

---

# Downward Counterfactuals and Motivation: The Wake-Up Call and the Pangloss Effect

**Matthew N. McMullen**

*Montana State University–Billings*

**Keith D. Markman**

*Ohio Wesleyan University*

---

*Three studies examined the motivational implications of thinking about how things could have been worse. It was hypothesized that when these downward counterfactuals yield negative affect, through consideration of the possibility of a negative outcome, motivation to change and improve would be increased (the wake-up call). When downward counterfactuals yield positive affect, through diminishing the impact of a potentially negative outcome, motivation to change and improve should be reduced (the Pangloss effect). Results from three studies supported these hypotheses. Studies 1 and 2 showed that a manipulation of the counterfactual made about an investment influenced decisions toward that investment. Study 3 showed that students' academic motivation was influenced by a manipulation of the type of downward counterfactual they made after an exam and that affect mediated the relationship between the counterfactual and motivation.*

---

**T**hinking about what might have been is a common human experience, particularly in response to traumatic and stressful events (Davis, Lehman, Wortman, Silver, & Thompson, 1995). These types of thoughts can have a tremendous impact on how we view and feel about ourselves, with consequences for affect (Gleicher et al., 1990), coping (Taylor & Schneider, 1989), and perceptions of control (Markman, Gavanski, Sherman, & McMullen, 1995; Markman & Weary, 1996), to name a few. Thus, an analysis of the types of counterfactuals people make becomes important for understanding how they influence us.

In particular, Markman, Gavanski, Sherman, and McMullen (1993) distinguished between upward counterfactuals, those that envision a better possibility, and downward counterfactuals, those that envision a worse possibility. In general, previous research has found that downward counterfactual thinking can improve affect

and upward counterfactual thinking can worsen affect (e.g., Markman et al., 1993, 1995; Medvec, Madey, & Gilovich, 1995). This phenomenon has been termed the affective contrast effect (McMullen, 1997; Roese, 1994), in that one's affect is displaced away from the valence of an imagined alternative. For example, Medvec et al. (1995) found that Olympic bronze (third place) medalists who focused on the downward counterfactual alternative of not winning any medal felt better than silver (second place) medalists whose salient counterfactual alternative was upward, that is, winning the gold.

Research has suggested that people will make upward counterfactuals, even if they may normally lead to negative affect, if these counterfactuals can help prepare for the future (Boninger, Gleicher, & Strathman, 1994; Markman et al., 1993; Roese, 1994). For example, Markman et al. (1993) found that in a gambling situation that was to be repeated in the future, people were more likely to make upward counterfactuals. In contrast, when people were in a nonrepeating situation, they made more downward counterfactuals. Roese (1994) confirmed the functional value of these counterfactuals in an anagram-solving task by showing that people showed greater improvement after making upward counterfactuals compared to downward but felt better after making downward counterfactuals compared to upward.

Thus, although upward counterfactual thinking has been credited with multiple and complex consequences,

---

**Authors' Note:** The authors wish to thank Andrea Booth and Tammy Smitman for their help in data collection. Portions of this research were presented at the meeting of the Midwestern Psychological Association, 1998. Please send correspondence concerning this article to Matthew N. McMullen, Department of Psychology, Montana State University–Billings, Billings, MT 59101; e-mail: mcmullen@msu-b.edu.

*PSPB*, Vol. 26 No. 5, May 2000 575-584

© 2000 by the Society for Personality and Social Psychology, Inc.

both preparative and affective, downward counterfactual thinking has been portrayed as merely to provide comfort after one is no longer involved in an ongoing task. We suggest here, however, that downward counterfactual thinking plays an important role in regulating and influencing motivation. This occurs by means of two distinct processes involved in counterfactual thinking: affective contrast and affective assimilation.

#### *AFFECTIVE CONTRAST AND ASSIMILATION*

Although the research cited above concerned itself solely with affective contrast, McMullen (1997) demonstrated both affective contrast and assimilation in counterfactual thinking (see Buunk, Collins, Taylor, VanYperen, & Dakof, 1990, for related findings in the social comparison literature). Participants were asked to construct counterfactuals about events recalled from their own pasts. When they were instructed to evaluate what actually happened in comparison to what could have happened, the well-established affective contrast effect occurred: They felt better following downward counterfactuals and worse following upward counterfactuals. Conversely, when participants reported their moods after vividly imagining what could have happened, affective assimilation appeared: They felt better following upward counterfactuals and worse following downward counterfactuals. An attentional focus explanation best fit the data, indicating that when attention was focused on the counterfactual possibility, affective assimilation occurred but when attention was focused on the factual event, affective contrast occurred.

For example, McMullen (1997) cited the case of people who had tickets for, but due to circumstances did not board, a plane that ultimately crashed. Although these individuals presumably experienced relief that they were not on the plane, their statements exhibited a great deal of fear and anxiety about what could have happened to them. Thus, downward counterfactuals can either provide comfort by indicating that things are not as bad as they could be (affective contrast) or lead to negative affect by focusing on negative possibilities (affective assimilation).

We distinguish between these different affective implications of counterfactual thinking because different affective states have different motivational consequences (for a review, see Taylor, 1991). Schwarz (1990) argued that positive and negative affective states provide different kinds of motivational information. Generally, we feel bad when we are not successful and good when we are successful; thus, according to Schwarz (1990), we have learned that negative affect informs us that something is wrong, that we are not achieving our goals, and that we should not be satisfied with the status quo. Positive affect informs us that all is well and that increased

effort is unnecessary. Because downward counterfactuals may lead to either positive or negative affect and because positive and negative affective states have distinct motivational implications, we hypothesize the following.

