

Looking Forward, Looking Back: Anticipation Is More Evocative Than Retrospection

Leaf Van Boven

University of Colorado at Boulder

Laurence Ashworth

Queen's University

The results of 5 experiments indicate that people report more intense emotions during anticipation of, than during retrospection about, emotional events that were positive (Thanksgiving Day), negative (annoying noises, menstruation), routine (menstruation), and hypothetical (all-expenses-paid ski vacation). People's tendency to report more intense emotion during anticipation than during retrospection was associated with a slight, but only occasionally significant, tendency for people to expect future emotions to be more intense than they remembered past emotions having been. The greater evocativeness of anticipation than retrospection was also associated with and statistically mediated by participants' tendency to report mentally simulating future emotional events more extensively than they report mentally stimulating past emotional events. The conclusion that anticipation is more evocative than retrospection has implications for research methodology, clinical practice, decision making, and well-being.

Keywords: affective forecasting, anticipation, emotion, memory, simulation

The bias toward the future applies most clearly to events that are in themselves pleasant or painful. The thought of such events affects us more when they are in the future rather than the past. (Parfit, 1984, p. 160)

Despite the deep desire of many science fiction aficionados, the physical ability to travel in time has eluded reality. Even though one can purchase inexpensive time travel machines on the Internet, the constraints of physical laws make such products persistently disappointing. Mental reality is far less constrained than physical reality, however; people have the ability to, and do routinely, engage in mental "time travel," reliving past events and imagining future events (Johnson & Sherman, 1990; Tulving, 2002). Such mental time travel matters because, among other things, it can influence current cognitions, decisions, and emotions. In this article, we examine the consequences of mental time travel for emotional experiences in the here and now.

Emotions aroused by anticipation of and retrospection about emotional events pervade everyday experience. For example, individuals may use the emotion aroused by anticipation of future events or retrospection about past events as a basis for making decisions (Mellers, Schwartz, Ho, & Ritov, 1997; Schwarz, 2002;

Soman, 2003; Wirtz, Kruger, Scollon, & Diener, 2003). Individuals may measure the quality of their own lives based on the emotions aroused during retrospection about past events (Chang, 2004; Strack, Schwarz, & Gschneidinger, 1985). Anxiety associated with the anticipation of future stressful events, such as public speaking, can be debilitating (Eng, Coles, Heimberg, & Safren, 2005; Hambrick, Turk, Heimberg, Schneier, & Liebowitz, 2003; Leary & Kowalski, 1995). And the emotions aroused by persistent, unpleasant, unwanted retrospection can be diagnosed as depressive rumination (Papageorgiou & Wells, 2005). Given the importance of emotional reactions to anticipation and retrospection, it is important to ask whether people have different emotional reactions when looking forward than they have when looking backward.

We wish to clarify at the outset the distinction between people's predicted and remembered emotions versus their emotional reactions to anticipation and retrospection. As an illustration, vacationers can predict how enjoyable a future beach holiday will be and can then remember how enjoyable that holiday was. Vacationers can also experience positive emotions in the here and now, during the anticipation of a future beach holiday (imagining fine white sand, crystal blue water, and well-tanned sunbathers), and during retrospection about a past holiday (remembering beaches, blues, and bodies).

That anticipation and retrospection can influence current emotions has been well established (if inadvertently) with various methodologies used to manipulate emotional arousal. Researchers have sometimes used retrospection to manipulate emotions by asking people to contemplate an emotional episode from their personal past (e.g., Lerner & Keltner, 2001; Levenson, Carstensen, & Gottman, 1994; Strack et al., 1985). At other times, researchers have used anticipation to manipulate emotions by asking people to imagine future emotional episodes, such as an upcoming stressful task that makes people anxious (e.g., Folkman & Lazarus, 1985; Mauss, Wilhelm, & Gross, 2004).

Leaf Van Boven, Department of Psychology, University of Colorado at Boulder; Laurence Ashworth, School of Business, Queen's University, Kingston, Ontario, Canada.

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Correspondence concerning this article should be addressed to Leaf Van Boven, Department of Psychology, University of Colorado at Boulder, 345 UCB, Boulder, CO 80309-0345. E-mail: vanboven@colorado.edu

Our central question is whether people might experience and report emotional reactions of a different intensity during anticipation of, than during retrospection about, emotional events. We suggest, following Parfit's (1984) observation, that anticipation arouses more intense emotion in the here and now than does retrospection. This hypothesis follows from three potential discrepancies between the way people think about future emotional events and the way they think about past emotional events.

Discrepancies Between Anticipation and Retrospection

Uncertain Futures

One potential discrepancy between anticipation and retrospection is that future events are usually less certain than are past events. The greater uncertainty of future events can produce more intense emotion during anticipation than during retrospection because uncertainty amplifies emotional reactions to the contemplation of emotional events (Wilson, Ceterbar, Krermer, & Gilbert, 2005). Not only can uncertainty be inherently stressful and upsetting (Buhr & Dugas, 2002; Monat, Averill, & Lazarus, 1972; van de Bos, 2001), people are also less able to normalize, or rationalize, uncertain events, making those events more evocative (Wilson et al., 2005).

Because future events tend to be less certain than past events, and because uncertainty amplifies emotion, anticipation of emotional events may be more arousing than retrospection about those events. Because there are more ways that a future beach holiday might happen—more beaches one might visit, more sunsets one might see, more books one might read—than ways it did happen, people might experience more pleasure during anticipation of, than during retrospection about, beach holidays.

Extreme Expectations

Another potential discrepancy between anticipation and retrospection is that people may predict that they will experience more extreme emotional reactions to future events than the emotional reactions they remember experiencing during past events. People tend to expect the best of good events and the worst of bad events (Schkade & Kahneman, 1998; Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000), but they may end up with more moderate memories of what actually transpired. This is partly because emotional events often provoke rationalization processes that make those events seem more mundane in hindsight than in foresight (Wilson & Gilbert, 2003). Indeed, at least two studies suggested that people expect to enjoy future vacations more than they remember enjoying past vacations, although the statistical significance of such comparisons was not reported in the original articles (Mitchell, Thompson, Peterson, & Cronk, 1997; Wirtz et al., 2003).

To the extent that people expect to experience more extreme emotions in the future than they remember having experienced in the past, it follows that people might be more aroused during anticipation than during retrospection (Elster & Loewenstein, 1992; Wirtz et al., 2003). People may expect future beach holidays to be more enjoyable than they remember past holidays having been, and these extreme expectations can make the anticipation of

future holidays more pleasant than the retrospection of past holidays.

Asymmetric Mental Simulation

A final potential discrepancy arises from the natural covariation between temporal perspective, mental simulation, and emotional arousal. A key function of emotion in everyday life is to place people in states of action readiness, directing them to approach or to avoid significant events (Frijda, 1988; Frijda, Kuipers, & ter Schure, 1989; Lazarus, 1991; Neese, 1990). The functionality of action readiness is obviously more relevant to future than to past events and, therefore, may be associated with a more extensive mental simulation of future events than past events. That is, people might think more thoroughly and episodically about future events than about past events because such mental simulation would allow for more informed decisions about approaching or avoiding future events. To the extent that people mentally simulate future events more extensively than they simulate past events, they might experience more intense emotion during anticipation than during retrospection. This is because mental simulation can amplify emotion, possibly because simulation engenders embodied states that mirror the states that people would actually experience in emotional situations (Niedenthal, Barsalou, Winkielman, Krauth-Gruber, & Ric, 2005).

