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Counterfactual thinking, persistence, and performance: A test of the Reflection and Evaluation Model

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Abstract

The present research extends previous functional accounts of counterfactual thinking by incorporating the notion of reflective and evaluative processing. Participants generated counterfactuals about their anagram performance, after which their persistence and performance on a second set of anagrams was measured. Evaluative processing of upward counterfactuals elicited a larger increase in persistence and better performance than did reflective processing of upward counterfactuals, whereas reflective processing of downward counterfactuals elicited a larger increase in persistence and better performance than did evaluative processing of downward counterfactuals. Moreover, path analyses indicated that whereas the relationship between counterfactual thinking and persistence was accounted for by emotional responses following upward and downward counterfactual generation, the relationship between counterfactual thinking and performance was accounted for by enhanced persistence following reflective processing of downward counterfactuals, but was accounted for by both enhanced persistence and strategic thinking following evaluative processing of upward counterfactuals.

Keywords: Counterfactual thinking; Motivation; Assimilation; Contrast

Recent social psychological research has examined the consequences of engaging in counterfactual simulations of the past, and a distinction has been made between upward counterfactual thinking—whereby alternatives that improve upon reality are simulated—and downward counterfactual thinking—whereby alternatives that worsen reality are simulated (e.g., Markman & McMullen, 2003; Roese, 1994; Sanna, 1996). In turn, possible functions of upward and downward counterfactual thoughts have been identified. One is the affective function (e.g., McMullen, 1997; Roese, 1997; Taylor & Schneider, 1989), whereby a given outcome will be judged more favorably to the extent that a less desirable alternative is salient. In this case, downward counterfactuals can enhance coping and well being by highlighting how the situation or outcome could easily have been worse. A second is the preparative function. Although upward counterfactuals may devalue the actual outcome and make one feel worse (e.g., Markman & McMullen, 2003; Mellers, Schwartz, Ho, & Ritov, 1997; Roese, 1994), simulating routes to better realities may help individuals improve upon their outcomes in the future (Johnson & Sherman, 1990; Karniol & Ross, 1996; Taylor & Schneider, 1989).

Markman, Gavanski, Sherman, and McMullen (1993) provided initial empirical support for the functions of counterfactual thinking. In their study, participants played blackjack against a computer and were led to believe that they would either be playing no additional hands of blackjack or three additional hands of blackjack. Participants who expected to play again demonstrated a greater tendency to generate upward counterfactuals relative to those who did not expect to play again. According to Markman

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et al., participants who expected to play again generated upward counterfactuals because they needed preparative information to help them perform better. On the other hand, participants who did not expect to play again needed no such information and, instead, only wanted to feel good about their current performance. Thus, the downward counterfactuals they generated served the affective function.

The Markman et al. (1993) study, as well as a number subsequent studies (e.g., Nasco & Marsh, 1999; Parks, Sanna, & Posey, 2003; Roese, 1994), focused exclusively on the consequences of *contrast-based* reactions to counterfactual generation whereby judgments are displaced *away* from the counterfactual standard. However, more recent work (e.g., Markman, Elizaga, Ratcliff, & McMullen, in press; Markman & McMullen, 2003, 2005; Markman, McMullen, Elizaga, & Mizoguchi, 2006; Markman, Ratcliff, Mizoguchi, Elizaga, & McMullen, 2007; Wayment, 2004) has indicated that *assimilation-based* reactions to counterfactual generation—whereby judgments are pulled *toward* the counterfactual standard—are also common. The purpose of the present paper is to examine the motivational and behavioral consequences of contrastive *and* assimilative counterfactual thinking. To do so, we will explore the interaction between *simulation direction* (upward versus downward) and *simulation mode* (reflective versus evaluative).

The Reflection and Evaluation Model

Markman and McMullen (2003; see also Markman and McMullen, 2005; Markman et al., 2007) developed the Reflection and Evaluation Model (REM) in order to provide an organizing framework for understanding how assimilation and contrast effects arise following mental simulation-based comparisons. The model asserts that two psychologically distinct modes of mental simulation operate during comparative thinking. The first mode is *reflection*, an experiential ("as if") mode of thinking whereby one imagines that information about the comparison standard is true of, or is part of, oneself or one's present standing, and the second mode is *evaluation*, whereby the outcome of a mental simulation run is used as a reference point against which to evaluate oneself or one's present standing.

