Research Article

The Least Likely of Times

How Remembering the Past Biases Forecasts of the Future

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ABSTRACT—*Atypical events are both memorable and unrepresentative of their class. We tested the hypotheses that (a) people tend to recall atypical instances of events, and (b) when they are unaware of this, they rely on these atypical instances in forecasting their affective reactions to future events. In three studies, participants who were asked to recall an instance of an event and participants who were asked to recall an atypical instance of an event recalled equally atypical instances. However, only the former participants made extreme forecasts about their reactions to future events. The results suggest that the* impact bias *(the tendency to overestimate the affective impact of future events) may be due in part to people's reliance on highly available but unrepresentative memories of the past.*

It was the best of times, it was the worst of times.
—Charles Dickens (1859), *A Tale of Two Cities*

A substantial body of research suggests that people tend to overestimate the intensity and duration of their affective reactions to future events (for reviews, see Gilbert, Driver-Linn, & Wilson, 2002; Loewenstein & Schkade, 1999; Wilson & Gilbert, 2003). People expect to feel worse after negative events and better after positive events than they actually end up feeling, and this is true even when the future events are similar to ones they have experienced in the past (Gilbert, Morewedge, Risen, & Wilson, 2004; Rachman & Eyrl, 1989; Wilson, Meyers, & Gilbert, 2001; Wirtz, Kruger, Scollon, & Diener, 2003). Researchers have discovered several causes of this *impact bias*. For example, people tend to underestimate their ability to rationalize failure and misfortune (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998), and they rarely consider the fact that the future event on which they are currently focused is just one of many that will determine their future affective state (Schkade & Kahneman, 1997; Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). In short, people mispredict their affective reactions to future events because they do not realize how and how often they will think about those events once they have happened.

Of course, knowing how and how often one will think about an event once it has happened is useful only if one imagines the event accurately. When people imagine their affective reactions to future events ("How happy would you be if someone threw you a surprise birthday party?"), they naturally rely on their memories of similar events in the past ("The surprise party we threw for Dad last year was just terrific, so I'd be ecstatic if someone threw a surprise party for me"). This strategy may be natural, but it may also be prone to error. Research has shown that atypical and unusual events are often more memorable than their mundane counterparts (Brown & Kulik, 1977; Dutta, Kanungo, & Freibergs, 1972; Fredrickson, 2000; Fredrickson & Kahneman, 1993; Hastie & Kumar, 1979; Ochsner, 2000). If people rely on those memories that come most easily to mind (Tversky & Kahneman, 1973), then they may tend to imagine events in the future by drawing on those events that are least representative of the past (Hamill, Wilson, & Nisbett, 1980). For example, Americans have experienced many terrorist attacks over the past decade, from the bombings of the Oklahoma City federal building and the U.S.S. *Cole* to the bombings of embassies in Kenya and Tanzania. Yet, for most Americans, the phrase "terrorist attack" instantly brings to mind the destruction of New York's World Trade Center on September 11, 2001. Because this was the worst of all terrorist attacks, it is naturally the most memorable, but as the worst of all terrorist attacks, it is also the least representative. The fact is that most terrorist attacks occur on foreign soil, involve military targets, and claim relatively few lives, and thus people who rely on memories of September 11 to predict their affective reaction to "a future terrorist attack" will tend to overestimate the intensity and duration of that reaction. In short, the tendency to remember the best of times and the worst of times—rather than the most typical of times—may be a source of impact bias.

In the following studies, we tested the hypothesis that when people attempt to forecast their affective reactions to a future

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event, (a) they tend to recall atypical instances of similar events, and (b) if they are unaware that these instances are atypical, they rely on them to make affective forecasts. This hypothesis suggests that people should make extreme affective forecasts when they are first asked to recall a single instance of a similar past event. But it also suggests that people should *not* make extreme affective forecasts under two conditions. First, if people are asked to recall many instances of a similar past event, then the single atypical instance that initially comes to mind should be followed by more typical instances, which should reduce the influence of the atypical instance on forecasts (e.g., "Dad's surprise party was great, Grandma's was okay, and Uncle Ernie's was disappointing, so I suppose I'd probably be happy, but maybe not ecstatic"). Second, when people are explicitly asked to recall a single atypical instance of an event, they should be aware that the instance that comes to mind is unrepresentative, which should allow them to adjust their own forecasts (e.g., "The best surprise party ever? That would be the one we threw for Dad, of course, but I wouldn't expect mine to be *that* good"). In other words, if affective forecasts are biased both by the atypicality of the memories that come easily to mind and by people's ignorance of the atypicality of those memories, then increasing the typicality of the memories (by asking people to recall several past instances) or increasing people's awareness of a memory's atypicality (by explicitly asking them to recall an atypical instance) should lead people to make more moderate forecasts.