Consistent with the possibility that mental simulation amplifies emotional arousal, people experience more intense emotion when asked to contemplate the detailed *what* of distant emotional events than when asked to contemplate the more abstract *why* of those events (Kross, Ayduk, & Michel, 2005; Strack et al., 1985). Events that people episodically remember experiencing are rated as more emotional than are events that people remember indirectly (Lindsay, Wade, Hunter, & Read, 2004). Asking people to generate mental imagery while listening to descriptions of emotional events arouses more intense emotion than asking people to attend to the verbal meaning of the descriptions (Holmes & Mathews, 2005). Thus, people may mentally simulate future beach holidays more extensively than they simulate past beach holidays. They may imagine future strolls on sandy beaches beneath bright suns more than they imagine past sunny, sandy strolls, and this differential simulation may arouse more pleasant emotions during anticipation than during retrospection.

Overview of the Present Experiments

The primary purpose of the present experiments was to examine whether people might, in fact, report more intense emotional reactions to anticipation of, than to retrospection about, emotional events. Participants in five experiments were asked to contemplate future or past emotional events. We measured participants' self-reported emotional reactions to anticipation and retrospection. We expected participants to report more intense emotion during anticipation than during retrospection.

We also examined the viability of the three discrepancies discussed earlier. First, we sought to control for asymmetric uncertainty by asking people to contemplate well-defined emotional events that are routine (Experiment 2) and unambiguous (Experiments 2, 3, and 5). In each case, there is little difference in the uncertainty of future events and the uncertainty of past events, so

asymmetric uncertainty should be unlikely to produce more intense emotion during anticipation than during retrospection. Second, we tested the viability of extreme expectations by examining whether predicted emotional reactions to future events were more extreme than remembered emotional reactions to past events and whether the difference between predicted and remembered emotional extremity statistically mediated any difference between emotional reactions to anticipation and emotional reactions to retrospection.

Third, we tested the role of asymmetric mental simulation in two ways. One is that we examined whether participants reported more intense emotions during anticipation of, than during retrospection about, purely hypothetical events (Experiment 4). A demonstration that anticipation of hypothetical events is more evocative than retrospection about those events, controlling for any extreme expectations, would imply that there is some difference in the way people imagine future emotional events versus the way they imagine past emotional events. We also examined whether participants reported mentally simulating future events more extensively than they reported mentally stimulating past events and whether this differential mental simulation statistically mediated the difference between reported emotion during anticipation and reported emotion during retrospection (Experiment 5).

Experiment 1: Thanksgiving Day

In an initial study, we asked people to anticipate and then to retrospect about a familiar, naturally occurring emotional event: their annual Thanksgiving holiday. We asked them to report their emotional reactions to the anticipation and retrospection and to predict and remember their enjoyment of the holiday. We hypothesized that people would report more intense emotional reactions to anticipation than retrospection. We also examined whether any difference between the extremities of the participants' predicted emotional experience and their remembered emotional experience would be associated with the difference between the intensity of emotional reactions to anticipation and the intensity of emotional reactions to retrospection.

Method

Participants were 36 university students (15 males, 21 females) who completed two questionnaires distributed via electronic mail in exchange for extra credit in their psychology courses and for a coffee mug emblazoned with the university logo.¹ Participants completed the first questionnaire approximately 2 weeks prior to Thanksgiving Day ($M = 13.83$ days, $SD = 1.23$); they completed the second questionnaire approximately 2 weeks after Thanksgiving Day ($M = 13.36$ days, $SD = 0.64$).

Both before and after their holiday, participants were asked to spend a few minutes contemplating their (future or past) Thanksgiving Day. Participants were then asked (on a 9-point scale; variables for future and past versions of each statement appear in brackets), "When you think about what your Thanksgiving Day [will be/was] like, how happy does it make you?" (1 = *not happy*, 9 = *very happy*). Participants also answered three questions about how much they expected to enjoy, or remembered enjoying, their Thanksgiving Day: "How happy [will/did] this [upcoming/past] Thanksgiving Day make you?" (1 = *not happy*, 9 = *very happy*);

"How much [will/did] you enjoy this [upcoming/past] Thanksgiving Day?" (1 = *not enjoy*, 9 = *enjoy very much*); and "How much fun [will/was] this [upcoming/past] Thanksgiving Day [be?/?]" (1 = *not fun*, 9 = *extremely fun*). After returning the second questionnaire, participants were thanked and debriefed via an electronic mail message.

Results and Discussion

As expected, participants reported that anticipation of their future Thanksgiving Day made them happier ($M = 6.86$, $SD = 1.76$) than retrospection about their past holiday ($M = 6.17$, $SD = 1.86$), $t(35) = 2.91$, $SE = 0.24$, $p = .006$, $d = 0.98$ (see Table 1). After averaging participants' three predicted and remembered enjoyment measures in two composite indices ($\alpha s = .90$ and $.91$, for each index), there was a nonsignificant tendency for participants to expect that they would enjoy their future Thanksgiving more ($M = 6.75$, $SD = 1.47$) than they remembered having enjoyed their past Thanksgiving ($M = 6.45$, $SD = 1.33$), $t(35) = 1.67$, $SE = 0.18$, $p = .105$, $d = 0.56$ (see Table 1).

We conducted a linear regression to examine whether the difference in current reported emotions might be partially explained by the difference between predicted enjoyment and remembered enjoyment. We calculated the difference between participants' current reported happiness during anticipation of Thanksgiving and their current reported happiness during their retrospection about Thanksgiving ($M = 0.69$, $SD = 1.43$) and regressed that difference on the difference between participants' predicted enjoyment and their remembered enjoyment ($M = 0.30$, $SD = 1.08$), which was associated with a significant coefficient ($b = .86$, $\beta = .65$), $t(34) = 5.04$, $SE = 0.17$, $p < .001$. Importantly, the constant was significantly positive ($b = .44$), $t(34) = 2.29$, $SE = 0.19$, $p = .029$, indicating that anticipation was associated with more intense reported happiness than retrospection, when controlling for the extremity of predicted and remembered enjoyment.

These results offer preliminary support for our central prediction that people would report more intense emotional reactions to anticipation of an emotional event than to retrospection about the same emotional event. These results also suggested that there was a nonsignificant tendency for individuals to expect that they would enjoy their future Thanksgiving Day more than they remembered enjoying their past Thanksgiving. The difference between predicted enjoyment and remembered enjoyment was correlated with the difference in reported current happiness. However, the difference between predicted enjoyment and remembered enjoyment did not fully account for the difference between current happiness during anticipation and current happiness during retrospection.

Experiment 2: Menstruation

We next broadened our investigation to the anticipation of and retrospection about routinely experienced and familiar negative

¹ An additional 16 participants completed the anticipation, but not the retrospection, questionnaire. There were no significant differences in predicted enjoyment, $t(50) = 0.38$, $SE = 0.44$, $p = .705$, observed power = $.066$, $d = 0.11$, or in immediate emotions associated with anticipation $t(50) = 0.44$, $SE = 0.53$, $p = .660$, observed power = $.072$, $d = 0.13$, between participants who completed the entire study and those who completed only the anticipation questionnaire.

Table 1
Experiment 1: Participants' Reactions to Anticipation and Retrospection About Thanksgiving Day

Measure	Temporal perspective	
	Anticipation	Retrospection
Reported current happiness	6.86 (1.76)	6.17 (1.86)
Predicted or remembered enjoyment	6.75 (1.47)	6.45 (1.33)

Note. The numbers in the table are means and, in parentheses, standard deviations.

emotions. We asked women to contemplate either their upcoming menstrual period or their most recent menstrual period, to report their emotional reactions to the contemplation, and to predict or remember how unpleasant their menstrual experience would be or was. We assumed that women would expect their menstrual experience to be unpleasant and would remember it as having been unpleasant—more unpleasant, perhaps, than women report while actually experiencing their periods (McFarland, Ross, & DeCourville, 1989). We predicted that women would report more negative emotion during anticipation of their period than during retrospection about it.