Fig. 1 depicts the interaction between simulation direction and mode. To illustrate, consider the student who receives a B on an exam but realizes that an A was easily attainable with some additional studying. In the case of upward evaluation (UE), the student switches attention between the outcome (a grade of B) and the counterfactual standard (a grade of A). According to the REM, such attentional switching ("I got a B…I could have gotten an A but instead I got a B") involves using the standard as a reference point and thereby instigates notions of evaluative processing (see also Oettingen, Pak, & Schnetter, 2001). In the case of upward reflection (UR), however, the student's attention is focused mainly on the counterfactual itself. Focusing on the counterfactual instigates notions of reflective processing whereby the student considers the implications of the counterfactual and temporarily experiences the counterfactual as if it were real ("What if I had actually gotten an A?"). In a sense, the student is "transported" into the counterfactual world (Green & Brock, 2000). Likewise, consider the case of a driver who pulls away from the curb without carefully checking rear and side-view mirrors, and subsequently slams on the brakes as a large truck whizzes by. In the case of downward evaluation (DE), the driver switches attention between the counterfactual standard (being hit by the truck) and the outcome (not being hit by the truck), thereby instigating notions of evaluative processing ("I was fortunate to not have been hit by that truck"). In the case of downward reflection (DR), however, the driver's attention is mainly focused on the counterfactual itself, thereby instigating notions of reflective processing ("I nearly got hit by that truck").

	Mode	
Direction	Reflection	Evaluation
Upward	"I almost got an A" (+ affect)	"I got a B…I failed to get an A" (- affect)
Downward	"I nearly got hit by that truck" (- affect)	"I was fortunate to not have been hit by that truck" (+ affect)

Fig. 1. The interaction between simulation direction and mode.

Motivational consequences

The REM advances earlier functional approaches by suggesting that upward and downward counterfactuals can both have affective and preparative (or, more generally, motivational) functions via notions of reflective and evaluative processing. A key assumption of the model is that the initial impetus to act, or disinclination to change the status quo, is rendered by recognizing one's internal affective state following counterfactual generation. Drawing on Schwarz and Clore's (1983) feelings-as-information perspective (see also Martin, Ward, Achee, & Wyer, 1993) the REM posits that counterfactuals that produce negative affect should engender greater persistence on tasks pursued to satisfy achievement goals than should counterfactuals that produce positive affect. Moreover, useful causal inferences that are derived from contemplation of the counterfactual should suggest specific behaviors that the individual might perform in the future (Roese, 1997). Thus, in achievement domains, the model predicts that UE is more likely than UR to heighten motivation.

The divergence between the REM and other functional approaches is more evident when downward counterfactuals are considered. Previous models of counterfactual thinking and motivation (e.g., Markman et al., 1993; Roese, 1994, 1997), and more recent and general models of mental simulation (e.g., Oettingen, 1996; Oettingen et al., 2001; Sanna, Stocker, & Clarke, 2003) contend that goal-based mental simulations necessarily involve contrasts with reality. The REM, on the other hand, predicts that DR enhances motivation in achievement domains, whereas DE engenders complacency. The negative affect derived from DR raises an individual's awareness of the possibility that a negative goal-state may be attained (see also Lockwood, Jordan, & Kunda, 2002; Wayment, 2004) whereas the positive affect derived from DE suggests that a negative goal-state has been successfully avoided.

Study overview

Participants in the present study generated counterfactuals about their performance on an initial set of anagrams, after which we measured persistence and performance on a second set of anagrams. Our basic prediction was that UE would enhance motivation and performance to a greater extent than would UR, whereas DR would enhance motivation and performance to a greater extent than would DE.

Additionally, we sought to examine the psychological mechanisms by which counterfactual thinking might exert its effects upon motivation and behavior. According to the REM, negative affect should mediate the relationship between counterfactual thinking and persistence. Thus, UE should elicit more persistence than UR because UE engenders negative affect, whereas DR should elicit more persistence than DE because DR engenders negative affect. Furthermore, however, we also posited that the mechanisms by which counterfactual thinking affects *performance* would differ for upward and downward counterfactuals. For both types of counterfactuals, we predicted that persistence would enhance performance vis-à-vis affect (i.e., affect motivates the individual to either change or maintain the status quo). Notably, however, Roese's two-stage model (1997) contends that upward counterfactuals prepare for the future by suggesting specific courses of action (e.g., "If I had studied harder, I would have received a better grade; therefore, I will study harder next time"), whereas downward counterfactuals suggest no such specific routes to better performance and thus are not involved in future preparation. For the present study, then, we predicted that when upward counterfactuals were generated, evaluative processing would affect performance by *dual* mechanisms: (a) indirectly, vis-à-vis affect and enhanced persistence; and (b) directly, by eliciting useful and strategic inferences. On the other hand, we predicted that when downward counterfactuals were generated, downward reflective processing would affect performance by a *single* mechanism: indirectly, vis-à-vis affect and persistence.