In Studies 1 and 2, we examined people's memories of and predictions for a negative event (missing a train, in Study 1) and a positive event (watching a football game, in Study 2). In both studies, we asked people to recall and describe either one past instance of the event (*free recallers*), one atypical past instance of the event (*biased recallers*), or three past instances of the event (*varied recallers*). We then asked them to forecast their reactions to a future occurrence of the event. We expected free recallers to recall a relatively atypical instance and hence to make relatively extreme affective forecasts. We expected biased recallers to recall a relatively atypical instance, but because they were aware of having done so, we expected them to make relatively moderate affective forecasts. Finally, we expected varied recallers to recall at least one relatively typical instance, and hence to make relatively moderate affective forecasts.

STUDY 1

Method

Sixty-two passengers (31 male and 31 female; mean age = 22.8 years, SD = 6.5 years) were approached by an experimenter while they waited on a subway platform at the Harvard Square station in Cambridge, MA, and were asked to complete a questionnaire. Participants were asked to "describe an instance in which you missed your train" (free recallers), to "describe the worst instance in which you missed your train" (biased recallers), or to "describe three instances in which you missed your train" (varied recallers). After describing these instances in writing, participants rated how they had felt in these instances by making a mark on a 128-mm continuous line (or three such lines for varied recallers) whose endpoints were labeled *very unhappy* and *very happy*. Finally, participants were asked to use the same scale to indicate how they predicted they would feel "if you missed your train today."

Results

Memory

We expected free recallers and biased recallers to recall equally negative instances. We expected varied recallers to remember a range of instances, at least one of which was more positive than the instance recalled by participants in the other two conditions. We used analysis of variance (ANOVA) to compare the ratings of the instance remembered by each free recaller, the instance remembered by each biased recaller, and the most positive instance remembered by each varied recaller. This analysis revealed differences between conditions, $F(2, 59) = 16.0$, $p < .001$. Planned orthogonal contrasts (weights shown in parentheses) revealed that free recallers (−1) and biased recallers (−1) recalled equally negative instances, and that varied recallers (+2) recalled an instance that was more positive than the instances of the other two groups, $t(59) = 5.64$, $p < .001$, $r = .592$ (see Table 1). In other words, free recallers and biased recallers remembered a negative instance of missing a train, whereas varied recallers remembered at least one positive instance.

Forecasts

Participants' forecasts were compared with ANOVA, which revealed differences between conditions, $F(2, 59) = 3.29$, $p =$

TABLE 1

Memory and Prediction in Studies 1, 2, and 3

Study and condition	Memory	Prediction
Study 1: missing a train		
Free recall	23_a (18)	31_a (23)
Biased recall	20_a (27)	46_b (26)
Varied recall	61_b (31)	49_b (24)
Study 2: watching a football game		
Free recall	109_a (28)	109_a (18)
Biased recall	96_a (23)	85_b (19)
Varied recall	71_b (41)	90_b (28)
Study 3: watching a baseball game		
Free recall	119_a (15)	115_a (14)
Biased recall	121_a (13)	104_b (22)
No recall	—	114_a (19)

Note. Entries indicate the average distance in millimeters between participants' marks and the negative endpoint of a 128-mm scale, and thus higher numbers indicate greater remembered or predicted happiness (Study 1) or goodness (Studies 2 and 3). Standard deviations are in parentheses. The memory ratings reported for the varied-recall condition in Studies 1 and 2 are for the best instance and worst instance recalled, respectively. Within a column and study, means that do not share a subscript differ at $p < .05$ by Fischer's LSD test.

.044. Planned orthogonal contrasts (weights shown in parentheses) revealed that free recallers (−2) made more negative forecasts than did either biased recallers (+1) or varied recallers (+1), $t(59) = 2.53$, $p = .01$, $r = .313$ (see Table 1).

Discussion

People who recalled an instance in which they had missed their train (free recallers) recalled an instance that was just as negative as the instance recalled by people who were explicitly trying to recall the most negative instance (biased recallers). Free recallers expected to feel very unhappy if they missed the next train, but biased recallers did not expect to feel any less happy than did people who had recalled a more positive instance of missing their train (varied recallers).

