is consistent with prior research on learning. In particular, studies on both human and animal learning find that learning only occurs when experiences violate expectations (Gluck & Bower, 1988; Rescorla & Wagner, 1972). This implies that people spontaneously compare their prediction with their experience (either explicitly or implicitly) and only learn from this comparison if their recalled prediction deviates from their experience. If, as we propose, people misremember their forecast as consistent with their experience, then they will not experience any discrepancy and will thus fail to revise their original intuitions, which will continue to serve as a basis for subsequent forecasts. Only when people accurately recall their forecast—or when they are reminded of their actual forecast—will they perceive the extent of their forecasting error, leading them to question their intuitions and adjust their subsequent forecasts (see Figure 1). As such, the process we propose represents a new mechanism underlying people's well-documented reluctance to change their prior beliefs (Einhorn & Hogarth, 1978).

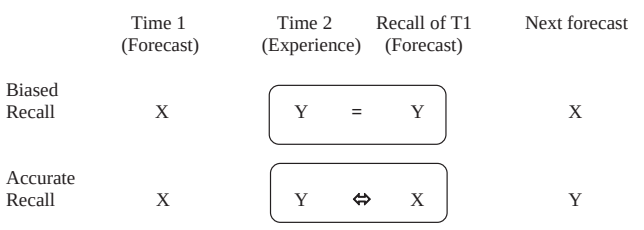


Figure 1. Proposed role of biased versus accurate recall of forecast in learning from experience.

Our conjecture that people use their actual experience as an input to recall their prediction is drawn from research on people's memories for their past attitudes, emotions, and probability estimates. Indeed, in a comprehensive review, Ross (1989) contends that remembering the past as consistent with the present is a pervasive tendency in people's recollection of their personal histories. For example, students whose attitudes changed over the course of a group discussion did not realize that their previous attitudes differed from their current ones, because they distorted their recollection of their prediscussion attitude to match their postdiscussion attitude (Goethals & Reckman, 1973). Like attitudes and behaviors, past emotions also are reconstructed on the basis of present appraisals; for example, people's recollections of their emotions related to the O. J. Simpson trial and H. Ross Perot's withdrawal from and subsequent reentry into the 1992 elections were distorted by their current appraisals of those events (Levine, 1997; Levine, Prohaska, Burgess, Rice, & Laulhere, 2001). Furthermore, research on the hindsight bias (Fischhoff, 1975) documents a similar pattern for recall of factual predictions. In these studies, people first predict an uncertain outcome and then, after the correct answer is revealed, tend to shift their recollection of their original prediction toward the revealed outcome (Hawkins & Hastie, 1990). For instance, people were more likely to remember having predicted that the Gurkha Army would defeat the British Army if they were informed that the Gurkhas actually did win the battle.[1]

Similarly, within the domain of affective forecasting, Wilson et al. (2003, Study 2) observed that participants who felt only slightly unhappy after receiving negative feedback on a test claimed that they would have predicted this limited affective impact (even though forecasters predicted more extreme affective reactions). Although this particular finding was interpreted as the result of participants' denigration of the test after receiving threatening feedback, we suggest that people may be generally biased when recalling their affective forecasts. In particular, we propose that people's memories of their affective forecasts are reconstructed in light of their current affective state and are therefore systematically misremembered as more accurate than they actually were. As a

[1] Whereas the hindsight bias concerns the predicted likelihood of objective events (e.g., the likelihood that the Gurkhas win), the misremembering studied in this article concerns predictions of subjective reactions to those events (e.g., your happiness if the Gurkhas win).

result, people fail to learn that their original intuitions were erroneous.

Overview

We conducted five studies to test our hypothesis that misremembering one's affective forecast obscures the magnitude of the forecasting error and impedes learning. In each study, we examine whether participants recall their affective forecasts as consistent with their affective experience. After establishing the recall bias, we test whether this bias indeed contributes to the persistence of the forecasting error, and whether reminding participants of their initial prediction facilitates learning, as reflected in future affective forecasts that more closely reflect their preceding experience.

The first two studies test the hypothesis that people who overestimate the lasting affective impact of a negative event will misremember their forecasts as less extreme than they actually were. In Study 1, we observe that football fans overestimate how upset they will be a week after a Super Bowl loss by their favorite team and subsequently misremember their affective forecast as less extreme than it actually was (and more consistent with their actual feelings 1 week after the loss). Similarly, in Study 2, we find that voters in a Presidential election overestimate how distraught they will be a week after a loss by their preferred candidate and subsequently misremember their affective forecast as less extreme and more congruent with their actual affective state. In Study 3, we obtain further evidence of the biasing influence of people's current affective state by experimentally manipulating their current mood prior to the recall of an election-related prediction. Finally, Studies 4 and 5 demonstrate that when people misremember their affective forecasts, they are less likely to learn from past experiences and, thus, fail to adjust future affective forecasts. The link between the recall error and the persistence of the forecasting error is supported by our findings that people who make smaller recall errors (Study 4) or who are reminded of their actual forecasts (Study 5) are more likely to adjust their subsequent forecasts in the direction of their past experience.

Study 1: Super Bowl

The goal of this study was to examine a situation in which people overestimate the lasting affective impact of a negative event (i.e., exhibit immune neglect) and test whether they systematically misremember their affective forecast as more similar to their actual experience than it actually was. To test this hypothesis, we asked respondents to predict how they would feel a week after the Super Bowl if their preferred team lost and then followed up with these same respondents after the game, when they had presumably recovered from the loss, to examine their memories of their affective forecasts.[2]

Method

Participants were undergraduate students who were first asked to complete a survey 3 days before the 39th Super Bowl (which pitted the Philadelphia Eagles against the New England Patriots) and then asked to complete a second survey 5 days after the game. Our procedure was designed to follow the procedure commonly used in studies of immune neglect (e.g., Gilbert et al., 1998).