Method

Participants and design

Eighty-seven male and female introductory psychology students at Ohio University participated in exchange for course credit. The data from seven participants in the downward counterfactual condition were eliminated because they responded incorrectly to the counterfactual solicitation (i.e., they generated upward counterfactuals in addition to, or instead of, downward counterfactuals). The remaining 80 participants were randomly assigned to the conditions of a 2 (*Direction*: upward vs. downward) × 2 (*Mode*: reflective vs. evaluative) between-subjects design. Participants were run on separate IBM computers in groups no larger than four.

Procedure

Participants were seated at computers running MediaLab software (Jarvis, 2004) and informed that the purpose of the experiment was to understand "puzzle-solving." After signing consent forms, participants clicked on a computer mouse to begin, and the following instructions appeared on the screen:

> In the experiment you will be solving anagrams. This task involves unscrambling a series of letters to FORM AS MANY WORDS AS POSSIBLE using ALL OF THE LETTERS in the series. For example, the letters "ALSET" can be unscrambled to form the words "TALES", "STALE", and "STEAL".
> You will be given two sets of 10 anagrams to solve. The first set of 10 anagrams will serve as practice for the second set. Following completion of the first set, you will receive FEEDBACK concerning your PERFORMANCE on this first set.
> Each anagram may have no solution, one solution, or multiple solutions. You have as much time as you require for finding all of the solutions that you can.

After reading these instructions, participants began solving the practice set of anagrams. Each anagram appeared in the center of the screen, and participants were asked to type in their solutions in the field that appeared below it. Participants were given the options of both skipping to the next anagram in the set and returning to previous anagrams in the set. Three of the 10 anagrams that appeared in the practice set were taken from practice items developed by Shah, Higgins, and Friedman (1998), and the authors developed the other seven. The 10 anagrams used in the experimental set were identical to the 10 anagrams employed by Shah et al. (1998) in their experimental set. Each anagram in both the practice and experimental sets had between two and four possible solutions.

Participants worked at their own pace and were given as much time as they wished to complete the set of anagrams. The computer kept track of how long participants spent generating solutions to each anagram. Following completion of the first set, all participants received *accurate* information regarding their performance, but *inaccurate* information concerning the total number of possible solutions by employing the following feedback format: "Out of '2X' possible solutions, you correctly found 'X' solutions." Thus, for example, a participant who found 12 correct solutions across the entire practice set of anagrams was told that, "Out of 24 possible solutions, you correctly found 12 solutions." The purpose of providing "2X" feedback was to leave each participant with equivalent "room" to generate either upward or downward counterfactuals (cf. Markman et al., 1993).

Next, participants were instructed to, "...think about how something different could have happened rather than what actually happened." Those assigned to the upward counterfactual condition were then told, "Specifically, think about how your performance on the anagrams might have turned out BETTER than it actually did," whereas those assigned to the downward counterfactual condition were told to "...think about how your performance on the anagrams might have turned out WORSE than it actually did." Participants then provided their counterfactual thoughts in writing.

Simulation mode was then manipulated. The evaluative mode instructions directed participants to "Close your eyes and think about your ACTUAL performance on the anagrams COMPARED to how you MIGHT have performed BETTER (WORSE). Take a minute and VIVIDLY EVALUATE your performance in comparison to how you might have performed better (worse)," whereas the reflective mode instructions directed participants to "Close your eyes and VIVIDLY imagine what might have been. Spend about a minute VIVIDLY IMAGINING how your performance on the anagrams might have been BETTER (WORSE)—the imagined performance you have been thinking about." Participants were then asked to describe these thoughts in writing, after which they indicated their current mood by rating themselves on four mood adjectives (*happy*, *tense*, *discouraged*, and *relaxed*) along 9-point scales ranging from 1 ("*not at all*") to 9 ("*very much*"). After completing the mood measure, participants were given as much time as they liked to complete the second set of 10 anagrams.