Method

Participants were 51 female university students who were not currently experiencing their menstrual period and who participated in the study in exchange for course credit or a chocolate bar. Participants randomly assigned to the anticipation condition ($n = 25$) were asked to “take a few minutes to think about what your next period will be like . . . the physical and emotional symptoms you will experience” and try “really to get a sense of what your period will be like.” Participants in the retrospection condition ($n = 26$) were given nearly identical instructions, except that they were asked to contemplate their last period rather than their next period.

Participants were then asked, “When you think about your period, how does it make you feel right now? That is, how does the act of thinking about your period influence your current mood?” (on a 9-point scale; 1 = *has no effect*, 9 = *substantially worsens current mood*). Participants were also asked to predict or to remember the “overall level of discomfort or unpleasantness that you [expect to experience/remember experiencing] during your [next/last] period” (on a 9-point scale; 1 = *no discomfort*, 9 = *extreme discomfort*). Finally, participants were asked whether their periods were “regular (i.e., you get your period every month)” and whether they were taking any medications, such as birth control pills, that might influence their menstrual cycle. Participants were then thanked and debriefed.

Results and Discussion

We excluded 2 participants from the analyses: one who did not report her current emotion and one who did not report how unpleasant her previous period was (resulting $N = 49$). Most women (80.43%) reported experiencing regular periods. Nearly half (43.48%) reported taking medication (primarily birth control

pills) that influenced their menstrual cycle. Neither the regularity of participants' menstrual cycles nor their use of medication differed by condition.

As expected, women reported that their mood was worse during anticipation of their next period ($M = 4.88$, $SD = 2.44$) than it was during retrospection about their last period ($M = 3.32$, $SD = 2.34$), $t(47) = 2.28$, $SE = 0.68$, $p = .027$, $d = 0.66$ (see Table 2). Participants did not predict that their next period would be significantly more unpleasant ($M = 5.63$, $SD = 2.14$) than they remembered their last period having been ($M = 5.16$, $SD = 1.82$), $t(47) = 0.82$, $SE = 0.58$, $p = .416$, observed power = .127, $d = 0.24$, (see Table 2). A multiple linear regression indicated that women's reports of how much thinking about their period worsened their mood was associated both with the extremity of their predicted or remembered menstrual unpleasantness ($b = .65$, $\beta = .52$), $t(46) = 4.37$, $SE = 0.15$, $p < .001$, $d = 1.29$, and with their temporal perspective (coded 1 and -1 for anticipation and retrospection, respectively; $b = .63$, $\beta = .25$), $t(46) = 2.14$, $SE = 0.29$, $p = .037$, $d = 0.63$.

These results conceptually replicate the central findings of Experiment 1 with an even more routinely experienced and familiar negative emotional event. Women reported more intense emotion during anticipation of, than during retrospection about, their periods, even after the extremity of predicted or remembered unpleasantness was controlled for. These findings cast some doubt on the possibility that differential uncertainty was primarily responsible for the greater evocativeness of anticipation than retrospection. Because women routinely experience their periods, they are unlikely to be substantially less certain about what their future periods will be like compared with what their past periods were like.

Experiment 3: Annoying Noise

The results presented thus far suggest that people report more intense emotion during anticipation of, than during retrospection about, naturally occurring emotional events. We next sought to examine reported emotional reactions to anticipation and retrospection in a laboratory setting that would allow more control over the nature of the emotional event and over the temporal distance between participants and the event. We also wished to measure people's emotional reactions to anticipation of and retrospection about a well-defined hedonic event that was unlikely to be associated with differential uncertainty.

Table 2
Experiment 2: Female Participants' Reactions to Anticipation and Retrospection About Their Menstrual Periods

Measure	Temporal perspective	
	Next period	Last period
Reported worsening of current mood	4.88 (2.44)	3.32 (2.34)
Predicted or remembered discomfort	5.63 (2.14)	5.16 (1.82)

Note. The numbers in the table are means and, in parentheses, standard deviations.

We asked participants to listen to an unambiguously annoying noise: the sound of a dial-up computer modem connecting to an Internet service provider. Participants in the anticipation condition listened to a short sample sound and were told that in exactly 20 min they would listen to the same sound for a longer time period. Participants in the retrospection condition listened to the longer sound before listening, exactly 20 min later, to a reminder: the same shorter sound heard by participants in the anticipation condition. Thus, participants in both conditions listened to a shortened version of an annoying noise that they either would listen to in 20 min or had listened to 20 min ago.

After listening to the sample or reminder sound, depending on condition, we measured participants' emotional reactions with a less direct and more comprehensive measure than was used in previous experiments. Participants in Experiment 3 were simply asked to indicate how much they were experiencing various emotions. We predicted that participants would report more intense emotion following anticipation than retrospection.

Method

Participants were 61 university undergraduates (27 males, 34 females) who participated in exchange for course credit. Participants learned that they would be asked to listen to the sound of a dial-up telephone modem connecting to an Internet service provider. Pretests and personal experience indicated that the screeching, disharmonic sound is indeed rather noxious and would elicit negative emotion.

Participants randomly assigned to the anticipation condition ($n = 32$) were first asked to listen to a 5-s sample of the noise played loudly over external speakers connected to a desktop computer. They were then told that in exactly 20 min they would listen to the same sound, at the same volume, extended to 58 s. Participants in the retrospection condition ($n = 29$) were asked to listen to 58 s of the sound before completing unrelated questionnaires for exactly 20 min. They were then asked to listen to a reminder: the same 5-s sound heard by participants in the anticipation condition.

After listening to the 5-s sound, participants in both conditions were asked to contemplate listening to the full 58-s sound. For participants in the anticipation condition, this longer sound was 20 min in the future. For participants in the retrospection condition, the sound was 20 min in the past.

To measure emotional reactions to anticipation or retrospection, we asked participants to report how much (on a 6-point scale; 1 = *not at all*, 6 = *a great deal*) they were currently experiencing each of 15 emotions: agitated, angry, annoyed, comfortable, delighted, glad, happy, irritated, negative, nervous, positive, sad, uncomfortable, unfortunate, and unhappy. To measure predicted (or remembered) feelings while listening to the 58-s sound, we asked participants to predict (or to remember) how much (on a 6-point scale; 1 = *not at all*, 6 = *a great deal*) they would (or did) experience 4 emotions while listening to the longer noise: comfortable, irritated, negative, and positive. Participants were thanked and debriefed after completing these measures.

Results and Discussion

After we reverse scored the ratings such that higher numbers indicated more negative emotion, we averaged the 15 ratings of

current emotions into a composite measure ($\alpha = .87$). We similarly reverse scored and then averaged participants' four predictions or memories of their emotions while listening to the longer sound ($\alpha = .66$).

As expected, participants reported more intense negative emotion after anticipation ($M = 3.42$, $SD = 0.78$) than after retrospection ($M = 2.66$, $SD = 0.91$), $t(59) = 3.50$, $SE = 0.22$, $p = .001$, $d = 0.91$ (see Table 3). Participants did not expect to feel significantly worse when they listened to the noise in 20 min ($M = 4.45$, $SD = 1.03$) than they remembered feeling when they listened to the noise 20 min ago ($M = 4.17$, $SD = 0.89$), $t(59) = 1.14$, $SE = 0.25$, $p = .261$, observed power = .201, $d = 0.30$ (see Table 3). A multiple linear regression indicated that participants' reported current emotion was correlated both with the extremity of their predicted or remembered emotion ($b = .56$, $\beta = .59$), $t(58) = 6.31$, $SE = 0.09$, $p < .001$, $d = 1.66$, and with their temporal perspective (coded 1 and -1 for anticipation and retrospection, respectively; $b = .30$, $\beta = .33$), $t(58) = 3.54$, $SE = 0.09$, $p = .001$, $d = 0.93$.