#### *AFFECTIVE ASSIMILATION AND MOTIVATION: THE WAKE-UP CALL*

We hypothesize that when a downward counterfactual evokes negative affect through consideration of the real possibility that something worse could have happened, it can serve as a wake-up call to change one's behavior. For example, if one almost gets into a car accident when talking on a cellular phone, the thought that the accident could have occurred, even if it actually did not, may be motivating enough to stop talking while driving. Thus, when experiencing affective assimilation (i.e., negative affect) after a downward counterfactual, the motivational implications are best characterized as "something bad could have happened, so I should change my behavior."

Employing negative affect to change potentially destructive behavior is not an unprecedented notion. Taking offenders to the morgue to view people killed by drunk drivers or juvenile delinquents to prison for an afternoon in the hopes of "scaring them straight" are practices based on these same ideas (e.g., Homant & Osowski, 1982; Lewis, 1983). If one can be made aware of the near reality of negative outcomes, then one may try harder to avoid them. Indeed, negative events do elicit more causal reasoning (Weiner, 1985) and negative affective states result in greater perceived threats in assessments of risk (Johnson & Tversky, 1983). Perceived vulnerability in turn leads to heightened intentions to perform health-relevant behavior, such as breast self-examination (see Miller, Shoda, & Hurley, 1996, for a review).

Furthermore, these cognitive responses to negative affect can lead to changes in behavior and performance. For example, Schwarz, Servay, and Kumpf (1985) found that a fear-arousing movie depicting the negative consequences of smoking resulted in greater intentions to quit and in fact reduced at least short-term actual smoking behavior (see also Maddux & Rogers, 1983; Roberson & Rogers, 1988; Rogers & Mewborn, 1976). Likewise, negative thinking about past events can lead to improved task performance. Specifically, under certain circumstances, people performed better after explaining why they had failed an imagined anagram task (Sherman, Skov, Hervitz, & Stock, 1981), after generating negative thoughts about past personal experiences (Goodhart, 1986), and after a negative focus on how an upcoming social interaction would turn out (Showers, 1992).<sup>1</sup>

Combined with previous views of the preparative function of upward counterfactual thinking (Markman et al., 1993; Roese, 1994), our suggestion that downward counterfactuals play a complementary role in motivation mirrors classic (Atkinson, 1957) and contemporary (Elliot & Harackiewicz, 1996) theories of motivation. These include a distinction between two basic orientations: a desire to achieve (or approach) success and a desire to avoid failure. Whereas the preparative function of upward counterfactual thinking may be thought of as focusing on an approach motivation, we focus here on the use of downward counterfactuals in avoidance motivation.

*AFFECTIVE CONTRAST AND MOTIVATION:  
THE PANGLOSS EFFECT*

We also hypothesize that downward counterfactuals interpreted to ameliorate a potentially negative outcome can reduce motivation to change and improve. These types of counterfactuals provide comfort through affective contrast: "Things really aren't as bad as they could be, so I should be satisfied with where I am." The motto of Dr. Pangloss, a philosopher in Voltaire's (1759/1947) *Candide*, was, "It's the best of all possible worlds." This type of counterfactual comparison implicitly denies that there is any room for improvement. Voltaire used Pangloss to criticize that philosophy for its complacency; after all, if things are as good as they could be, why bother to change or try harder? We suggest that people may use downward counterfactuals in much the same way as Pangloss—to gloss over potential problems and to justify the status quo. We hypothesize that this type of affective contrast results in decreased motivation to change and improve on behavior.

There is evidence that people often take a rosy view of an event after it has taken place (Mitchell, Thompson, Peterson, & Cronk, 1997). In particular, Sanna (1996, 1998) has found that optimists are more likely than defensive pessimists to engage in this type of retrospective cushioning with downward counterfactuals. In turn, these optimists are then less likely to think through future courses of action than their defensive pessimist counterparts (Norem & Cantor, 1986; Sanna, 1996; Showers, 1992). Moreover, in the Johnson and Tversky (1983) studies of risk estimates, a positive mood induced through reading about positive events resulted in decreased perceptions of a variety of risks. Perceptions of invulnerability have been associated with risky behaviors such as not using contraceptives (Burger & Burns, 1988). Thus, the optimism and positive affect brought about by downward counterfactual contrasts may lull people into a false sense of security, resulting in decreased motivation to change or improve in the future.

The studies reported here all used the same straightforward design: a downward assimilation condition, a downward contrast condition, and a control (no counterfactual) condition. We hypothesized that the downward assimilation conditions would yield a desire to change and improve and the downward contrast conditions would yield complacency. Studies 1 and 2 asked participants to make an investment decision after reviewing the investment's past performance. The downward counterfactual was present in the stimulus materials themselves—the investment came close to losing a great deal of money in its past performance.

Assimilation and contrast were manipulated in these first two studies through instructions on how best to analyze the investment's past performance (it was assumed that most students would feel unsure of how to best appraise an investment record). Previous research (McMullen, 1997) demonstrated that attentional focus on the counterfactual versus the factual event determines affective assimilation or contrast, respectively. We used a manipulation based on this notion. Participants were instructed to examine the investment's past performance record and, in the assimilation condition, to seriously consider what could have happened; in the contrast condition, they were instructed to evaluate what actually happened in comparison to what could have happened; and in the control condition, they were instructed to effectively ignore counterfactuals altogether.

STUDY 1

*Method*

*PARTICIPANTS AND DESIGN*

The study participants were 58 introductory psychology students at Montana State University–Billings. They were randomly assigned to one of the three conditions: downward assimilation, downward contrast, or control (no counterfactual).