STUDY 2

Method

Prior to the start of a Harvard football game, 54 Harvard football fans (20 female, 33 male, and 1 not reporting his or her gender; mean age = 30.4 years, $SD = 14.4$ years) were approached by an experimenter before they entered the stadium and were asked to complete a questionnaire. Participants were asked to "describe a football game you've seen when Harvard won" (free recallers), to "describe the best football game you've seen when Harvard won" (biased recallers), or to "describe three football games you've seen when Harvard won" (varied recallers). After describing these instances in writing, participants rated how they had felt in each of these instances by making a mark on a 128-mm continuous line (or three such lines for varied recallers) whose endpoints were labeled *very bad* and *very good*. Finally, participants were asked to use the same scale to indicate how good they predicted the game they were about to watch would be.

Results

Three participants were visibly intoxicated, and 5 failed to complete the questionnaire. These participants were excluded from all analyses, leaving a total of 46 participants.

Memory

We expected free recallers and biased recallers to recall equally positive instances, and varied recallers to recall a range of instances, at least one of which would be more negative than the instance recalled by participants in the other two conditions. We used ANOVA to compare the ratings of the instance remembered by each free recaller, the instance remembered by each biased recaller, and the most negative instance remembered by each varied recaller. This analysis revealed differences between conditions, $F(2, 43) = 5.62$, $p = .007$. Planned orthogonal contrasts (weights shown in parentheses) revealed that free recallers (+1) and biased recallers (+1) recalled equally positive instances, and that varied recallers (−2) recalled an instance that was more negative than the instances of the other two groups, $t(43) = 3.16$, $p = .003$, $r = .434$ (see Table 1). In other words, free recallers and biased recallers remembered a positive instance of a football victory, whereas varied recallers remembered at least one negative instance.

Forecasts

Participants' forecasts were compared with ANOVA, which revealed differences between conditions, $F(2, 46) = 5.09$, $p = .01$. Planned orthogonal contrasts (weights shown in parentheses) revealed that, as expected, free recallers (+2) made more positive forecasts than did biased recallers (−1) or varied recallers (−1), $t(43) = 3.09$, $p = .003$, $r = .426$ (see Table 1).

Discussion

People who recalled an instance in which they had seen their team win a football game (free recallers) recalled an instance that was just as positive as the instance recalled by people who were explicitly trying to recall the most positive instance (biased recallers). Free recallers expected the game they were about to watch to be good, but biased recallers did not expect the game to be any better than did people who had recalled a less positive instance (varied recallers).

STUDY 3

The foregoing studies show that people who are asked to recall an instance of an event tend to recall an atypical instance and then make more extreme forecasts about future events than do people who are explicitly instructed to recall an atypical instance or a variety of instances. These studies left two questions unanswered. First, free recallers in Studies 1 and 2 made extreme forecasts only after being asked to engage in a recall task, and thus we did not know whether people who are not explicitly asked to engage in such a task would make equally extreme forecasts. Therefore, in Study 3, some participants were instructed to recall an instance of an event (*free recallers*), some were instructed to recall an atypical instance of an event (*biased recallers*), and some were given no recall task (*nonrecallers*). We expected that if people spontaneously recall atypical instances and use them as a basis for forecasting, then nonrecallers would make forecasts that were as extreme as those made by free recallers. Second, participants in Studies 1 and 2 made forecasts only after being explicitly asked to rate the instances they had recalled, and thus it is possible that their forecasts were influenced by their previous ratings of the recalled instances rather than by the act of remembering those instances. Thus, in Study 3, we asked participants to make forecasts before they rated the instance they had recalled.

Method

Prior to the start of a Boston Red Sox baseball game, 117 Red Sox fans (52 female, 64 male, and 1 not reporting his or her gender; mean age = 33.0 years, SD = 11.6 years) were approached by an experimenter just before they entered Fenway Park in Boston, MA, and were asked to complete a questionnaire. Some participants were asked to recall and describe in writing "a game you've seen when the Red Sox won" (free recallers), some were asked to recall and describe in writing "the best game you've seen when the Red Sox won" (biased recallers), and some were asked no questions about previous games (nonrecallers). Next, participants were asked to indicate their prediction for how much they would enjoy the game they were about to watch by making a mark on a 128-mm continuous line whose endpoints were labeled *not at all* and *very much*. Next, free recallers and biased recallers were asked to rate on the same 128-mm scale their enjoyment of the game they had recalled and described.

Results

Nine participants who failed to complete the survey and 1 participant whose responses were more than 4 standard deviations from the mean were excluded from the analyses, leaving a total of 107 participants.