These findings conceptually replicated the results of Experiments 1 and 2 in a more controlled laboratory setting with a more indirect and comprehensive measure of current emotional experience. Participants reported experiencing more intense negative emotion during anticipation of, than during retrospection about, a noxious sound, even after the extremity of their predicted or remembered emotion was controlled for. This pattern provided additional evidence suggesting that the extremity of predicted and remembered emotions does not fully explain why people experience more intense emotions during anticipation than during retrospection. These results also cast further doubt on the role of asymmetric uncertainty, given that the short sample or reminder sound made clear to participants exactly what the longer sound would be like.

Experiment 4: Hypothetical Ski Vacation

The evidence accumulated thus far indicates that people report more intense emotion when they anticipate emotional events that are in their future than when they retrospect about emotional events that are in their past. In each of the preceding experiments, however, people's temporal perspective was confounded with an actual temporal relation to emotional events. That is, participants anticipated events that were actually in their future and they retrospect about events that were actually in their past. It is therefore difficult to ascertain whether the greater evocativeness of anticipation, compared with that of retrospection, arose from some

Table 3
Experiment 3: Participants' Reactions to Anticipation and Retrospection About Listening to an Annoying Noise

Measure	Temporal perspective	
	Anticipation	Retrospection
Reported current negative emotion	3.42 (0.78)	2.66 (0.91)
Predicted or remembered emotion	4.45 (1.03)	4.17 (0.89)

Note. The numbers in the table are means and, in parentheses, standard deviations.

mental framing of future or past events or from participants actually being in a state of action readiness during anticipation. In Experiment 4, we wished to disentangle temporal perspective from actual temporal relation by asking people to look forward to or backward on a purely hypothetical event.

The possibility that people mentally simulate future events more extensively than they simulate past events implies that anticipation of a hypothetical future event would produce more emotional arousal than would retrospection about a hypothetical past event. Because temporal perspective and mental simulation naturally covary over time, their association may become overgeneralized, such that merely adopting a future perspective may produce more extensive simulation than adopting a past perspective, and this mental simulation may arouse more intense emotion during anticipation than during retrospection. To test this possibility, we asked participants to report their emotional reactions to contemplating a hypothetical all-expenses-paid ski vacation that was framed in either the future or the past tense. We expected participants to report more intense emotion during anticipation of the vacation than during retrospection about the vacation, even though the vacation was hypothetical in both cases.

Method

Participants were 95 university undergraduates (gender was not recorded) who participated in exchange for course credit. Participants were asked to imagine that they had won a 5-day, all-expenses-paid ski trip to the Whistler–Blackcomb ski resort in British Columbia, Canada.² Participants randomly assigned to the anticipation condition ($n = 45$) were provided with a detailed map of downhill ski trails at the resort and were given the following instructions:

Imagine that you have won a holiday package from a local radio station. Six months from now you will go on an all expenses paid ski vacation at the Whistler–Blackcomb ski resort in British Columbia, Canada. The trip will include a 5-night stay (Tuesday through Saturday) at the Chateau Whistler, five daily lift tickets for 2 (Wednesday through Sunday), half-day private snowboard or skiing instructions for 2, and snowboard or ski rentals (if needed). The hotel room will be a suite in a 5-star hotel and will come with a Jacuzzi tub and a complimentary breakfast each day of your stay. The hotel itself will be virtually “ski to the door,” meaning that the ski chair will be a five minute walk from the hotel’s front door. The hotel will also be minutes from the Whistler nightlife and the other shops and restaurants.

Participants in the retrospection condition ($n = 50$) read a nearly identical scenario, except they were asked to imagine the trip took place 6 months in the past. The second sentence, for instance, began as follows: “Six months ago you went on an all expenses paid ski vacation. . . .” After reading the description, participants were asked to spend 1 min imagining the vacation as though it were actually going to (or did) happen. We conducted the experiment during July and August so that participants in both conditions were asked to imagine a vacation that took place in January or February, when the snow is typically fresh and the powder is fine.

After thinking about the future or past vacation, participants answered three questions that measured how contemplating the trip influenced their current emotions: “When you think about the

trip, how happy does it make you? That is, how happy do you feel right now when you think about this trip?” (1 = *not happy*, 7 = *extremely happy*); “When you think about the trip how would you say it affects your current mood? Does it put you in a better mood, worse mood, or leave you unaffected?” (−3 = *worse mood*, 0 = *no change*, +3 = *better mood*); and “How much would you say you enjoy [anticipating/remembering] the Whistler trip?” (1 = *not at all*, 7 = *a great deal*). Finally, as an assessment of how much participants predicted or remembered enjoying the vacation, they indicated how much they thought they would actually enjoy (or would have enjoyed) the vacation (1 = *not at all*, 7 = *a great deal*). After completing these measures, participants were thanked and debriefed.

Results and Discussion

After we recoded participants’ ratings of their mood change on a scale ranging from 1 to 7, we averaged participants’ three reports of their current emotions in a composite measure ($\alpha = .76$). As expected, participants reported more intense positive emotion during anticipation of the hypothetical future ski vacation ($M = 5.84$, $SD = 0.92$) than during retrospection about the hypothetical past ski vacation ($M = 5.51$, $SD = 0.63$), $t(93) = 2.06$, $SE = 0.16$, $p = .042$, $d = 0.43$ (see Table 4). Participants did not anticipate that they would enjoy the vacation significantly more ($M = 6.16$, $SD = 1.19$) than participants “remembered” enjoying the vacation ($M = 6.00$, $SD = 1.09$), $t(93) = 0.67$, $SE = 0.23$, $p = .507$, observed power = .101, $d = 0.14$ (see Table 4). A multiple linear regression indicated that participants’ reported current emotion was associated with the extremity of their predicted or remembered emotion ($b = .471$, $\beta = .67$), $t(92) = 8.98$, $SE = 0.05$, $p < .001$, $d = 1.87$, and with their temporal perspective (coded 1 and −1 for anticipation and retrospection, respectively ($b = .129$, $\beta = .163$), $t(92) = 2.18$, $SE = 0.16$, $p = .032$, $d = 0.45$).

These results demonstrate that simply adopting a future or past temporal perspective, independent of people’s actual temporal relation to an emotional event, is sufficient to produce more intense emotion during anticipation than during retrospection. These results also replicate people’s tendency to report more intense reported emotion during anticipation than during retrospection, independent of any difference between the extremity of predicted emotion and the extremity of remembered emotions. This finding bolsters our suggestion that the association between how people think about future events and how they think about past events is overgeneralized to emotional events that are only hypothetically in the past or future.

Experiment 5: Imagining Annoying Noises

In our final experiment, we sought to scrutinize more closely the nature of the mental processes that might be associated with the greater evocativeness of anticipation, compared with that of retro-

² Because this experiment was conducted at a university in western British Columbia, Canada, most participants (83%) had previously visited the Whistler–Blackcomb ski resort, although none reported having won an all-expenses-paid Whistler ski vacation. There were no main effects or interactions that were contingent on whether participants had skied at Whistler (largest $F = 0.40$, smallest $p = .531$).

Table 4
Experiment 4: Participants Reactions to Anticipation and Retrospection About a Hypothetical Ski Vacation

Measure	Temporal perspective	
	Anticipation	Retrospection
Reported current positive emotion	5.84 (0.92)	5.51 (0.63)
Predicted or remembered enjoyment	6.16 (1.19)	6.00 (1.09)

Note. The numbers in the table are means and, in parentheses, standard deviations.

spection. In particular, we sought to gather more direct evidence for the role of mental simulation by developing a self-report measure of how extensively people mentally simulate an emotional experience. We expected that participants would report more extensive mental simulation during anticipation than during retrospection and that this differential mental simulation would statistically mediate the greater evocativeness of anticipation, compared with retrospection. A second purpose of this experiment was to address a question begged by the results of Experiment 4; namely, how does the emotion aroused by anticipating a hypothetical future event compare with the emotion aroused by anticipating an actual future event and the emotion aroused by retrospection about an actual past event?