Time 1. Ninety-seven participants completed a survey 3 days before the Super Bowl. They first indicated which team they preferred to win and then estimated, on a 7-point scale, how happy they would be in general five days after the game if their preferred team lost the Super Bowl (1 = *not happy*, 7 = *very happy*). They were also asked how much they cared about the Super Bowl (1 = *couldn't care less*, 2 = *care a little bit*, 3 = *care quite at bit*, 4 = *care a lot*).

Time 2. Five days after the Super Bowl, participants completed a follow-up survey in which they first rated their general happiness (1 = *not happy*, 7 = *very happy*) and then were asked to recall their previous (Time 1) predictions of their general happiness. Below, we report the analyses for the 19 fans of the losing team (the Eagles), who did not indicate that they "couldn't care less" about the game.

Results and Discussion

The results were consistent with our prediction. Eagles fans overestimated their distress due to their team's loss, and a week after the loss, recalled their predictions as less negative than they had actually been (see Figure 2).

Accuracy of Time 1 predictions. Replicating previous immune neglect findings, Eagles fans overestimated the effect of their team's loss on their general happiness 5 days after the game: They were significantly happier than they had predicted, $M_{\text{Predicted}} = 3.95$, $M_{\text{Actual}} = 4.89$, paired $t(18) = 2.96$, $p < .01$.

Accuracy of recall of Time 1 predictions. As expected, the Eagles fans recalled their prediction as less extreme than it had actually been—and more similar to their current happiness. Their recalled prediction ($M_{\text{Recalled}} = 4.47$) was significantly more favorable than their actual prediction, $t(18) = 2.14$, $p < .05$, and did not significantly differ from their current happiness, $t(18) = 1.71$, $p > .10$.

The results suggest that our participants relied on their present affective state when reporting their recalled prediction. To test this conjecture, we regressed each participant's recalled prediction on his or her current happiness, controlling for the person's actual prediction as well as self-reported caring about the game. This analysis suggests that participants' recollections of their predictions were influenced both by their actual predictions, $\beta = 0.73$, $F(1, 18) = 6.50$, $p = .023$, and by their current happiness, $\beta = 0.41$, $F(1, 18) = 3.61$, $p = .078$. Thus, Eagles fans misremembered their prediction as overly consistent with their actual experience, obscuring their forecasting error.

Study 2: The 2008 Presidential Elections

Study 1 provides initial support for the hypothesis that people misremember their affective forecasts in the direction of their actual experience. Study 2 shares the same basic procedure as Study 1 and was designed to achieve three objectives. The first objective was to examine the robustness of this effect by testing

[2] Consistent with prior work on immune neglect, the forecasting errors in this study emerged only among those who experienced a negative event. We therefore restrict our analyses to those participants, as we cannot test for biased recall of the prediction in the direction of the actual state when the predicted state is identical to the actual state.

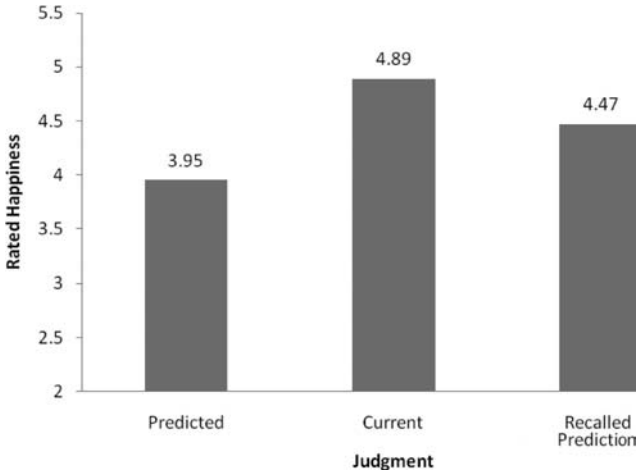


Figure 2. Predicted happiness, current happiness, and recall of predicted happiness following a Super Bowl loss (Study 1).

whether the recall bias extends to a more important event: the loss of a preferred candidate in a Presidential election. Consistent with the results of Study 1, we expected that participants whose preferred candidate lost the election would remember their affective forecast as less extreme than it actually was. The second objective of this study was to address a possible alternative account of the recall bias observed in Study 1. Participants in the first study reported their current happiness before recalling their predictions. It is therefore possible that they adjusted their recalled predictions in the direction of their current happiness out of a desire to appear consistent with their prior response. To examine this possibility, we manipulated the order of the two questions: Some participants rated their current happiness before recalling their prediction (as in Study 1), whereas others first recalled their prediction and only then rated their current happiness. Replicating the recall bias in the latter condition would indicate that the bias does not result from a desire to be consistent with a previous response. Finally, Study 2 also differs from the previous study in the nature of the affective forecast being explored. Rather than asking participants to predict the effect of the outcome on their general happiness (as in Study 1), participants in Study 2 were asked to predict how strongly they would feel about the election outcome itself. This constitutes a more conservative test of the impact bias and recall error by keeping the focus on the elections at both Time 1 and Time 2.

Method

One hundred ninety-four members of a national panel (age range = 19–68 years, median age = 36) completed two online surveys: an initial survey prior to the 2008 U.S. Presidential election and a follow-up survey 1 week after the elections.

Time 1. In the first online survey, administered one week before the 2008 Presidential election, participants first indicated who they would vote for if the election were held that day (John McCain or Barack Obama). They then predicted how happy they would be about the election outcome, 1 week after the election, if Barack Obama were to win and if John McCain were to win (on two separate scales; 1 = *very unhappy*, 9 = *very happy*).

Time 2. One week after the election, the same respondents were asked to complete a follow-up survey. Approximately half the participants first indicated how happy they were about the outcome of the election (1 = *very unhappy*, 9 = *very happy*) and then, on a separate screen, recalled the prediction they had made two weeks earlier. The remaining participants first recalled their prediction and then indicated their current happiness about the outcome of the election. We next report the analyses for the 73 participants whose preferred candidate lost the elections (i.e., the McCain supporters).[3]

Results and Discussion

Despite the changes in the procedure, the results of this experiment replicated those of Study 1 (see Figure 3).