*PROCEDURE*

Participants were told to imagine that they had \$10,000 in an investment for the past month. They were instructed that if the investment fell to less than 30, they would lose half of their money but if it rose to greater than 60, they would double their money. Between 30 and 60, the investment earns a market rate of interest. After this explanation, they were given several questions of understanding to make sure they knew the rules of this investment (e.g., "Under what conditions will you double your money?"). They were next shown a daily record of the price from the past 30 days, as follows: 40, 43, 43, 38, 39, 41, 43, 45, 44, 46, 45, 46, 48, 46, 48, 45, 43, 41, 36, 32, 37, 39, 41, 45, 44, 47, 46, 47, 45, and 45. The price rose

and fell over the period, several times falling to less than \$40 and once within 2 points of 30 but never coming within 10 points of 60. Thus, there were several prominent downward counterfactuals but no close upward counterfactuals, and in this fashion, the objective closeness of the counterfactual was held constant across the assimilation/contrast/control manipulations.

It was assumed that most college students would not have much experience in evaluating investments; therefore, to manipulate assimilation and contrast, participants were told that their financial advisors recommended one of the three following methods of evaluating investments: (a) assimilation condition: "Never think about what you have but rather always focus on what could have happened," (b) contrast condition: "Always focus on what you have and compare that to what could have happened," and (c) control condition: "Only think about your end result, not about what could have happened during the period." These instructions are based on McMullen's (1997) attentional focus manipulation of affective assimilation and contrast.

Next, they were instructed to give their assessments of what happened in free-response format. The two key dependent measures followed. First, they were asked, "Given this situation, would you stay with your current course or would you pull your money out?" Second, they were instructed, "Now, specify exactly how much money (out of the \$10,000 you have invested now) you would keep in or pull out." They were given two boxes in which to enter amounts and were reminded to make sure they summed to \$10,000.

### Results and Discussion

All participants answered all questions of understanding correctly, indicating that they comprehended the rules of the investment. A chi-square analysis showed that participants' decisions to stay with or get out of the investment differed with respect to condition,  $\chi^2(2) = 13.76, p < .001$ . Specifically, more people (12 of 19) in the assimilation condition said they would get out of the investment compared to the control condition (7 of 22),  $\chi^2(1) = 4.3, p < .05$ . However, those in the contrast condition were less likely to get out of the investment (1 of 18) compared to the control condition,  $\chi^2(1) = 4.0, p < .05$ . These results confirmed the hypothesis that affective assimilation leads to a desire to change one's current course and affective contrast reduces the desire to change.

Further confirming these hypotheses, the counterfactual manipulation significantly influenced the specific amounts of money participants said they would keep in or pull out,  $F(2, 55) = 11.57, p < .0001$ . Specifically, those in the assimilation condition elected to take more

**TABLE 1: Investment Decisions and Affect by Counterfactual Manipulation**

	<i>Assimilation</i>	<i>Control</i>	<i>Contrast</i>
Study 1			
Percentage abandoning investment	63 <sub>a</sub>	32 <sub>b</sub>	6 <sub>c</sub>
Money pulled out	7,395 <sub>a</sub>	4,955 <sub>b</sub>	2,112 <sub>c</sub>
Study 2			
Percentage abandoning investment	87 <sub>a</sub>	60 <sub>a</sub>	27 <sub>b</sub>
Money pulled out	8,400 <sub>a</sub>	5,667 <sub>b</sub>	2,964 <sub>c</sub>
Fearful	3.5 <sub>a</sub>	3.0 <sub>a</sub>	3.0 <sub>a</sub>
Worried	3.7 <sub>a</sub>	3.1 <sub>a, b</sub>	3.0 <sub>b</sub>
Regret	2.9 <sub>a</sub>	1.9 <sub>b</sub>	2.0 <sub>b</sub>
Relief	4.0 <sub>a</sub>	4.0 <sub>a</sub>	3.4 <sub>b</sub>
Fortunate	3.9 <sub>a</sub>	3.7 <sub>a</sub>	3.7 <sub>a</sub>
Satisfaction	2.3 <sub>a</sub>	2.5 <sub>a, b</sub>	3.1 <sub>b</sub>

NOTE: Means with different subscripts across rows are significantly different at  $p < .05$ .

money out relative to the control condition,  $t(39) = 2.3, p < .05$ , and those in the contrast condition elected to keep more money in relative to the control condition,  $t(37) = 2.7, p < .05$  (see Table 1 for means).

Could it be that some participants generated upward counterfactuals, which led to preparative thoughts and thus to the pattern of decisions described above? One possibility is that those in the assimilation condition, who presumably experienced more negative affect regarding the investment, generated more upward counterfactuals because of this negative affect (Sanna, Meier, & Turley-Ames, 1998). Earlier research has demonstrated that these upward counterfactuals are related to preparative thoughts (Roese, 1994). In the current research, however, content coding of participants' written free-responses showed that of the 64% of participants who made codable counterfactuals, 15% in the contrast condition and 0% in the assimilation and control conditions mentioned upward counterfactuals. Thus, upward counterfactuals cannot account for the pattern of decisions demonstrated here.

Although this study supported the predicted pattern of decisions, the underlying mechanism responsible for these effects is still unclear. We have proposed that affect drives these effects such that negative affect is associated with mobilization and positive affect is associated with complacency (Schwarz, 1990; Taylor, 1991). Although the manipulation used in Study 1 was similar to one previously shown to influence affect (McMullen, 1997), no measures of affect were employed. Study 2 was designed to replicate Study 1 while including the additional dependent measures necessary to test the hypothesized role of affect.



## STUDY 2

*Method**PARTICIPANTS AND DESIGN*

Participants were 45 psychology students at Montana State University–Billings and Marywood University. They were randomly assigned to one of the three conditions: downward assimilation, downward contrast, or control (no counterfactual).