To pursue these two goals, we modified the procedure of Experiment 3. Participants in the anticipation condition listened to a short sample of an annoying noise and were told they would listen to the same noise for a longer duration in 20 min. Participants in the retrospection condition listened to the annoying noise for the longer duration before listening to a short reminder sound exactly 20 min later. Participants in a third condition listened to the short sample of the annoying noise, exactly as in the anticipation condition, but were asked simply to imagine that they would listen to a longer version of the noise in 20 min. It was made clear to these participants that they would not actually listen to the noise.

The possibility that people's different emotional reactions to anticipation and retrospection arises from an overgeneralized association between temporal perspective and mental simulation suggests that participants who simply imagine listening to a noise in the future should report more emotional arousal than those who remember actually listening to the noise in the past. We therefore predicted that participants in both the anticipation and imagination conditions would report more intense emotion than participants in the retrospection condition. We also predicted that participants in both the anticipation and imagination conditions would report mentally simulating the experience of actually listening to the noise more than would participants in the retrospection condition and that the difference in mental simulation would statistically mediate the difference in emotion between conditions.

Method

Participants were 83 university undergraduates (gender was not recorded) who participated in exchange for course credit. Participants were randomly assigned to either the anticipation condition ($n = 27$), the retrospection condition ($n = 29$), or the imagination condition ($n = 27$). The procedure and measures in the anticipation

and retrospection conditions were identical to those of Experiment 3. In the imagination condition, participants listened to the 5-s sample of the annoying sound of a dial-up telephone modem connecting to the Internet. In contrast with the anticipation condition, participants in the imagination condition then read, "You will NOT have to listen to the [58-s] noise, but we would like you to IMAGINE that you were going to listen to the noise in 20 min time."

After listening to the 5-s sample or reminder sound, participants in all three conditions were given exactly 30 s to contemplate listening to the sound for 58 s. Participants completed the same measures of current emotion as in Experiment 3 ($\alpha = .89$). In the anticipation and imagination conditions, participants also made the same predictions as were made in Experiment 3 about what their emotions would be while listening to the noise; participants in the retrospection condition made the same retrospective ratings of what their emotions actually were while listening to the noise ($\alpha = .62$).

To measure the extent to which participants mentally simulated listening to the noise, we asked them to rate their agreement (0 = *disagree*, 6 = *agree*) with seven statements: "When I think about listening to the noise [in 20 min/20 min ago], I imagine what the noise [will be/was] like"; "Right now I can hear the noise in my head"; "It feels as though I am actually listening to the noise right now"; "I am thinking about what my feelings [will be/were] like while listening to the noise"; "I am thinking about how long the noise [will last/lasted]"; "I am thinking of how unpleasant it [will be/was] listening to the noise"; and "I am thinking about the auditory properties of the noise—its tone, volume, and so on." These measures were generated on the basis of debriefing discussions with participants in previous experiments about what it was like to mentally simulate an emotional event. We averaged these measures into a composite measure of mental simulation ($\alpha = .72$). After completing these items, participants in the imagination and retrospection conditions were thanked and debriefed. Participants in the anticipation condition completed unrelated questionnaires for exactly 20 min, at which time they actually listened to the 58-s noise, after which they were thanked and debriefed.³

Results

Current, predicted, and remembered emotion. In a replication and extension of the results of previous experiments, participants reported more intense emotion during anticipation and imagination than during retrospection (see Table 5). We submitted participants' reported emotion to a multiple linear regression with two orthog-

³ To measure participants' reported online emotions while they were listening to the noise, we asked participants in the anticipation and retrospection conditions to rate, while they actually listened to the 58-s noise, how much they felt each of the 15 emotions used to measure their reported emotion during anticipation of and retrospection about the noise ($\alpha = .89$). These ratings did not differ by condition ($M = 4.34$, $SD = 0.99$, and $M = 4.04$, $SD = 0.91$, for the anticipation and retrospection conditions, respectively), $t(54) = 1.21$, $SE = 0.25$, $p = .232$, observed power = .221, $d = 0.33$. Anticipating that they would listen to the annoying noise did not significantly influence participant's reported emotions while they actually listened to the noise, compared with the reported emotions of participants who did not anticipate listening to the noise.

Table 5
Experiment 5: Participants Reactions to Imagination, Anticipation and Retrospection About Listening to an Annoying Noise

Measure	Temporal perspective		
	Anticipation	Imagination	Retrospection
Reported current negative emotion	3.85 (0.73)	3.79 (1.13)	2.89 (0.95)
Reported mental simulation	4.54 (0.94)	4.19 (0.91)	3.55 (0.92)
Predicted or remembered emotion	4.93 (0.68)	4.94 (0.89)	4.46 (0.91)

Note. The numbers in the table are means and, in parentheses, standard deviations.

onally coded contrast variables ($R^2 = .17$), $F(2, 80) = 9.10$, $MSE = 0.90$, $p < .001$. The first contrast indicated that participants in the anticipation and imagination conditions reported significantly more intense negative emotion ($M_s = 3.85$ and 3.79 , and $SD_s = 0.73$ and 1.13 , respectively; weights = 1 each) than participants in the retrospection condition ($M = 2.89$, $SD = 0.95$; weight = -2 ; $b = .311$, $\beta = .43$), $t(80) = 4.26$, $SE = 0.44$, $p < .001$, $d = 0.95$. The second contrast indicated that participants' current emotions in the anticipation and imagination conditions were not significantly different from each other (weights = 1 and -1 , respectively; $b = .03$, $\beta = .03$), $t(80) = 0.27$, $SE = 0.26$, $p = .79$, $d = 0.06$. Thus, simply imagining an emotional event in the future produced reported emotional arousal of an intensity that was comparable with anticipating an actual future event—an arousal that was significantly more intense than the arousal during retrospection about the actually experienced event.

There was also a tendency for participants in the anticipation and imagination conditions to expect to experience more negative emotion than participants in the retrospection condition remembered experiencing (see Table 5). We conducted a multiple linear regression that estimated participants' predicted or remembered feelings from two orthogonally coded contrast variables ($R^2 = .07$), $F(2, 80) = 2.77$, $MSE = 0.70$, $p = .069$. The first contrast indicated that participants in the anticipation and imagination conditions predicted that they would experience significantly more intense negative emotion ($M_s = 4.93$ and 4.94 , and $SD_s = 0.68$ and 0.89 , respectively; weights = 1 each) than participants remembered experiencing ($M = 4.46$, $SD = 0.91$; weight = -2 ; $b = .151$, $\beta = .25$), $t(80) = 2.35$, $SE = 0.34$, $p = .021$, $d = 0.53$. The second contrast indicated that participants' predicted feelings in the anticipation and imagination conditions were not significantly different from each other (weights = 1 and -1 , respectively; $b = -.01$, $\beta = -.01$), $t(80) = 0.08$, $SE = 0.23$, $p = .935$, $d = 0.02$. Thus, participants expected to feel worse while listening to the noise in the future than they recalled feeling in the past, and this difference was statistically significant.

Mental simulation. As expected, participants reported mentally simulating listening to the noise more extensively during anticipation and imagination than during retrospection (see Table 5). We conducted a multiple linear regression estimating participants' reported mental simulation from two orthogonally coded contrast variables ($R^2 = .17$), $F(2, 80) = 8.37$, $MSE = 0.86$, $p <$

$.001$. The first contrast indicated that participants reported mentally simulating listening to the noise significantly more extensively during anticipation and imagination ($M_s = 4.54$ and 4.19 , and $SD_s = 0.94$ and 0.91 , respectively; weights = 1 each) than during retrospection ($M = 3.55$, $SD = 0.92$; weight = -2 ; $b = .27$, $\beta = .39$), $t(80) = 3.85$, $SE = 0.43$, $p < .001$. The second contrast indicated that participants' reported mental simulations in the anticipation and imagination conditions were not significantly different from each other (weights = 1 and -1 , respectively; $b = .18$, $\beta = .14$), $t(80) = 1.40$, $SE = 0.25$, $p = .167$.