Accuracy of Time 1 predictions. Consistent with previous demonstrations of immune neglect, McCain supporters overestimated their affective reaction to the Obama victory. One week after the election, they were happier (or less unhappy) with the Obama victory than they had predicted, $M_{\text{Predicted}} = 1.89$, $M_{\text{Actual}} = 2.73$, $F(1, 72) = 24.14$, $p < .001$.

Accuracy of recall of Time 1 predictions. Replicating Study 1, the McCain supporters recalled their prediction of how they would feel following an Obama win as less extreme than it actually was, $M_{\text{Recalled}} = 2.44$, $M_{\text{Predicted}} = 1.89$, $F(1, 72) = 14.34$, $p < .001$, and more similar to—although still more negative than—their actual happiness with the election outcome, $M_{\text{Actual}} = 2.73$, $F(1, 72) = 4.49$, $p = .038$. Furthermore, this effect did not depend on the order of the questions ($F < 1$). Participants misremembered their predictions as more moderate (and thus in the direction of their actual happiness), regardless of when their actual happiness was assessed.

To test whether participants relied on their actual happiness when recalling their forecast, we regressed their recalled predictions on their current happiness, while controlling for their actual predictions. Consistent with our hypothesis, participants' recollections were not only influenced by their actual predictions, $\beta = 0.33$, $t(70) = 3.81$, $p < .001$, but also by their current happiness, $\beta = 0.60$, $t(70) = 6.97$, $p < .001$. Furthermore, the influence of current happiness did not depend on whether it was measured before or after the recall of the prediction, $F(1, 67) = 1.22$, *ns*. The insensitivity of the recall bias to the order manipulation shows that people anchor on their current happiness even when it is not made salient by the experimenter.

In sum, participants in Study 2 overestimated the intensity of their affective reaction to the loss of their preferred presidential candidate, yet misremembered their prediction as less extreme and more similar to their actual affective reaction. However, although participants in both Studies 1 and 2 showed a recall bias that was reliably related to their current happiness, these studies do not allow us to infer the causal nature of this relationship. We test this in Study 3.

[3] As in the preceding study, and consistent with immune neglect, we restrict our analyses to those whose preferred candidate lost the election, as those whose candidate won the election (Obama supporters) correctly forecasted their affect, thus making it impossible to test whether their actual experience biased their recalled prediction.

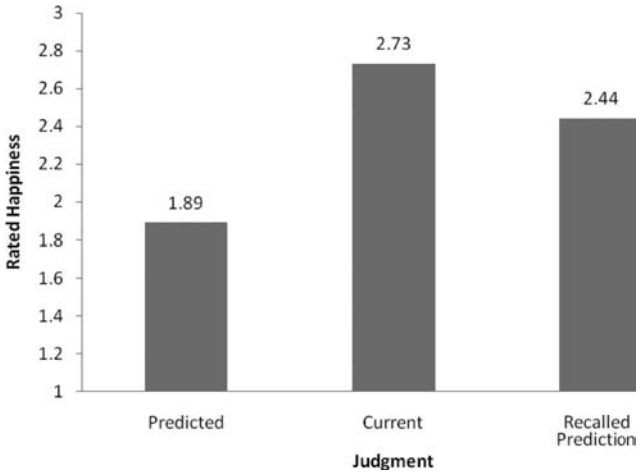


Figure 3. Predicted happiness, current happiness, and recall of predicted happiness with a Presidential election loss (Study 2).

Study 3: Mood Induction

In Study 3, we seek to test directly whether people's memory for their forecasts is influenced by their current feelings by experimentally manipulating these feelings. Moreover, we extend our analysis to a more naturalistic situation in which people do not initially make an explicit affective forecast, and thus are asked to recall an implicit prediction, rather than an explicit one. As such, this study did not test whether a forecasting error occurred but, rather, whether people's current mood affected their recollection of prior (implicit) forecasts. Specifically, in June of 2008, after the Democratic Presidential primaries had ended, we asked participants to recall how they had expected to feel if Barack Obama were to win the nomination. We manipulated participants' mood at the time of recall by varying the background music that played as participants completed the experiment.

Method

Fifty-two undergraduate students participated in the study as part of a course requirement. In June 2008, about 1 week after Hillary Clinton's concession speech following the Democratic primaries, participants were asked to fill out a computer-based "memory survey" while listening to music through headphones. Borrowing from mood manipulations used in prior research (e.g., Tamir, Robinson, & Clore, 2002), we had participants in the positive mood condition listen to Wolfgang Amadeus Mozart's *Eine kleine Nachtmusik*, whereas participants in the negative mood condition listened to the somber *Adagietto* from Gustav Mahler's Fifth Symphony. As such, we did not separately test the effect of positive and negative mood but, rather, examined the effect of differences in mood. While listening to the music, participants first answered a series of filler questions (e.g., "How many movies did you watch last semester?") to ensure that participants had been sufficiently exposed to the music (our mood manipulation) prior to the presentation of the critical questions.

Next, participants answered a series of questions about politics in general (e.g., "How many newspaper articles did you read about politics last semester?") and the primary season in particular (e.g., "In February 2008, who did you want to be the Democratic nominee for the 2008 Presidential elections?"). They were then asked the critical question, the recall of their implicit affective forecast: "We now know that the Democratic nominee will be Barack Obama. In February 2008, how happy did you think you would be, *in general*, in June 2008, if Barack Obama would be the democratic nominee?" They answered this question on a 9-point scale (1 = *not happy*, 9 = *very happy*). Finally, as a mood manipulation check, participants indicated to what extent they were right now feeling happy (1 = *not happy*, 9 = *very happy*), refreshed (1 = *tired*, 9 = *refreshed*), pleased (1 = *displeased*, 9 = *pleased*), and excited (1 = *distressed*, 9 = *excited*).

Results and Discussion

The results indicate that people's recall of their implicit predictions was indeed influenced by the mood manipulation.