Participants were probed for suspiciousness regarding any aspects of the experiment. Although several individuals indicated mild suspicion regarding the feedback they received following the practice set of anagrams, none reported completely doubting the feedback. Following the suspiciousness probe, participants were debriefed and thanked.

Results

Manipulation check

Two independent judges, both of whom were blind to experimental condition, and one of whom was blind to the experimental hypotheses, coded the counterfactuals generated by each participant for evidence of reflective versus evaluative processing along a 5-point (-2, *mostly reflective*; -1, *somewhat more reflective*; 0, *somewhat reflective, somewhat evaluative*; $+1$, *somewhat more evaluative*; $+2$, *mostly reflective*) rating scale. An example of a counterfactual that received a "-2" (mostly reflective) was, "I imagined that the letters were forming words right in front of my eyes," an example of a counterfactual that received a "0" (somewhat reflective, somewhat evaluative) was, "I was imagining myself finding many solutions to one scrambled bit of letters. I also imagined myself being much more confident about my ability to get as many words as possible," and an example of a counterfactual that received a "$+2$" (mostly evaluative) was, "I could have performed better than I did if I tried more and different combinations of letters." Inter-rater reliability on this measure was high ($r = .87$), and thus the two coder's ratings were averaged.

Analyses were then conducted to establish that the reflection and evaluation manipulations elicited relative tendencies to engage in reflective versus evaluative processing. As expected, a Direction × Mode ANOVA performed on the mode scores revealed a main effect of Mode, $F(1,76) = 18.89$, $p < .001$, $\eta^2 = .20$, indicating that the reflection condition engendered relatively more reflective processing ($M = -.42$, $SD = 1.16$), whereas the evaluation condition engendered relatively more evaluative processing ($M = +.56$, $SD = .87$). No other effects were significant (all ps $> .12$).

Affect

After reverse-scoring responses to "*discouraged*" and "*tense*," the four mood adjectives were combined ($\alpha = .82$) to create an affect index. A Direction × Mode ANOVA yielded the predicted interaction on this affect index, $F(1,76) = 16.77$, $p < .001$, $\eta^2 = .18$. Whereas UE elicited more negative affect ($M = 3.35$, $SD = 1.85$) than did UR ($M = 5.17$, $SD = 1.70$), $F(1,76) = 12.82$, $p = .001$, $d = 1.02$, DR elicited more negative affect ($M = 3.74$, $SD = 1.80$) than did DE ($M = 4.97$, $SD = 1.18$), $F(1,76) = 5.13$, $p = .03$, $d = .81$.

Persistence

To examine our predictions regarding persistence on the anagram task, a Direction × Mode × Set Persistence (*Set 1* vs. *Set 2*) mixed ANOVA was conducted with repeated measures on the third factor. To begin, the analysis revealed a main effect of Set Persistence, $F(1,76) = 5.45$, $p = 02$, $\eta^2 = .07$, indicating that participants spent longer solving the Set 2 anagrams ($M = 696.71$ s, $SD = 325.49$) than they did solving the Set 1 anagrams ($M = 621.58$ s, $SD = 298.85$). Second, the analysis revealed a Direction × Set Persistence interaction, $F(1,76) = 7.15$, $p = .009$, $\eta^2 = .09$, indicating that upward counterfactuals led to greater Set 2 persistence ($M = 777.28$ s,

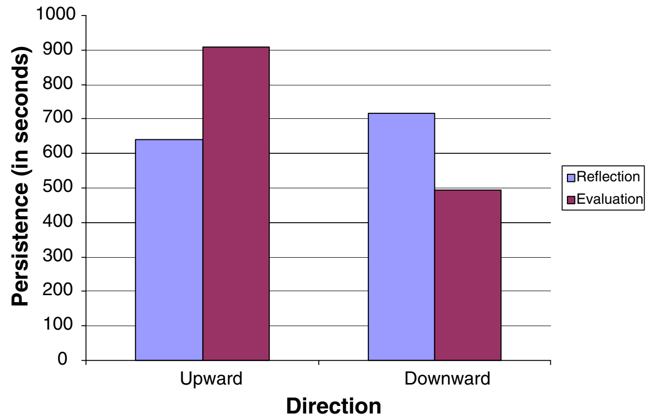

Fig. 2. Set 2 persistence as a function of simulation direction and simulation mode.