Structural analyses. Our theoretical analysis implies a particular correlational structure among the variables measured in this experiment. Specifically, the effect on current emotions of anticipation and imagination versus the effect of retrospection should be statistically mediated by two variables: the extremity of predicted or remembered emotion and the degree of reported mental simulation. We tested both mediation paths simultaneously with a structural equation model.

We included five variables in the structural equation model: (a) a contrast-coded variable indicating whether participants were in the anticipation condition or the imagination condition versus the retrospection condition (coded 1, 1, and -2 , respectively); (b) an orthogonally coded contrast variable indicating whether participants were in the anticipation condition versus the imagination condition (coded 1 and -1 , respectively); (c) the index of participants' reported mental simulation; (d) the index of participants' predicted or remembered emotions; and (e) the index of participants' current emotions. The full model is displayed in Figure 1.

The regression weights and the pattern of significant and non-significant paths in the model support our two mediation predictions. First, consider participants' predicted or remembered emotional intensity. The variable indicating whether participants were in the anticipation condition or the imagination condition rather than the retrospection condition (anticipation and imagination vs. retrospection) was significantly associated with their predicted or

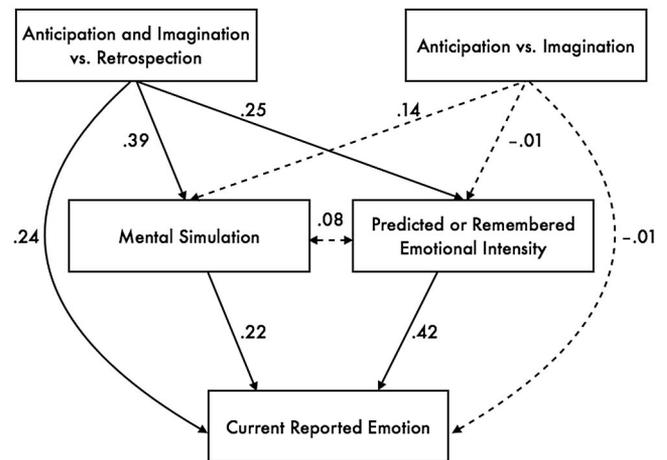


Figure 1. A structural equation model of participants' average reported current emotion during anticipation of, imagination of, or retrospection about listening to an annoying noise (Experiment 5: Imagining annoying noises). Solid arrows represent statistically significant correlations ($p < .05$); dashed arrows represent nonsignificant correlations. Numbers are standardized regression weights.

remembered emotion ($Z = 2.38, p = .017$), which, in turn, was significantly associated with participants' current reported emotion ($Z = 4.81, p < .001$). A Sobel test indicated that this combined path was significant ($Z = 2.14, p = .032$). The extremity of predicted emotion versus that of remembered emotion thus partially mediated—at least in this experiment—the effect of anticipation and imagination on current reported emotion versus that of retrospection on current reported emotion.

Next, consider participants' reported mental simulation. The variable indicating whether participants were in the anticipation condition or the imagination condition rather than the retrospection condition was significantly associated with their reported mental simulation ($Z = 3.90, p < .001$), which, in turn, was significantly associated with participants' current emotion ($Z = 2.36, p = .018$). A Sobel test confirmed that this combined path was significant ($Z = 2.02, p = .043$). The effect of anticipation and imagination versus the effect of retrospection on mental simulation thus partially mediated the effect of temporal perspective on current reported emotion.

Two additional observations of the structural equation model are noteworthy. First, there is no independent correlation between reported mental simulation and predicted or remembered emotion. The influence of temporal perspective on the extremity of predicted or remembered emotion therefore is not mediated by the influence of temporal perspective on mental simulation (or vice versa). Second, there is a significant independent correlation between the anticipation and imagination of emotions and the correlation of retrospection and current emotions ($Z = 2.49, p = .012$). This suggests that the greater evocativeness of anticipation, compared with that of retrospection, is only partly explained by extreme expectations and asymmetric mental simulation, as measured in this experiment.

Discussion

These results yield three important conclusions. First, the imagination of a hypothetical future event produced current emotion of approximately equivalent intensity to the anticipation of an actual future event—emotion that was significantly more intense than that produced by retrospection about an actually experienced event. This result, in conjunction with the results of Experiment 4, highlights the importance of how people think about emotional events as a reason why anticipation arouses more intense emotion than retrospection.

Second, individuals who anticipated or imagined an emotional event expected to experience more intense emotion than participants remembered experiencing, and these extreme expectations partially mediated the effect of temporal perspective on current emotion. The correlation between the extremity of predicted or remembered emotion and the current emotional experience is consistent with the results of the preceding four experiments, although those earlier differences were not significant. Nevertheless, as we discuss shortly, a meta-analysis of the five experiments suggests that extreme expectations may play a slight role in producing more intense emotions during anticipation than during retrospection.

Finally, participants reported more extensive mental simulation during anticipation and imagination than during retrospection, consistent with the possibility of an overgeneralized association

among emotional arousal, mental simulation, and temporal perspective. Moreover, this differential mental simulation partly mediated the more intense emotional reactions to anticipation and imagination versus emotional reactions to retrospection. Taken together, then, the results of Experiment 5 provide evidence for two mediational processes that produce more intense emotions during anticipation than during retrospection: a tendency for people to expect to experience more extreme emotions than they remember having experienced and a tendency for people to mentally simulate future events more extensively than they mentally simulate past events.

General Discussion

The results of five experiments provide consistent evidence that people report more intense emotions when they anticipate emotional events rather than when they retrospect about them. The greater evocativeness of anticipation than that of retrospection emerged in positive events (Thanksgiving holidays, ski vacations), negative events (menstruation, annoying noises), uncommon events (annual Thanksgiving holiday), commonplace events (annoying noises, menstruation), and events of varying temporal distance (from annoying noises that are 20 min away to holidays that are 2 weeks away to ski vacations that are 6 months away). People also reported more intense emotion during anticipation of, than during retrospection about, purely hypothetical events (all-expenses-paid ski vacation). These results suggest that the tendency to report more intense emotions during anticipation than during retrospection is robust and pervasive in everyday life.

Tentative Conclusions

At the outset, we described three discrepancies in people's thoughts about future events versus their thoughts about past events that could produce more intense emotion during anticipation than during retrospection. Although each possibility may influence the evocativeness of anticipation and retrospection in everyday life, not all processes were equally likely in our experiments. Let us take stock of the three propositions, given the cumulative evidence.

One proposition was that people might experience more intense emotion during anticipation than during retrospection because future events are usually more uncertain than past events and because uncertainty arouses emotion. We tentatively reject this possibility on the basis of two observations. First, participants were highly familiar with and routinely experienced their menstrual periods in Experiment 2, so it seems unlikely that they were meaningfully more uncertain about their next menstrual experience than they were about their last menstrual experience. Second, care was taken in Experiments 3 and 5 to ensure that participants knew exactly what the future annoying noise would be like, so it seems unlikely that they were substantially more uncertain about future noises than about past noises.