Mood-manipulation check. Because the four mood measures were highly correlated (Cronbach's $\alpha = .87$), we combined them into a single measure of current affect by averaging the standardized responses. As expected, participants who listened to the *Adagietto* reported experiencing less positive feelings than did those who listened to *Eine kleine Nachtmusik* ($M = -1.08$ vs. $M = 0.88$), $F(1, 50) = 4.46$, $p = .040$.

Recall of implicit affective forecasts. If people rely on their current mood to reconstruct their affective forecasts, then participants in the negative mood condition should recall more negative affective forecasts than those in the positive mood condition. Indeed, when participants who listened to the somber *Adagietto* were asked how happy they thought they would be after an Obama victory, they remembered less positive forecasts than did participants who listened to the upbeat *Eine kleine Nachtmusik* ($M_{\text{Neg. Mood}} = 5.54$, $M_{\text{Pos. Mood}} = 6.75$), $F(1, 50) = 4.05$, $p = .050$.[4]

In sum, by manipulating people's current mood, we changed their recollection of how happy they thought they would be after an Obama victory, indicating that people use their current happiness to reconstruct past affective forecasts.

Study 4: Failure to Learn

The previous studies demonstrated that people misremember their affective forecasts as overly consistent with their current feelings, which we have argued can obscure the fact that they made a forecasting error. In the next two studies, we experimentally test implications of this recall bias for people's likelihood to learn from past forecasting mistakes and adjust their subsequent forecasts.

[4] We also tested whether the effect of the music on the recalled forecasts was mediated by the mood measure. First, as mentioned before, the music-manipulation reliably affected participants' self-reported mood, $\beta = 0.29$, $F(1, 50) = 4.46$, $p = .040$. Furthermore, participants who were in a more positive mood also recalled more positive affective forecasts, $\beta = 0.40$, $F(1, 50) = 9.26$, $p = .004$. Controlling for the mood rating rendered the effect of the music manipulation on the recalled forecasts nonsignificant, $\beta = 0.17$, $F(1, 49) = 1.68$, *ns*, whereas the effect of the mood rating remained reliable, $\beta = 0.35$, $F(1, 49) = 6.57$, $p = .013$. Finally, a Sobel test indicated that this reduction in the effect of the music manipulation was marginally significant ($z = 1.73$, $p = .083$).

In Study 4, we focus on the affective impact of a major purchase. We asked students at the start of the semester to specify an "important purchase" and to forecast their general happiness at the end of the semester in the event that they did or did not make this purchase. We expected that people would overestimate the impact of the purchase on their happiness and that they would misremember their predictions as less extreme than they actually were. To assess whether people learned about the limited affective impact of specific consumption events, we measured participants' general belief in the impact of purchases on their happiness, both at Time 1 and at Time 2. We expected that participants who showed a greater bias when recalling their prediction would be less likely to revise their belief in the lasting hedonic impact of their purchases. Participants who make a larger recall error (i.e., whose recollections are most biased by their subsequent experiences) are less likely to notice a discrepancy between their recalled forecast and their experience and thus are less likely to adjust their beliefs. In contrast, participants who make smaller recall errors are more likely to notice that their experience violated their expectations and are thus more likely to reevaluate their intuitions about the hedonic impact of purchases (see Figure 1).

Method

Forty undergraduate students completed both the Time 1 predictions and the Time 2 follow-up questions as part of a course requirement.

Time 1. About 1 month into the semester, students were asked to write down a short description of an important purchase they were considering making prior to the end of that semester. Next, they were asked to predict their general happiness at the end of the semester, both if they did make this purchase and if they did not make this purchase. Participants indicated their predictions by putting an *X* on a line anchored by *not happy* and *very happy*. The position of the mark was later measured in millimeters, with higher numbers reflecting greater happiness. Next, we measured people's general belief in the lasting hedonic impact of purchases by asking them to indicate how much "the purchase of an important consumer good or service" would influence their general happiness a week after the purchase (1 = *no effect*, 7 = *large effect*).

Time 2. All respondents were again contacted at the end of the semester (about 2 months after Time 1) and were asked to complete a follow-up survey. They were first reminded of the purchase they had intended to make and then were asked to indicate whether they had actually made the purchase. Next, they were asked to think about their general happiness ("How happy are you in general nowadays?") without reporting it explicitly. Participants were then asked to recall their Time 1 predictions as accurately as possible. Next, participants stated their general belief in the lasting hedonic impact of purchases on the same scale as was used at Time 1 (thus providing us with a measure of learning). Finally, participants indicated their general happiness by marking an *X* on a line anchored by *not happy* and *very happy*.

Results and Discussion

Accuracy of Time 1 predictions. As expected, participants overestimated the effect of the purchase on their general happiness (see Figure 4). Although they predicted at Time 1 that they would be happier at the end of the semester if they made the purchase ($M_{\text{Purchase}} = 7.99$, $M_{\text{No Purchase}} = 4.73$), $F(1, 39) = 60.27$, $p < .001$, participants' self-reported happiness at Time 2 did not depend on whether or not they had done so ($M_{\text{Purchase}} = 6.23$, $M_{\text{No Purchase}} = 6.65$, $F < 1$). More specifically, people who made their intended purchase had overestimated their Time 2 happiness ($M_{\text{Prediction}} = 8.18$, $M_{\text{Actual}} = 6.23$), $F(1, 10) = 15.75$, $p = .003$, whereas those who did not had underestimated their Time 2 happiness ($M_{\text{Prediction}} = 5.32$, $M_{\text{Actual}} = 6.65$), $F(1, 28) = 5.58$, $p = .025$. The absolute magnitude of the forecasting error did not depend on whether participants had made the purchase ($F < 1$). Given that both purchasers and nonpurchasers mispredicted how they would feel, we included both groups to test our hypotheses about biased recall and learning. This gave us the opportunity to test whether the effects observed in the previous studies with negative outcomes extend to positive outcomes as well.