*PROCEDURE*

All instructions and stimuli were exactly the same as in Study 1 except that after the presentation of the investment performance record, but before the key dependent measures, scales ranging from 1 (*not at all*) to 3 (*some-what*) to 5 (*very much*) were presented. The scales measured how participants felt about their particular situation. They responded to whether they felt (a) fearful about losing money, (b) relief about not losing money, (c) worried about money, (d) fortunate for what they have, (e) regret about what they did, or (f) satisfied with the outcome.

*Results and Discussion*

The chi-square analysis for the decision to stay in or withdraw from the investment showed significant differences across conditions,  $\chi^2(2) = 11.11, p < .005$ . Participants in the contrast condition were significantly more likely to stay with the investment than those in the control condition,  $\chi^2(1) = 3.40, p < .05$ , and the difference between the assimilation and control conditions approached statistical significance,  $\chi^2(1) = 2.73, p < .10$ . The difference in the actual amount of money participants specified to take out of the investment was significantly higher in the assimilation compared to the control condition,  $t(28) = 2.45, p < .05$ , and marginally lower in the contrast compared to the control condition,  $t(27) = 1.91, p < .07$ . Thus, the overall pattern of results for participants' investment decisions replicated Study 1 (see Table 1 for all relevant means).

Intercorrelations among the affect adjectives were varied, ranging from .05 to .75. In general, the three negative emotions (regret, worry, and fear) were intercorrelated ( $r$ s ranged from .39 to .75) but the three positive emotions (relief, fortunate, and satisfaction) were mixed ( $r$ s ranged from  $-.18$  to .46). Therefore, a factor analysis on the adjectives was performed. Three factors were extracted (with roots greater than 1.0), and after a varimax orthogonal rotation, all the negative adjectives remained on one factor, with relief and fortunate on the second and satisfaction on the third. Further analyses were carried out on these three factors.

The first factor, the negative emotions, showed the expected pattern, with more negative affect in the

assimilation condition compared to the contrast condition,  $F(1, 28) = 4.11, p < .05$ . The second factor, fortunate and relief, showed no significant effects of the counterfactual manipulation,  $F(1, 28) = 1.71, ns$ . The third factor, satisfaction, did show the expected pattern, with greater satisfaction in the contrast relative to the assimilation condition,  $F(1, 28) = 4.04, p < .05$ . All relevant means and pairwise comparisons are presented in Table 1. Surprisingly, relief was lower in the contrast condition compared to the control and assimilation conditions. The reason for this is unclear; however, perhaps relief is an unusual emotion in that to experience it one must first experience the negative affect from the close call, and in the contrast condition, this negative affect was generally reduced.

The extent to which the emotions predicted the investment decisions was analyzed as follows: The contrast condition was assigned  $-1$ , the control condition was  $0$ , and the assimilation condition was  $+1$ . Using this dummy coding, the manipulation predicted the amount of money participants decided to take out of the investment,  $r = .56, p < .001$ . The combined negative emotions predicted the investment decision,  $r = .54, p < .001$ , as did satisfaction,  $r = -.35, p < .05$ , but relief and fortunate did not,  $r = .18, ns$ . Next, when the investment decision was regressed onto both the dummy-coded manipulation and satisfaction, satisfaction did not remain significant,  $\beta = -.17, ns$ , but the manipulation did,  $\beta = .50, p < .001$ . But when this same analysis was applied to the negative emotions, the negative emotions remained significant,  $\beta = .40, p < .01$ , along with the manipulation,  $\beta = .44, p < .01$ .

It is clear from these results that positive emotions played no role in mediating the effect of the counterfactual manipulation on investment decisions. Because the manipulation coefficient did not drop to nonsignificance, even the negative emotions were not perfect mediators, although they did continue to predict investment decisions after the manipulation was held constant. Of course, we are not suggesting that affect must be the only mediator of these effects. Cognitive responses, such as attributions or scripts (Roese, 1994), may play an important role as well. But the use of close counterfactuals (Kahneman & Varey, 1990) may have led to the complexity of our affect results. It is very likely that close counterfactuals lead to mixed emotions—when one almost experiences a negative outcome, there may be feelings of both fear and relief, as the results from Study 2 suggest. Perhaps to experience the positive emotions, such as relieved and fortunate, one must first experience the negative affect, such as fear, from the close call. This would explain why our negative but not our positive adjectives predicted investment decisions after controlling for the counterfactual manipulation. Therefore, in Study 3, we used a new para-

digm with a very direct manipulation of affect that employed participant-generated elaborative (Medvec & Savitsky, 1997) counterfactuals rather than the stimulus-based close counterfactuals employed in Studies 1 and 2. Elaborative counterfactuals are those that individuals actively generate and think through on their own. With this procedure, we hoped to avoid the complexities associated with close counterfactuals and thus provide an even stronger test of the hypothesized mediational role of affect.

### STUDY 3

Study 3 employed a situation that, for our participants, should be a more involving, real-life situation: the college student receiving their first exam grade in a course. We hypothesized that their counterfactual thoughts about their performance on that first exam would influence their affect as well as their plans for the rest of the course. Specifically, if students perceive their first exam grade in light of the contrast effect as “better than it could have been,” our Pangloss effect should appear and they should report less motivation toward the rest of the class. If, on the other hand, students’ thoughts about how much worse it could have been elicit negative affect, this should act as the wake-up call, motivating them to work harder to prevent that eventuality.

Assimilation and contrast were manipulated in exactly the same way as in McMullen (1997, Study 1), a manipulation that produced strong and clear affect results. Participants were instructed in the assimilation condition to spend a few moments vividly imagining the counterfactual outcome happening and in the contrast condition to evaluate their actual grade in comparison to the counterfactual grade.