Another proposition was that people experience more intense emotion during anticipation than during retrospection because they predict that they will experience more intense emotions than they remember having experienced. Although only significant in one of five experiments, predicted emotions were always more extreme than remembered emotions, as reflected by a significant test of

pooled significance ($Z = 2.92, p = .004$). Further, the extremity of predicted or remembered emotion was correlated in every experiment with the reported intensity of current emotions. And the significant difference between predicted and remembered emotion in Experiment 5 partially mediated the difference between reported emotion during anticipation and retrospection. These results lead to the tentative conclusion that extreme expectations may explain a small part of people's more intense reactions to anticipation than to retrospection.

The final proposition was that emotions are more intense during anticipation than during retrospection because of people's overgeneralized tendency to mentally simulate future events more extensively than they simulate past events and because mental simulation tends to amplify current emotions. Consistent with this proposition, simply asking people to contemplate a hypothetical ski vacation as though it were in the future produced more intense emotion than contemplating a hypothetical vacation as though it had occurred in the past (Experiment 4). The emotion aroused by imagining a hypothetical future event was more intense, even, than the emotion aroused by remembering an actually experienced emotional event (Experiment 5). More important, participants reported more extensive mental simulation during anticipation and imagination of an emotional event than during retrospection about an emotional event, and this mental simulation partially mediated the effect of temporal perspective on current emotions. We therefore tentatively conclude that asymmetric mental simulation is at least partly responsible for the greater evocativeness of anticipation, compared with that of retrospection.

Questions and Limitations

One question raised by our experiments concerns participants' self-reported emotion. Did participants report the emotions they actually experienced during anticipation and retrospection or did they report their intuitive beliefs about their emotional reactions to anticipation and retrospection? It is possible that because people have limited introspective access to psychological processes (Nisbett & Wilson, 1977; Wilson, 1985), participants in Experiments 1, 2, and 4 answered our explicit questions about how thinking about an emotional event made them feel on the basis of their beliefs about how thinking about that event should make them feel. It is also possible that participants correctly guessed our hypotheses and that experimental demand led them to report more intense emotion during anticipation than during retrospection. In light of such concerns, future research might seek, in addition to self-report measures, convergent measures of emotional experience during anticipation and retrospection.

Still, three observations should assuage these concerns about the validity of participants' self-reported emotions. First, like other emotion researchers (e.g., Lazarus, 1991; Schachter & Singer, 1962; Smith & Ellsworth, 1985; Zillmann, 1988), we view beliefs about affective experience as integral to emotion—emotions are inherently subjective interpretations, appraisals, or beliefs about affective states. Second, participants in Experiments 3 and 5 were simply asked to report their current emotions rather than asked to report how anticipation or retrospection made them feel, so their responses are unlikely to arise solely from intuitions or experimental demand.

Finally, we conducted a follow-up experiment in which we made extra efforts to separate the emotion measurement and the temporal perspective manipulation in the eyes of participants. The procedure was nearly identical to Experiment 3. Participants (31 males, 21 females; $N = 52$) reported their current emotions after listening to a short sample or reminder of a longer sound they would hear 20 min in the future or had heard 20 min in the past. Unlike Experiment 3, however, the emotion measure was embedded in an ostensibly unrelated background questionnaire that was developed to measure various factors that may or may not influence responses to other questionnaires. Participants were asked to report, on a 5-point scale, how much (1 = *very slightly/not at all*, 5 = *very much*) they currently felt agitated, angry, annoyed, irritated, negative, nervous, uncomfortable, unfortunate, unhappy, and upset ($\alpha = .86$). Replicating our earlier results, we found that, after a natural log transformation was applied to restore normality, participants reported more intense emotion following anticipation ($M = 0.30, SD = 0.31$, back-transformed $M = 1.33$) than following retrospection ($M = 0.14, SD = 0.18$, back-transformed $M = 1.14$), $t(50) = 2.05, SE = 0.07, p = .046, d = 0.58$. And the fraction of participants (42.86%) who, during debriefing, correctly estimated whether or not the emotion measure was related to the annoying noises was not significantly different from the 50% expected if participants were guessing (95% confidence interval = 29.11%, 57.81%).⁴

The results of this follow-up experiment bolster our assumption that participants reported how they actually felt rather than how they believed anticipation or retrospection would make them feel. Reports of one's emotions are simply that—reports of how one feels at the moment. They are not explicitly reports of how thinking about future or past events makes one feel, and they are, therefore, less prone to concerns about biased responses that are due to intuitive theories or experimental demand. And the fact that participants did not identify, above chance levels, the relation between the temporal perspective manipulation and the emotion measure casts doubt on the potential role of experimental demand.

A potential limitation of the present experiments is the scope of our conceptual analyses and stimuli, which are constrained to the kinds of moderate emotional events that people experience in everyday life. It is not clear whether our analyses and findings would generalize to more extreme emotional events, such as winning the lottery, being diagnosed with leukemia, or losing a loved one. Many extreme emotional events are often unexpected, incomprehensible, and personally transformative. Few people expect to experience windfalls, be diagnosed with a deadly disease, or lose a child—and life as a lottery winner, a terminally ill person, or a bereaved person is likely to be unimaginably different from what came before. The difficulty of anticipating such extreme events may render them qualitatively different from the spectrum of emotional events analyzed in this article.

⁴ Participants' indication of whether the emotion measure was related to the annoying noises did not interact with the effect of temporal perspective on current emotion, $F(1, 48) = 0.96, MSE = 0.19, p = .33$, observed power = .160.

Implications

The fact that current emotions are more intense during anticipation than during retrospection has at least four implications for psychological science and practice. One is methodological. As noted earlier, researchers sometimes manipulate emotional states by asking people to retrospect about emotional events and sometimes manipulate emotions by asking people to anticipate emotional events. The results of our experiments imply that manipulating emotion through anticipation may be the more effective method.

A second implication is clinical. Individuals often suffer from debilitating anticipatory anxiety about future stressful experiences (Hinrichsen & Clark, 2003; McCroskey, 1970; Vassilopoulos, 2004). Our results suggest that encouraging individuals to reframe their future emotional experience in the past tense—looking back on the future experience—might alleviate such anxiety.

A third implication concerns the valuation of future and past experiences. People often use the emotions aroused by anticipating future experiences as a basis for valuing those experiences (Hsee & Rottenstreich, 2004; Slovic, Finucane, Peters, & MacGregor, 2002). For instance, people might deem a potential beach holiday that arouses greater pleasure during anticipation as more valuable than a holiday that arouses less pleasure during anticipation. People might also use the emotions aroused by retrospection about past experiences as basis for valuing those experiences, as when they deem a holiday that produces greater pleasure during retrospection as more valuable than a holiday that produces less pleasure during retrospection. Combined with the present findings, such valuation by feelings (Hsee & Rottenstreich, 2004) suggests that people might systematically value future outcomes more than they value past outcomes. The same beach holiday may be more valuable in foresight than in hindsight.

A final implication concerns subjective well-being. Several researchers have suggested that the enjoyment people glean from retrospection is an important component of life satisfaction (Argyle, 2002; Chang, 2004; Diener, Suh, Lucas, & Smith, 1999; Van Boven & Gilovich, 2003). Our research suggests that the enjoyment people glean from anticipation might also be an important component of life satisfaction: one's satisfaction with life is influenced both by looking backward and by looking forward.

Conclusion

The importance of temporal distance has reappeared and is in vogue among psychological scientists, owing largely to research highlighting the importance of temporal distance for construal (Trope & Liberman, 2003) and intertemporal choice (e.g., Loewenstein, 1996; Metcalfe & Mischel, 1999). The present experiments indicate that when it comes to emotion, people are sensitive not only to temporal distance but also to temporal perspective. The psychological distance between the self and a future emotional event is almost always decreasing, whereas the psychological distance between the self and a past emotional event is almost always increasing. People's cognitions and emotions therefore critically depend on both the distance between and the direction from the self and emotional events in psychological space. Emotional experience, in other words, depends not only on whether an emotional event is near or far but also on whether one is looking forward or looking back.