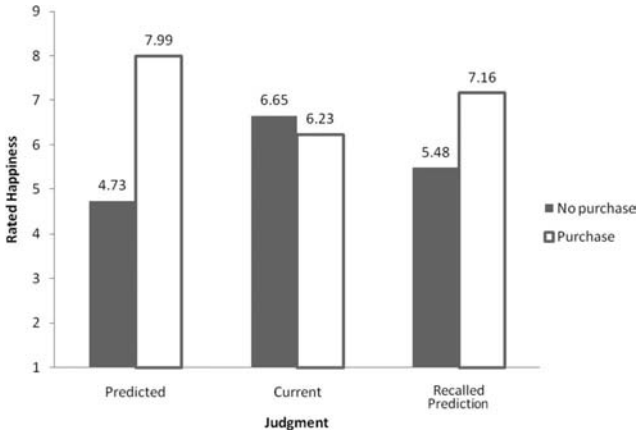


Figure 4. Predicted happiness, current happiness, and recall of predicted happiness after making or not making an important purchase (Study 4).

Accuracy of recall of Time 1 predictions. Participants misremembered their positive prediction (i.e., how happy they would be if they did make the purchase) as less positive than it actually was ($M_{\text{Recalled}} = 7.16$, $M_{\text{Prediction}} = 7.99$), $F(1, 38) = 7.78$, $p = .008$, and similarly misremembered their negative prediction (i.e., how happy they would be if they did not make the purchase) as less negative than it actually was ($M_{\text{Recalled}} = 5.48$, $M_{\text{Prediction}} = 4.73$), $F(1, 38) = 4.26$, $p = .046$. Furthermore, neither recall error depended on whether or not they actually did make the purchase (both Fs < 1); participants misremembered both the positive and the negative prediction as less extreme than it had actually been, regardless of whether this was the prediction that corresponded to their actual outcome.

Next, we examined whether participants' recollection of their affective forecast was influenced by their current happiness. Note that we had collected two predictions for each participant: their prediction of how happy they would be if they made the purchase and their prediction of how happy they would be if they did not make the purchase. Thus, each participant made a prediction for the outcome that they obtained (e.g., purchase) as well as the outcome that they did not obtain (e.g., no purchase).

We conducted a repeated measures analysis in which we regressed participants' recollections of both predictions onto their current happiness and each of the actual predictions. As in our previous studies, participants' recalled predictions were again in-

fluenced by their current happiness, $\beta = 0.31$, $F(1, 36) = 4.00$, $p = .053$. It is interesting to note that the effect of current happiness did not depend on whether they were recalling their forecast for the outcome that they obtained or for the outcome that they did not obtain ($F < 1$). This implies that people anchored on their current happiness regardless of its relevance for the recalled prediction.

Recall errors and learning. Given that participants' experiences did not support the expected effect of the purchase on their general happiness, did they learn to adjust their intuitive theories accordingly? To address this question, we compared participants' Time 1 and Time 2 ratings of their belief in the lasting hedonic impact of purchases. At Time 2, this belief was reliably weaker than at Time 1 ($M_{\text{Time 1}} = 5.50$, $M_{\text{Time 2}} = 5.05$), $F(1, 35) = 5.74$, $p = .022$, indicating that participants did revise their beliefs in the face of a disconfirming experience. However, not all participants revised their beliefs equally. When we regressed the degree of learning (i.e., the reduction in the perceived hedonic impact of purchases at Time 2 vs. Time 1) on people's recall error (i.e., the difference between the actual and recalled affective forecasts), we found that people who made a bigger error when recalling their predictions were less likely to adjust their beliefs, $t(34) = -1.99$, $p = .055$.[5] A median split on the magnitude of the recall error revealed that, whereas participants who made a small recall error revised their beliefs significantly, $D = 0.71$, $t(16) = 2.95$, $p = .009$, those who made a large recall error failed to substantially adjust their belief in the hedonic impact of purchases ($D = 0.27$, $t < 1$, *ns*). These findings indicate that misremembering a prior affective forecast as consistent with one's current happiness may prevent people from learning to revise their intuitions in the face of a disconfirming experience.

At first glance, this might seem to be an odd finding; one might expect that people who misremember their prior prediction as overly moderate would adjust their intuitions in that direction. However, these findings are consistent with past research demonstrating that decision makers question their intuitions only when they become aware that they have produced a clear error (Kahneman & Frederick, 2002) and with previous findings that the magnitude of learning is a direct function of the extent to which an experience deviates from expectations (Gluck & Bower, 1988). Because the recall bias obscures the forecasting error, it will also reduce the likelihood that people revise their intuitions.

Study 5: Reminding People of Their Forecast

Our final study was designed to meet two distinct objectives: examine whether the recall bias generalizes to a different affective forecasting error and test whether reminding people of their previous prediction—and thus negating the effect of the recall bias—facilitates learning (i.e., the adjustment of subsequent forecasts in the direction of the previous experience).

In the preceding studies, we focused on the impact bias, but there are other affective forecasting errors that have been shown to persist despite disconfirming experiences. In the next study, we extend our investigation to another such error: the prediction of hedonic sequence effects. As noted earlier, previous research indicates that people tend to overestimate the extent to which their enjoyment of an experience will be influenced by the nature of the experience that precedes it (Novemsky & Ratner, 2003): a "hedonic sequence effect." Consistent with the results of Studies 1 to 4, we expected that after experiencing a smaller sequence effect than they had anticipated, participants would misremember their prediction of the sequence effect as less extreme than it actually was. Although this basic hypothesis is the same as that tested in the earlier studies, this different paradigm allows for a lab test in which we have full control over the nature of the events that participants experience. Specifically, we asked participants to predict their enjoyment of a given jelly bean flavor in two different flavor sequences and a month later asked them to consume and rate their enjoyment of that jelly bean in each of the two sequences.