### Method

#### PARTICIPANTS AND DESIGN

Participants were 53 Montana State University–Billings students who volunteered to take a Survey of Study Habits questionnaire. They participated in this study after having had their first exam in an upper level psychology or history course. They were randomly assigned to the contrast, assimilation, or control conditions.

#### PROCEDURE

All participants were first asked to indicate their grade on their first exam and how satisfied they were with that grade. Next, those in the counterfactual conditions (contrast and assimilation) were instructed to make a downward counterfactual: “People often think about how they could have done worse. For example, if someone gets a B on a test, they might imagine that they could have received a D.” They were instructed to indicate the specific grade they were imagining.

Those in the contrast condition were instructed to “evaluate your grade in comparison to the worse grade you imagined” and describe their thoughts in writing. Those in the assimilation condition were instructed to “vividly imagine receiving that worse grade” and also describe their thoughts. Those in the control condition, who had not been instructed to generate any counterfactuals, described their thoughts about their (actual) exam. Next, all participants were instructed to indicate the extent to which they were experiencing the following, on bipolar adjective rating scales: bad-good, happy-sad, fearful-hopeful, disappointed-relieved, and peaceful-nervous.

The key dependent measures followed. All participants were asked, “How much do you feel you should change the way you should study for the next exam?” “Do you feel you should study harder, not as hard, or about the same for the upcoming exam?” “Do you feel you should put more effort into the rest of this class?” and “How many hours more or less do you intend to study for the next exam?”

To ensure that participants’ actual study habits would not be influenced by the manipulation, all were instructed to vividly imagine that they were going to receive a high grade on the next exam. They were then instructed to list as many ways as they could think to improve their scores on the next exam. This in effect put all participants into an upward simulation condition regarding their future exams, a manipulation that has been shown to increase motivation, performance, and affect (Boninger et al., 1994; Roese, 1994). All participants were fully debriefed.

### Results

First, all affect adjective ratings were significantly correlated with one another ( $r$ s ranged from .30 to .85, all  $p$ s < .05). Thus, all affect adjective ratings were averaged after appropriate reverse scoring so that higher numbers indicated positive affect.<sup>2</sup> An ANOVA revealed a significant effect of the manipulation on affect,  $F(2, 49) = 9.7$ ,  $p < .001$ . Consistent with hypotheses, affect ratings were significantly higher in the contrast ( $M = 5.9$ ) compared to the assimilation condition ( $M = 3.6$ ),  $t(34) = 4.0$ ,  $p < .001$ . In addition, the assimilation condition was significantly lower than the control condition ( $M = 4.7$ ),  $t(31) = 3.0$ ,  $p < .01$ , although the difference between the contrast and the control conditions was only marginal,  $t(33) = 1.7$ ,  $p = .09$ . See Table 2 for all means and comparisons.

All motivation-related dependent measures were significantly intercorrelated ( $r$ s ranged from .37 to .76, all  $p$ s < .05) and were averaged to create a single motivation score for each participant. An ANOVA indicated that the manipulation influenced motivation,  $F(2, 50) = 5.7$ ,  $p < .01$ . As hypothesized, motivation was greater in the

**TABLE 2: Affect and Study Intentions by Counterfactual Manipulation**

	<i>Assimilation</i>	<i>Control</i>	<i>Contrast</i>
Study 3			
Bad-good	3.2 <sub>a</sub>	4.9 <sub>b</sub>	5.9 <sub>b</sub>
Sad-happy	3.5 <sub>a</sub>	4.9 <sub>b</sub>	6.0 <sub>b</sub>
Regret-satisfaction	3.0 <sub>a</sub>	4.0 <sub>a</sub>	5.6 <sub>b</sub>
Nervous-peaceful	4.0 <sub>a</sub>	5.1 <sub>b</sub>	4.9 <sub>a, b</sub>
Unpleasant-pleasant	3.5 <sub>a</sub>	5.6 <sub>b</sub>	5.4 <sub>b</sub>
Fearful-hopeful	5.2 <sub>a</sub>	6.1 <sub>a, b</sub>	6.9 <sub>b</sub>
Disappointed-relieved	2.8 <sub>a</sub>	3.5 <sub>a</sub>	5.5 <sub>b</sub>
Average affect	3.6 <sub>a</sub>	4.9 <sub>b</sub>	5.7 <sub>b</sub>
Change way you study?	3.5 <sub>a</sub>	3.1 <sub>b</sub>	2.6 <sub>c</sub>
Study harder for next exam?	4.4 <sub>a</sub>	4.1 <sub>a, b</sub>	3.7 <sub>b</sub>
More effort into class?	3.6 <sub>a</sub>	3.4 <sub>a, b</sub>	2.7 <sub>b</sub>
How many more/less hours?	4.1 <sub>a</sub>	2.9 <sub>a, b</sub>	2.7 <sub>b</sub>
Average motivation	3.9 <sub>a</sub>	3.2 <sub>b</sub>	2.8 <sub>b</sub>

NOTE: Affect adjectives have been reverse-scored so that higher numbers indicate positive affect. Means with different subscripts across rows are significantly different at  $p < .05$ .

assimilation condition ( $M = 3.9$ ) than in the contrast condition ( $M = 2.8$ ),  $t(34) = 3.3$ ,  $p < .005$ . As in the affect data, the difference between assimilation and control ( $M = 3.2$ ) was significant,  $t(32) = 2.1$ ,  $p < .05$ , but the difference between contrast and control was not,  $t(34) = 1.6$ ,  $p = .12$ . See Table 2 for all means and individual comparisons.