References

- Argyle, M. (2002). *The psychology of happiness* (2nd ed.). New York: Routledge.
- Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: Psychometric properties of the English version. *Behaviour Research and Therapy, 40*, 931–946.
- Chang, E. C. (2004). Distinguishing between ruminative and distractive responses in dysphoric college students: Does indication of past depression make a difference? *Personality and Individual Differences, 36*, 845–855.
- Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of process. *Psychological Bulletin, 125*, 276–302.
- Elster, J., & Loewenstein, G. (1992). Utility from memory and anticipation. In J. Elster & G. Loewenstein (Eds.), *Choice over time* (pp. 213–224). New York: Russell Sage Foundation.
- Eng, W., Coles, M. E., Heimberg, R. G., & Safren, S. A. (2005). Domains of life satisfaction in social anxiety disorder: Relation to symptoms and response to cognitive-behavioral therapy. *Journal of Anxiety Disorders, 19*, 143–156.
- Folkman, S., & Lazarus, R. S. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology, 48*, 150–170.
- Frijda, N. H. (1988). The laws of emotion. *American Psychologist, 43*, 349–358.
- Frijda, N. H., Kuipers, P., & ter Schure, E. (1989). Relations among emotion, appraisal, and emotional action readiness. *Journal of Personality and Social Psychology, 57*, 212–228.
- Hambrick, J. P., Turk, C. L., Heimberg, R. G., Schneier, F. R., & Liebowitz, M. R. (2003). The experience of disability and quality of life in social anxiety disorder. *Depression and Anxiety, 18*, 46–50.
- Hinrichsen, H., & Clark, D. M. (2003). Anticipatory processing in social anxiety: Two pilot studies. *Journal of Behavior Therapy and Experimental Psychiatry, 34*, 205–218.
- Holmes, E., & Mathews, A. (2005). Mental imagery and emotion: A special relationship? *Emotion, 5*, 489–497.
- Hsee, C. K., & Rottenstreich, Y. (2004). Music, pandas, and muggers: On the affective psychology of value. *Journal of Experimental Psychology: General, 133*, 23–30.
- Johnson, M. K., & Sherman, S. J. (1990). Constructing and reconstructing the past and the future in the present. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 482–526). New York: Guilford Press.
- Kross, E., Ayduk, O., & Michel, W. (2005). When asking “why” does not hurt. *Psychological Science, 16*, 709–715.
- Lazarus, R. S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Leary, M. R., & Kowalski, R. M. (1995). *Social anxiety*. New York: Guilford Press.
- Lerner, J., & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology, 81*, 146–159.
- Levenson, R. W., Carstensen, L. L., & Gottman, J. M. (1994). The influence of age and gender on affect, physiology, and their interrelations: A study of long-term marriages. *Journal of Personality and Social Psychology, 67*, 56–68.
- Lindsay, D. S., Wade, K. A., Hunter, M., & Read, J. D. (2004). Adults' memories of childhood: Affect, knowing, and remembering. *Memory, 12*, 27–43.
- Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes, 65*, 272–292.
- Mauss, I. B., Wilhelm, F. H., & Gross, J. J. (2004). Is there less to social anxiety than meets the eye? Emotion experience, expression, and bodily responding. *Cognition and Emotion, 18*, 631–662.

- McCroskey, J. C. (1970). Measures of communication-bound anxiety. *Speech Monographs*, *37*, 269–277.
- McFarland, C., Ross, M., & DeCourville, N. (1989). Women's theories of menstruation and biases in recall of menstrual symptoms. *Journal of Personality and Social Psychology*, *57*, 522–531.
- Mellers, B., Schwartz, A., Ho, K., & Ritov, I. (1997). Decision affect theory: Emotional reactions to the outcomes of risky options. *Psychological Science*, *8*, 423–429.
- Metcalf, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review*, *106*, 3–19.
- Mitchell, T. R., Thompson, L., Peterson, E., & Cronk, R. (1997). Temporal adjustments in the evaluation of events: The "rosy view." *Journal of Experimental Social Psychology*, *33*, 421–448.
- Monat, A., Averill, J. R., & Lazarus, R. S. (1972). Anticipatory stress and coping reactions under various conditions of uncertainty. *Journal of Personality and Social Psychology*, *24*, 237–253.
- Neese, R. M. (1990). Evolutionary explanations of emotions. *Human Nature*, *1*, 261–289.
- Niedenthal, P. M., Barsalou, L. W., Winkielman, P., Krauth-Gruber, S., & Ric, F. (2005). Embodiment in attitudes, social perception, and emotion. *Personality and Social Psychology Review*, *9*, 184–211.
- Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, *84*, 231–259.
- Papageorgiou, C., & Wells, A. (2005). *Depressive rumination: Nature, theory and treatment*. Chichester, England: Wiley.
- Parfit, D. (1984). *Reasons and persons*. Oxford, England: Clarendon Press.
- Schachter, S., & Singer, J. E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review*, *69*, 379–399.
- Schkade, D. A., & Kahneman, D. (1998). Does living in California make people happy? A focusing illusion in judgments of life satisfaction. *Psychological Science*, *9*, 340–346.
- Schwarz, N. (2002). Feelings as information: Moods influence judgments and processing strategies. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 534–547). New York: Cambridge University Press.
- Slovic, P., Finucane, M., Peters, E., & MacGregor, D. (2002). The affect heuristic. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 397–420). New York: Cambridge University Press.
- Smith, C., & Ellsworth, P. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, *77*, 548–565.
- Soman, D. (2003). Prospective and retrospective evaluations of experiences: How you evaluate an experience depends on when you evaluate it. *Journal of Behavioral Decision Making*, *16*, 35–52.
- Strack, F., Schwarz, N., & Gschneidinger, E. (1985). Happiness and reminiscing: The role of time perspective, affect, and mode of thinking. *Journal of Personality and Social Psychology*, *49*, 1460–1469.
- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, *110*, 403–421.
- Tulving, E. (2002). Episodic memory: From mind to brain. *Annual Review of Psychology*, *53*, 1–25.
- Van Boven, L., & Gilovich, T. (2003). To do or to have? That is the question. *Journal of Personality and Social Psychology*, *85*, 1193–1202.
- van de Bos, K. (2001). Uncertainty management: The influence of uncertainty salience on reactions to perceived procedural fairness. *Journal of Personality and Social Psychology*, *80*, 931–941.
- Vassilopoulos, S. (2004). Anticipatory processing in social anxiety. *Behavioural and Cognitive Psychotherapy*, *32*, 303–311.
- Wilson, T. D. (1985). Strangers to ourselves: The origins and accuracy of beliefs about one's own mental states. In J. H. Harvey & G. Weary (Eds.), *Attribution: Basic issues and applications* (pp. 9–36). Orlando, FL: Academic Press.
- Wilson, T. D., Ceterbar, D. B., Krummer, D. A., & Gilbert, D. T. (2005). The pleasures of uncertainty: Prolonging positive moods in ways people do not anticipate. *Journal of Personality and Social Psychology*, *88*, 5–21.
- Wilson, T. D., & Gilbert, D. T. (2003). Affective forecasting. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 35, pp. 345–411). San Diego, CA: Academic Press.
- Wilson, T. D., Wheatley, T., Meyers, J. M., Gilbert, D. T., & Axsom, D. (2000). Focalism: A source of the durability bias in affective forecasting. *Journal of Personality and Social Psychology*, *78*, 821–836.
- Wirtz, D., Kruger, J., Scollon, C. N., & Diener, E. (2003). What to do on spring break? The role of predicted, on-line, and remembered experience in future choice. *Psychological Science*, *14*, 520–524.
- Zillmann, D. (1988). Cognitive excitation interdependencies in aggressive behavior. *Aggressive Behavior*, *14*, 51–64.

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