The second objective of this study was to test directly our hypothesis that affective forecasting errors persist in part because of a systematic bias in people's recall of their initial prediction—a problem that should be remedied by reminding people of their prediction. Consider, for instance, the finding described earlier that people who failed to experience a large sequence effect with one type of stimulus (jelly beans) continued to expect large sequence effects with other types of stimuli (ice cream and songs; Novemsky & Ratner, 2003). We propose that the persistence of this belief in hedonic sequence effects was partly due to the fact that people did not realize they had made a forecasting error in the initial domain (jelly beans) and therefore did not perceive a need to revise their intuitive theories about hedonic sequence effects. We expect that reminding participants of their initial, extreme forecast will highlight the divergence between their forecast and the experience, make them more likely to notice their error, and evoke a realization that they need to revise their belief in hedonic sequence effects. Thus, reminding people of their extreme original prediction will lead them to produce less extreme subsequent predictions, compared with people who are not reminded of their prediction. In sum, whereas in Study 4 we measured people's recalled forecasts to test the hypothesis that misremembered forecasts inhibit learning, in Study 5, we test the same hypothesis by ensuring accurate recall of the initial prediction using a reminder manipulation.

Method

Design and participants. Within a 1-month period, undergraduate participants ($N = 53$) completed two experimental sessions in exchange for course credit. The study used a two-cell (no reminder vs. reminder of initial prediction) between-participants design.

Time 1. In the first session, participants were asked to select their top-ranked, middle-ranked, and bottom-ranked jelly bean flavor out of a list of eight flavors (e.g., cherry, lemon-lime, licorice). Next, participants were asked how much they would enjoy eating their middle-ranked jellybean (a) after having consumed their favorite jelly bean and (b) after having consumed their least favored jelly bean. All participants first indicated how much they would enjoy the jelly bean after their top-ranked flavor and

[5] Participants who made larger recall errors did not differ in their Time 1 belief in the hedonic impact of purchases ($t < 1$), nor in their current happiness ($t < 1$), but did tend to make larger prediction errors (i.e., a larger difference between predicted happiness and actual happiness), $t(34) = 2.52$, $p = .017$. However, the effect of the recall error on learning still holds when controlling for the prediction error, $t(33) = -2.00$, $p = .054$.

then how much they would enjoy the jelly bean after their bottom-ranked flavor. Ratings were made as pencil marks on unnumbered scales anchored by *not at all* and *very much* (that were later measured in millimeters).

Time 2. In the second session, each participant was given a ranking sheet on which the experimenter had written the three flavors that this participant previously had identified as his or her top-, middle-, and bottom-ranked flavors. Participants were then asked to eat their top-ranked jelly bean followed by their middle-ranked jelly bean and to rate how much they were enjoying the middle-ranked jelly bean on the same unnumbered scale. Next, they ate their bottom-ranked jelly bean followed by their middle-ranked jelly bean and again rated their enjoyment of the middle-ranked jelly bean on the unnumbered scale. This experience allowed participants to see whether their assessments of a single item varied depending on what item preceded it. Participants in the *reminder* condition ($n = 22$) then saw their completed Time 1 survey, which contained their affective forecasts for the middle-ranked flavor in both sequences, as the next sheet in their packet. They were told that this sheet was in the folder to help keep each participant's materials together. Participants were not asked any direct questions about their Time 1 forecasts, but to make sure that they would notice these forecasts, we positioned the sheet with the forecasts as the top sheet that each participant saw before turning to the new materials. Participants in the *no-reminder* condition ($n = 31$) did not see their Time 1 survey before proceeding to complete the remaining questions.

To test whether participants adjusted their beliefs about the extent to which their enjoyment of an item varies depending on what was experienced before it, we next asked all participants to make a similar forecast about the enjoyment of ice cream as they had for jelly beans. All participants selected a top-, middle-, and bottom-ranked flavor out of a set of eight different ice cream flavors (e.g., chocolate, vanilla, pink bubblegum) and predicted on unnumbered scales (anchored by *not at all* and *very much*) how much they would enjoy a spoonful of their middle-ranked ice cream flavor after eating a spoonful of their top-ranked flavor and after eating a spoonful of their bottom-ranked flavor. Finally, participants in the no-reminder condition were asked to recall their Time 1 affective forecasts (i.e., their predicted enjoyment of the middle-ranked jelly bean in each of the two sequences).

Results

Accuracy of Time 1 predictions. For each respondent, the (predicted and actual) sequence effect was calculated as the absolute value of the difference between the ratings of the Flavor 2 jellybean in the two sequences. For example, a person who indicated her expected enjoyment of the Flavor 2 jelly bean to be "80" after her least favorite flavor but only "44" after her favorite flavor would receive a difference score of 36 ($D = 36$), reflecting the prediction of a hedonic contrast effect. Although most participants (60%) predicted such a contrast effect, a sizeable minority (38%) predicted an assimilation effect, whereby they expected to enjoy the middle flavor more following their favorite flavor than following their least favorite flavor.

We first tested our prediction that participants would overestimate the magnitude of the hedonic sequence effect. As expected, participants predicted a much larger sequence effect (either assimilation or contrast) than they actually experienced ($D_{PRED} = 34.5$, $D_{EXP} = 8.9$), $t(51) = 6.63$, $p < .001$. Note that this prediction error occurred for both those who predicted assimilation ($D_{PRED} = 44.8$, $D_{EXP} = 7.2$), $t(19) = 6.29$, $p < .001$, and those who predicted contrast ($D_{PRED} = 29.2$, $D_{EXP} = 9.9$), $t(31) = 3.91$, $p < .001$. Thus, as expected, people overestimated the extent to which their enjoyment of a given experience would be affected by their enjoyment of a preceding experience.