Memory

We expected that free recallers would recall an instance that was as positive as the instance recalled by biased recallers, and they did, $t(69) = 0.637$, $p = .526$, $r = .076$ (see Table 1).

Forecasts

We expected free recallers to make more positive forecasts than biased recallers. We also expected nonrecallers to make forecasts that were just as positive as the forecasts made by free recallers. Participants' forecasts were compared with ANOVA, which revealed differences between conditions, $F(2, 104) = 3.60$, $p = .03$. Planned orthogonal contrasts (weights shown in parentheses) revealed that free recallers (+1) and nonrecallers (+1) made more positive forecasts than did biased recallers (−2), $t(104) = 2.68$, $p = .009$, $r = .25$ (see Table 1).

Discussion

People who recalled an instance in which they had seen their team win a baseball game (free recallers) recalled an instance that was just as positive as the instance recalled by people who were explicitly trying to recall the most positive instance (biased recallers), but only free recallers expected to greatly enjoy the game they were about to see. People who were not asked to recall a game (nonrecallers) expected to enjoy the game they were about to see just as much as free recallers did.

META-ANALYSIS

We have suggested that people draw on their memories of past events to forecast their reactions to future events. Therefore, we expected the extremity of the instances that people recalled and described to be correlated with the extremity of their forecasts. Together, the foregoing studies provided a sufficiently large sample to test this prediction for two groups of participants: the free recallers ($n = 72$) and the biased recallers ($n = 73$). We conducted a meta-analysis of the relationship between recall and forecast for free recallers (weighting the effect size and significance level of each study by its sample size, as suggested by Rosenthal, 1984, pp. 85–87). The weighted mean correlation was $r = .32$, $z = 3.22$, $p = .007$: Study 1 unweighted $r(19) = .28$; Study 2 unweighted $r(14) = .21$; Study 3 unweighted $r(33) = .59$. We conducted a similar meta-analysis of the relationship between recall and forecast for biased recallers and obtained a mean correlation of $r = .34$, $z = 2.68$, $p = .004$: Study 1 unweighted $r(19) = .41$; Study 2 unweighted $r(14) = -.01$; Study 3 unweighted $r(34) = .45$. These correlations suggest that both free recallers and biased recallers drew on the instances they had recalled when making their forecasts (though biased recallers adjusted those forecasts more than free recallers did).

GENERAL DISCUSSION

It is not difficult to understand why people make mistakes when trying to forecast their affective reactions to novel events, but researchers have struggled to explain why people often seem to make the same mistakes when forecasting their affective reactions to events they have experienced before. The tendency to recall and rely on atypical instances may help explain this otherwise puzzling phenomenon. If people remember last year's family vacation by recalling its rare moments of satisfaction, then they may make predictions and plans accordingly, only to find themselves once again eating stale sandwiches at an overcrowded campground and wondering how they managed to learn so little from their previous visit.

This tendency may have consequences that are far more serious than a disappointing vacation. In the final months of 2001, the number of commercial airline passengers fell by 18%, presumably because the September 11 attacks were fresh in the minds of travelers, who sought alternative modes of transportation. Because driving a car is more dangerous than flying on a commercial airplane (Sivak & Flannagan, 2003), travelers who used an atypical past event as a basis for predicting their future safety placed themselves at a substantially increased risk of injury and death. Indeed, the increase in automobile traffic occasioned by the September 11 attacks ultimately killed more people than did the attacks themselves (Gigerenzer, 2004). When people rely on atypical instances to make forecasts and decisions, they may be in danger of more than misprediction.

Yet if the tendency to recall and rely on atypical instances is common, it is not inevitable. In our studies, participants who were asked to recall a single instance of an event, or to recall no event at all, made extreme forecasts about the future; but participants who were asked to recall several events or to recall an atypical event did not. This finding may have some paradoxical implications. For example, when a person thinks about "a trip to the dentist," a lone root canal may come to mind more readily than numerous checkups and cleanings, and this may leave the patient feeling so apprehensive about an upcoming appointment that he or she furtively plans to miss it. Family members who are concerned about the person's health may be naturally inclined to do what they can to keep the person from recalling and dwelling on the single most dreadful day he or she ever spent in a dentist's chair, but the present research suggests that they might be wiser to encourage the person to recall and recount that awful day in painful detail. When biased recollection is unavoidable, it may make sense to explicitly promote it, thereby alerting people to the unrepresentativeness of the events they are remembering.

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