The counterfactual manipulation, after being dummy-coded as in the analyses for Study 2, successfully predicted the affect mediator ( $r = -.53$ ,  $p < .001$ ) and affect predicted motivation ( $r = -.59$ ,  $p < .001$ ). The counterfactual manipulation also predicted motivation ( $r = .43$ ,  $p < .01$ ) until affect was also entered into the regression analysis as a predictor, after which the coefficient for the counterfactual manipulation dropped to nonsignificance ( $\beta = .17$ , *ns*), although the affect coefficient remained significant ( $\beta = -.51$ ,  $p < .001$ ). This provides evidence that affect mediated the counterfactual's impact on motivation.

### General Discussion

In Studies 1 and 2, participants were more likely to stay with an investment if a downward counterfactual indicated that "I'm better off than I could have been" but were more likely to abandon that investment if that same counterfactual indicated that "I could have lost a lot of money." Study 2 showed that negative affect predicted these investment decisions even after controlling for the counterfactual manipulation: Those who reported more negative affect were more likely to withdraw their money from the investment, and those who experienced less negative affect were more likely to keep their money in the investment. In Study 3, students reported less motiva-

tion in a class if they were led to perceive their first test as "better than it could have been" and thus reported positive affect. On the other hand, they reported greater motivation if they vividly imagined that "I could have done worse" and thus experienced negative affect.

There are two stages to this process: (a) downward counterfactual thinking can lead to either positive or negative affect (McMullen, 1997) and (b) affect has motivational implications (Schwarz, 1990; Taylor, 1991). Specifically, negative affect increases motivation by informing us that our current state is unsatisfactory and needs to be changed, whereas positive affect induces complacency by informing us that our present state is acceptable and no further action is necessary.

Our proposed affective assimilation/contrast mechanism is straightforward. When attention is focused on positive information, one experiences positive affect, and when attention is focused on negative information, one experiences negative affect (McMullen, 1997). For example, mood manipulations elicit positive affect through directions to consider happy events and negative affect through directions to consider sad events (Dermer, Cohen, Jacobson, & Anderson, 1979; Strack, Schwarz, & Gschneidinger, 1985); of importance, however, consideration of these same events may produce the opposite mood when they are treated as comparisons with which to evaluate factual reality. A counterfactual has both positive and negative possibilities inherent, a reality of one's own actual state, and an alternative. If one focuses on a downward counterfactual alternative, such as "I could have lost money in that investment" or "I could have flunked that test," this simulation of negative events leads to negative affect. If one focuses on one's factual reality or performance, as in "At least I made a little money" or "I got a better grade than I could have," positive affect results from the contrast to the standard provided by the counterfactual.

What factors, then, might lead to assimilation or contrast? Social comparison researchers have generally focused on motivational determinants such as relevance to the self (Tesser, 1988), future prospects (Aspinwall, 1997; Lockwood & Kunda, 1997), and controllability (Testa & Major, 1990), among others (for reviews, see Collins, 1996; Taylor & Lobel, 1989). Presumably, these factors may similarly influence counterfactual thinking. But we have employed a relatively pure manipulation of assimilation and contrast here to ensure that these motivational factors would not contaminate our motivation dependent measures. Thus, we had participants focus directly on reality or its alternative, either through expert advice on investments (Studies 1 and 2) or through direct instructions to evaluate the factual event or vividly imagine its alternative (Study 3).

*AFFECT AND MOTIVATION*

The critical element of our proposal is that affective states have motivational implications. Schwarz's (1990) feelings-as-information hypothesis suggests that negative affect alerts us that something is wrong and further action is required; positive affect informs us that we are doing fine and no further action is necessary. When our mock investors felt bad about their investment, they wanted to withdraw their money, and when our students felt bad when thinking about their grades, they felt they should work harder. This revisits the possibility, speculated by Markman et al. (1993), that to improve, one must first experience negative affect. They proposed that there may be a trade-off between affect and future preparation in that upward counterfactuals may prepare us for improvement but they also make us feel worse. This research takes their hypothesis one step further by suggesting that even downward counterfactuals can motivate us but only if they first evoke negative affect. When they do provide comfort, rather than being motivating, they induce complacency.

Roese (1994) argued that upward counterfactuals prepare us for the future by suggesting specific courses of action: "If I had studied harder, I would have received a better grade; therefore, I will study harder next time." Downward counterfactuals, in this analysis, provide no such route to better performance and are thus not involved in future preparation. We have provided evidence, however, that affect can play a central role in this process, such that counterfactual thoughts can be motivating (or demotivating) independent of the behavioral information that they convey.

Although we focused on downward counterfactual thinking here, it is possible that this argument may hold true even for upward counterfactuals. Specifically, upward counterfactuals may, through assimilation, produce positive affect and therefore decreased motivation or, through contrast, negative affect and increased motivation. Some research supports just such a suggestion. Oettingen (1996) finds that positive fantasies decrease motivation and success in domains as diverse as weight loss, recovery from illness, and romantic and professional success. The positive affect brought about by imagining success reduced the motivation to actually achieve that success, as when job-seeking positive fantasizers sent out fewer job applications (Oettingen, 1996). But when positive fantasies were contrasted with reality, they were associated with greater success. Indeed, in her manipulations of positive fantasy, Oettingen had participants imagine only the positive aspects of the fantasy, which decreased motivation, versus alternating between the fantasy and the negative aspects of reality, which increased motivation. This manipulation is virtually identical to the one McMullen (1997) used to induce

affective assimilation and contrast, respectively, and to the ones we used here.

On the other hand, there is reason to believe that upward counterfactuals may be more complicated. Assimilation-based upward counterfactuals may produce the confidence or inspiration necessary for continued effort. For example, Sherman et al. (1981) found an asymmetry between imagining success and imagining failure on an anagram-solving task. Explaining how a failure might occur increased performance, unless that explanation was followed by a negative expectation for future performance, in which case performance decreased. Explaining success on the task improved performance regardless of whether it was accompanied by an expectation. In a similar fashion, upward counterfactual thinking might enhance motivation and performance regardless of whether it involves assimilation or contrast. Upward assimilation may provide inspiration through visualizing a desired outcome, and upward contrast may provoke increased effort by highlighting one's relatively inferior state.