Accuracy of recall of Time 1 predictions. More important for the present investigation, participants recalled their predictions as less extreme than they had actually been, in line with our previous findings.[6] Participants recalled the magnitude of their predicted sequence effect as considerably smaller than it had actually been ($D_{RECALL} = 12.4$, $D_{PRED} = 29.8$), $t(29) = 3.68$, $p < .001$, and not different from their actual experience ($D_{EXP} = 10.3$), $t(29) = 0.65$, *ns* (see Figure 5). Thus, participants' recall error completely obscured the fact that they had made an erroneous affective forecast. The recall error was reliable both for participants who had predicted contrast ($D_{RECALL} = 14.3$, $D_{PRED} = 25.4$), $t(19) = 2.19$, $p = .041$, and for participants who had predicted assimilation ($D_{RECALL} = 8.7$, $D_{PRED} = 41.5$), $t(9) = 3.35$, $p = .009$. To test whether they had relied on their actual experience to reconstruct their previous affective forecast, we regressed their recalled prediction onto their actual experience, controlling for their actual prediction. We found that their actual experience was a reliable predictor of their recalled prediction, $\beta = 0.68$, $t(27) = 4.80$, $p < .001$, whereas their actual prediction was not, $\beta = 0.07$, $t(27) = 0.48$, *ns*.

Subsequent forecasts. Finally, we examined whether reminding people of their original forecasts would change people's intuitions, as reflected in their subsequent predictions. To test this, we first computed a difference measure that compared participants' Time 2 predicted sequence effect for ice cream with their Time 1 predicted sequence effect for jelly beans. On average, participants predicted a smaller sequence effect in their initially predicted direction (i.e., assimilation or contrast) for ice cream than for jelly beans ($D_{PRED_ICE} = 14.3$, $D_{PRED_JB} = 34.5$), $t(51) = 4.98$, $p < .001$, suggesting either that participants revised their beliefs based on their disconfirming experience or that, for some reason, they a priori expected weaker sequence effects for scoops of ice cream than for single jelly beans.

However, our key objective was to test whether reminding people of their initial predictions would lead them to rely more on their actual experience with jelly beans when making their prediction about sequence effects in a new domain (ice cream). Consistent with our hypothesis that biased memories of prior forecasts impede learning, participants who freely recalled their prior prediction showed a smaller reduction in the predicted sequence effect than did participants who were shown their actual forecasts. Participants who freely recalled their prior forecast reduced the magnitude of the predicted sequence effect by only 11.9 points,

[6] The following analysis is based on only the participants in the no-reminder conditions, as we do not have recall data for the participants who had been reminded of their predictions.

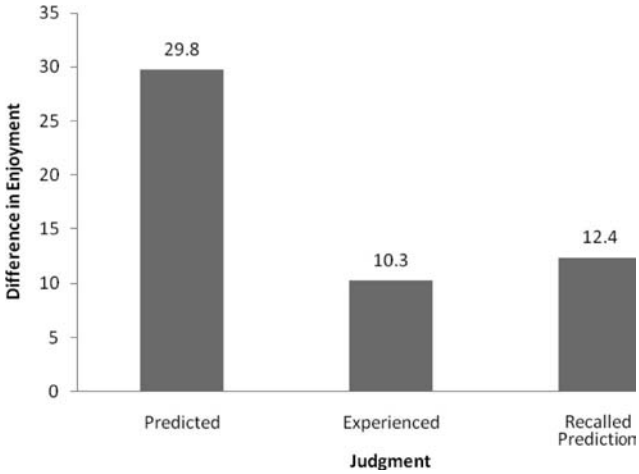


Figure 5. Predicted, experienced, and recall of predicted hedonic sequence effect (Study 5).

whereas those who had been reminded of their forecast reduced it by 31.8 points, $F(1, 50) = 5.39$, $p = .024$.[7]

Discussion

The results of Study 5 demonstrate that the systematic recall error observed in our impact bias studies generalizes to another context in which people systematically mispredict their affective reaction. Participants overestimated the extent to which they would experience a hedonic sequence effect and misremembered their prediction as less pronounced than it had actually been. Indeed, they misremembered their forecast as having been no different than their actual experience. Moreover, their actual experience reliably influenced their recalled prediction, whereas their actual prediction did not.

More important, this study tested a critical implication of our proposed account for the persistence of affective forecasting errors. If the systematic misremembering of one's original prediction contributes to the persistence of affective forecasting errors, then reminding people of their original prediction should highlight the forecasting error, encourage people to second-guess their intuitions, and result in future affective forecasts that more closely reflect their past experiences. Indeed, compared with participants who freely (but erroneously) recalled their jelly bean forecasts, participants who had been reminded of their jelly bean forecasts produced subsequent forecasts that were closer to their actual experience (and thus less similar to the mistaken forecasts).

General Discussion

The results of five studies support our key hypothesis that people's failure to learn from affective forecasting errors is due, at least in part, to their failure to accurately recall their forecasts. In Study 1, football fans overestimated how unhappy they would be if their team lost the Super Bowl and misremembered their prediction as very similar to their (more moderate) actual experience. In Study 2, we observed a similar recall error for affective forecasts about a substantially more important event, an historic Presidential election. John McCain supporters overestimated how distraught they would be a week after the elections in the event of a McCain loss and misremembered their affective forecasts as less extreme and more consistent with their actual affective state after the elections. In Study 3, we provided further evidence for the causal role of current affect by experimentally manipulating current mood and showing that this reliably impacts participants' recalled predictions. In Study 4, we found that recalled affective forecasts regarding a major purchase were biased by current affect, even when the predicted event did not obtain. Finally, Study 5 replicated our basic findings for a different type of affective forecasting error, demonstrating the robustness of the recall bias across affective forecasting contexts.

The results of these studies indicate that people's biased recall of their affective forecasts can obscure the magnitude of their forecasting errors. We have argued that this bias reduces their likelihood of learning from experience—an inference that was tested in the final two studies. As expected, we found that those who exhibited smaller recall errors (Study 4), and those who were reminded of their actual forecasts (Study 5) showed a greater adjustment of their subsequent forecasts in the direction of their actual experience.

There are situations, however, where people's forecasting abilities might improve even when they cannot accurately recall their prior forecasts and are unaware of their forecasting error. For instance, Wilson et al. (2001) observed that people who received negative or positive feedback on a personality test were less affected by this outcome than they had predicted, and those who received negative (but not positive) feedback expected to be less affected by similar test feedback in the future. As Wilson et al. (2001) noted, however, this finding does not necessarily reflect true "learning" among those who received negative feedback. The improved forecasts do not necessarily imply that participants had learned about the general limited affective impact of negative experiences but, rather, that they coped with the threatening personal implications of the test's (negative) results by denigrating its validity, which in turn made them less concerned about negative feedback on similar tests in the future. Our finding that participants in the purchase study (Study 4) did not learn to adjust their beliefs when they recalled their predictions as consistent with their experience indicates that, when people do not realize they made a forecasting error, learning may be limited to personally threatening negative outcomes (e.g., negative test feedback rather than failing to make a purchase), consistent with the conclusion of Wilson et al. However, our results also indicate that, even in the absence of a threat-based reconstrual of outcomes, people can learn to improve their affective forecasts after both positive and negative outcomes when they accurately recall their erroneous forecast and, thus, notice the discrepancy with their experience.

Although our results showed that people's recollection of their forecast was influenced by their experience, there was variation across studies in how this influence compared with the effect of the actual prediction. For example, whereas the effect of the experi-

[7] It could be argued that a reduction in the predicted context effect constitutes learning only if participants in fact experienced a weaker context effect than they had predicted. We therefore repeated the analysis after removing 10 participants who did not meet this criterion, leading to the same conclusion, $F(1, 40) = 5.79$, $p = .021$.

ence overwhelmed the effect of the actual prediction in Study 5, the effect of the experience was smaller than that of the actual prediction in Study 1. We speculate that the relative influence of the actual prediction depends to some extent on the strength of people's intuitive theories. For instance, if people have strong beliefs about the impact of a sports game on their happiness (Study 1), this belief would inform both their initial prediction and the recall of that prediction. In contrast, if people have a weaker belief about hedonic sequence effects (Study 5), this belief may still inform their prediction but not the recall of that prediction, which instead will be based on their actual experience. However, even when the recalled forecast is reliably related to the actual forecast, the biasing influence of the actual experience can still obscure the magnitude of the forecasting error and impede learning, as was observed in the studies reported here.

One issue relevant to the interpretation of the present results is the role of cognitive versus motivational factors underlying the recall error. Could the recall error be driven by a desire for consistency on the part of participants, such as a motivation to view themselves (or present themselves) as capable forecasters? Our findings suggest that the process is more likely to be cognitive than motivational (Einhorn & Hogarth, 1978), given that people's current affective state predicted their recollections of their affective forecasts, even when these recalled forecasts were for outcomes that did not come to pass (Study 4). Furthermore, measuring current happiness after recall (rather than before) did not reduce the recall bias, which would be expected if people were motivated to present themselves as accurate forecasters (Study 2). Similarly, an argument based on a general desire for consistency does not explain the results of the final study, in which people reminded of their initial forecasts deviated more (not less) from those initial forecasts when making subsequent forecasts.

Implications and Future Research

We have argued that people who recall their forecast as consistent with their experience fail to notice their forecasting error and therefore do not feel the need to revise their intuitions. As a consequence, subsequent forecasts, which are based on these unaltered intuitions, continue to be biased. We speculate that under certain conditions, the recall error may actually produce more accurate subsequent forecasts, rather than contribute to the persistence of the forecasting error. In particular, if people use their recalled forecasts as a basis for subsequent forecasts, then misremembering a forecast as consistent with the actual experience should, in fact, improve subsequent forecasts (because the misremembered forecast is more accurate than the actual forecast). This may occur when people have to make a new forecast about an experience that is identical to the one they just had. Repeatedly making predictions for an identical experience, however, is less likely to occur in the real world than making predictions for related but distinct experiences, as studied here.

Our finding that people's memories for their affective forecasts are biased by their current affective state is consistent with earlier findings that people erroneously recall their previous attitudes or behaviors (Goethals & Reckman, 1973), their previous emotional states (e.g., Levine, 1997), and past predictions about the likelihood of events (Fischhoff, 1975). It is important to note that we found that this biased recall reduces the likelihood of people learning from their past forecasting errors. We suspect that the mechanisms that impede learning from past affective forecasting errors also inhibit learning in these other domains as well (e.g., in realizing the extent to which their attitudes have changed). If this is the case, then any strategy that facilitates the accurate recall of one's prior beliefs, feelings, or likelihood judgments should also make it easier to detect changes in those beliefs, feelings, or judgments, and thus facilitate learning about the mechanisms behind those changes.

Conclusion

The present results document one precursor to learning from forecast-disconfirming experiences: People who have made a forecasting error are more likely to adjust their forecasting strategies when they accurately recall their (erroneous) forecasts. Previous research suggests that people will be more likely to learn from experienced outcomes if they keep a tally of how often their predictions were correct. We argue that such a tally is hard to keep, not only because people fail to recall experienced outcomes (Einhorn & Hogarth, 1978) but also because they fail to recall their prior forecasts. Learning from past experiences, therefore, should be facilitated if people are reminded of their earlier forecast (see Study 5) before making their next prediction. Perhaps the initial forecast would be more easily retrieved if individuals reported it multiple times, created an easily accessible record of their forecast, or elaborated more on their forecast (e.g., by explaining the initial forecast to someone else). Any such intervention, which encourages people to contemplate the accuracy of their previous forecasts after the actual experience unfolds, should facilitate learning from disconfirming experiences. Such interventions rarely occur in reality, however, implying that people are likely to continue misforecasting their future feelings despite experiences that should call into the question the validity of their intuitions.

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Call for Nominations

The Publications and Communications (P&C) Board of the American Psychological Association has opened nominations for the editorships of **Journal of Experimental Psychology: Learning, Memory, and Cognition; Professional Psychology: Research and Practice; Psychology and Aging; Psychology, Public Policy, and Law;** and **School Psychology Quarterly** for the years 2013–2018. Randi C. Martin, PhD, Michael C. Roberts, PhD, Ronald Roesch, PhD, and Randy W. Kamphaus, PhD, respectively, are the incumbent editors.

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