More generally, many tasks may actually depend on positive affect for persistence. One specific mechanism through which this may occur was demonstrated by Martin, Ward, Achee, and Wyer (1993). They showed that depending on the question individuals ask themselves during task performance, affect may have different interpretations. If people ask themselves, "Have I reached my goal?" negative affect signals "No, I should continue" and positive affect signals "Yes, I can stop now." This is consistent with what we have argued here. However, if people ask themselves, "Am I enjoying this task?" then affect has opposite motivational implications: Positive affect implies that one should continue and negative affect implies that one should stop. It therefore seems likely that tasks engaged in for enjoyment would have very different results than the present, achievement-oriented tasks such as academic performance and investment decisions. It is perhaps no accident that counterfactual research showing preparative functions of upward counterfactuals have employed achievement-oriented tasks, such as winning money (Markman et al., 1993) and solving anagrams (Roese, 1994). It would be interesting to examine these phenomena in tasks involving enjoyment or creativity (e.g., Hirt, Melton, McDonald, & Harackiewicz, 1996) rather than achievement.

Furthermore, any motivation-reducing properties of positive affect may be moderated not only by the type of task but also by individual differences. Specifically, Sanna (1996, 1998) has demonstrated that defensive pessimists generate more upward possibilities in response to negative affect than do optimists and that defensive pessimists use these upward prefactuals to



improve their performance (Norem & Cantor, 1986). Optimists, on the other hand, tend to generate downward counterfactuals after task performance is completed and tend to perform best in positive moods. Again, the affect-motivation relationship is central but here qualified by individual differences.

Other sources of motivation are of course possible. Roese (1994) has demonstrated that counterfactual thinking promotes improvement by turning thoughts about what one should have done into scripts for future performance, without necessarily provoking any corresponding negative affect. Furthermore, upward counterfactuals are generally not effective at promoting improvement unless they specify a behavior (Taylor & Pham, 1996). Clearly, downward counterfactuals cannot do this because they do not envision a route to a positive outcome. We would contend, however, that for many behaviors that are self-destructive or potentially damaging, it is clear what one must do: stop the destructive behavior. Only when one realizes that the behavior is potentially damaging will this become important, and it is just this realization that is promoted by downward assimilation and postponed by downward contrast.

#### NOTES

1. However, these effects of negative thinking disappeared or reversed when the negative thoughts were turned into expectancies or predictions for future performance. Although developing negative expectancies about what will happen can lead to expectancy confirmation, resulting in decreased motivation and performance, thinking about possible negative scenarios can lead to increased motivation to avoid those negative possibilities.

2. Study 3 employed bipolar adjective rating scales, with positive and negative affect on opposite poles of each scale. This procedure precluded the distinction between positive and negative emotions found in Study 2.

#### REFERENCES

- Aspinwall, L. G. (1997). Future-oriented aspects of social comparisons: A framework for studying health-related comparison activity. In B. P. Buunk & F. X. Gibbons (Eds.), *Health, coping, and well-being: Perspectives from social comparison theory* (pp. 125-165). Mahwah, NJ: Lawrence Erlbaum.
- Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review*, *6*, 359-372.
- Boninger, D. S., Gleicher, F., & Strathman, A. J. (1994). Counterfactual thinking: From what might have been to what may be. *Journal of Personality and Social Psychology*, *67*, 297-307.
- Burger, J. M., & Burns, L. (1988). The illusion of unique invulnerability and the use of effective contraception. *Personality and Social Psychology Bulletin*, *14*, 264-270.
- Buunk, B. P., Collins, R. L., Taylor, S. E., VanYperen, N. W., & Dakof, G. A. (1990). The affective consequences of social comparison: Either direction has its ups and downs. *Journal of Personality and Social Psychology*, *59*, 1238-1249.
- Collins, R. L. (1996). For better or worse: The impact of upward social comparison on self-evaluations. *Psychological Bulletin*, *119*, 51-69.
- Davis, C. G., Lehman, D. R., Wortman, C. B., Silver, R. C., & Thompson, S. C. (1995). The undoing of traumatic life events. *Personality and Social Psychology Bulletin*, *21*, 109-124.
- Dermer, M., Cohen, S. J., Jacobson, E., & Anderson, E. A. (1979). Evaluative judgments of aspects of life as a function of vicarious exposure to hedonic extremes. *Journal of Personality and Social Psychology*, *37*, 247-260.
- Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology*, *70*, 461-475.
- Gleicher, F., Kost, K. A., Baker, S. M., Strathman, A. J., Richman, S. A., & Sherman, S. J. (1990). The role of counterfactual thinking in judgments of affect. *Personality and Social Psychology Bulletin*, *16*, 284-295.
- Goodhart, D. E. (1986). The effects of positive and negative thinking on performance in an achievement situation. *Journal of Personality and Social Psychology*, *51*, 117-124.
- Hirt, E. R., Melton, R. J., McDonald, H. E., & Harackiewicz, J. M. (1996). Processing goals, task interest, and the mood-performance relationship: A mediational analysis. *Journal of Personality and Social Psychology*, *71*, 245-261.
- Homant, R. J., & Osowski, G. (1982). The politics of juvenile awareness programs: A case study of JOLT. *Criminal Justice and Behavior*, *9*, 55-68.
- Johnson, E. J., & Tversky, A. (1983). Affect, generalization, and the perception of risk. *Journal of Personality and Social Psychology*, *45*, 20-31.
- Kahneman, D., & Varey, C. A. (1990). Propensities and counterfactuals: The loser that almost won. *Journal of Personality and Social Psychology*, *59*, 1101-1110.
- Lewis, R. V. (1983). Scared straight-California style: Evaluation of the San Quentin Squires Program. *Criminal Justice and Behavior*, *10*, 209-226.
- Lockwood, P., & Kunda, Z. (1997). Superstars and me: Predicting the impact of role models on the self. *Journal of Personality and Social Psychology*, *73*, 91-103.
- Maddux, J. E., & Rogers, R. W. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of Experimental Social Psychology*, *19*, 469-479.
- Markman, K. D., Gavanski, I., Sherman, S. J., & McMullen, M. N. (1993). The mental simulation of better and worse possible worlds. *Journal of Experimental Social Psychology*, *29*, 87-109.
- Markman, K. D., Gavanski, I., Sherman, S. J., & McMullen, M. N. (1995). The impact of perceived control on the imagination of better and worse possible worlds. *Personality and Social Psychology Bulletin*, *21*, 588-595.
- Markman, K. D., & Weary, G. (1996). The influence of chronic control concerns on counterfactual thought. *Social Cognition*, *14*, 292-316.
- Martin, L. L., Ward, D. W., Achee, J. W., & Wyer, R. S. (1993). Mood as input: People have to interpret the motivational implications of their moods. *Journal of Personality and Social Psychology*, *64*, 317-326.
- McMullen, M. N. (1997). Affective contrast and assimilation in counterfactual thinking. *Journal of Experimental Social Psychology*, *33*, 77-100.
- Medvec, V. H., Madey, S. F., & Gilovich, T. (1995). When less is more: Counterfactual thinking and satisfaction among Olympic medalists. *Journal of Personality and Social Psychology*, *69*, 603-610.
- Medvec, V. H., & Savitsky, K. (1997). When doing better means feeling worse: The effects of categorical cutoff points on counterfactual thinking and satisfaction. *Journal of Personality and Social Psychology*, *72*, 1284-1296.
- Miller, S. M., Shoda, Y., & Hurlley, K. (1996). Applying cognitive-social theory to health-protective behavior: Breast self-examination in cancer screening. *Psychological Bulletin*, *119*, 70-94.
- 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.
- Norem, J. K., & Cantor, N. (1986). Defensive pessimism: Harnessing anxiety as motivation. *Journal of Personality and Social Psychology*, *51*, 1208-1217.
- Oettingen, G. (1996). Positive fantasy and motivation. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to action* (pp. 236-259). New York: Guilford.
- Robberson, M. R., & Rogers, R. W. (1988). Beyond fear appeals: Negative and positive persuasive appeals to health and self-esteem. *Journal of Applied Social Psychology*, *18*, 277-287.

- Roese, N. J. (1994). The functional basis of counterfactual thinking. *Journal of Personality and Social Psychology*, *66*, 805-818.
- Rogers, R. W., & Mewborn, C. R. (1976). Fear appeals and attitude change: Effects of a threat's noxiousness, probability of occurrence, and the efficacy of coping responses. *Journal of Personality and Social Psychology*, *34*, 54-61.
- Sanna, L. J. (1996). Defensive pessimism, optimism, and simulating alternatives: Some ups and downs of prefactual and counterfactual thinking. *Journal of Personality and Social Psychology*, *71*, 1020-1036.
- Sanna, L. J. (1998). Defensive pessimism and optimism: The bitter-sweet influence of mood on performance and prefactual and counterfactual thinking. *Cognition and Emotion*, *12*, 635-665.
- Sanna, L. J., Meier, S., & Turley-Ames, K. J. (1998). Mood, self-esteem, and counterfactuals: Externally attributed moods limit self-enhancement strategies. *Social Cognition*, *16*, 267-286.
- Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 527-561). New York: Guilford.
- Schwarz, N., Servay, W., & Kumpf, M. (1985). Attribution of arousal as a mediator of the effectiveness of fear-arousing communications. *Journal of Applied Social Psychology*, *15*, 178-188.
- Sherman, S. J., Skov, R. B., Hervitz, E. F., & Stock, C. B. (1981). The effects of explaining hypothetical future events: From possibility to probability to actuality and beyond. *Journal of Experimental Social Psychology*, *17*, 142-158.
- Showers, C. (1992). The motivational and emotional consequences of considering positive or negative possibilities for an upcoming event. *Journal of Personality and Social Psychology*, *63*, 474-484.
- 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.
- Taylor, S. E. (1991). Asymmetrical effects of positive and negative events: The mobilization-minimization hypothesis. *Psychological Bulletin*, *110*, 67-85.
- Taylor, S. E., & Lobel, M. (1989). Social comparison activity under threat: Downward evaluation and upward contacts. *Psychological Review*, *96*, 569-575.
- Taylor, S. E., & Pham, L. B. (1996). Mental simulation, motivation, and action. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 219-235). New York: Guilford.
- Taylor, S. E., & Schneider, S. K. (1989). Coping and the simulation of events. *Social Cognition*, *7*, 174-194.
- Tesser, A. (1988). Toward a self-evaluation maintenance model of social behavior. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 20, pp. 181-227). New York: Academic Press.
- Testa, M., & Major, B. (1990). The impact of social comparison after failure: The moderating effects of perceived control. *Basic and Applied Social Psychology*, *44*, 672-682.
- Voltaire. (1947). *Candide*. London: Penguin. (Original work published 1759)
- Weiner, B. (1985). "Spontaneous" causal thinking. *Psychological Bulletin*, *97*, 74-84.

Received March 25, 1998

Revision accepted January 25, 1999