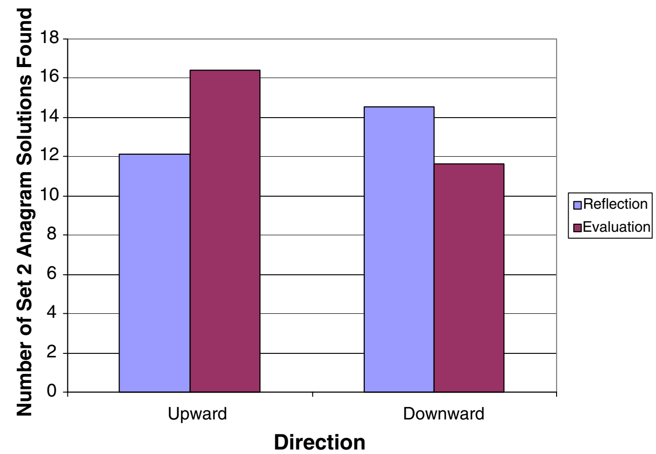

Fig. 3. Set 2 performance as a function of simulation direction and simulation mode.

$SD = 354.81$) than did downward counterfactuals ($M = 603.08$ s, $SD = 262.40$). The Mode × Set Persistence interaction was not significant, $F\ (1,76) = 2.54$, $p = .12$, $\eta^2 = .03$.

Importantly, the predicted Direction × Mode × Set Persistence interaction was obtained, $F\ (1,76) = 24.94$, $p < .001$, $\eta^2 = .25$. Subsidiary two-way analyses conducted on this significant three-way interaction indicated that there were no significant effects for Set 1 persistence, all *p*s > .27. However, a significant Direction × Mode interaction emerged for Set 2 persistence, $F\ (1,76) = 13.86$, $p < .001$, $\eta^2 = .15$, and that interaction is depicted in Fig. 2. Whereas UE elicited greater persistence ($M = 907.91$ s, $SD = 387.75$) than did UR ($M = 640.43$ s, $SD = 260.89$), $F\,(1,75) = 19.09$, $p < .001$, $\eta^2 = .32$, DR elicited greater persistence ($M = 717.29$ s, $SD = 280.40$) than did DE ($M = 494.88$ s, $SD = 195.07$), $F\ (1,75) = 10.18$, $p = .003$, $\eta^2 = .23$.

Performance

To examine whether counterfactual thinking exerted an effect on anagram performance, a Direction × Mode × Set Performance (*Set 1* vs. *Set 2*) mixed ANOVA was conducted with repeated measures on the third factor. Overall, participants performed better on the second set of anagrams ($M = 13.48$, $SD = 4.49$) than they did on the first set of anagrams ($M = 12.81$, $SD = 4.10$), albeit marginally, $F\ (1,76) = 2.91$, $p = .09$, $\eta^2 = .04$. Neither the Direction × Set Performance nor the Mode × Set Performance interactions were significant, both *F*s < 1.

Consistent with the pattern found for persistence, however, this analysis did reveal a significant Direction × Mode × Set Performance interaction, $F\ (1,76) = 12.61$, $p = .001$, $\eta^2 = .14$. Whereas subsidiary two-way analyses of the three-way interaction indicated that there were no significant effects for Set 1 performance, all *p*s > .32, a significant Direction × Mode interaction emerged for Set 2 performance, $F\ (1,76) = 13.92$, $p < .001$, $\eta^2 = .16$ (see Fig. 3). Whereas UE engendered better performance ($M = 16.41$, $SD = 4.79$) than did UR ($M = 12.14$, $SD = 4.51$), $F\ (1,75) = 10.31$, $p = .003$, $\eta^2 = .21$, DR engendered better performance ($M = 14.56$, $SD = 3.75$) than did DE ($M = 11.63$, $SD = 3.92$), $F\ (1,75) = 6.50$, $p = .02$, $\eta^2 = .16$.

Regressions/path analyses

Regression analyses were then conducted to examine the predicted relations among the study variables. To examine our specific hypotheses regarding mediation, we followed procedures outlined by Kenny, Kashy, and Bolger (1998). Because our predictions differed for upward and downward counterfactual thinking, we carried out separate analyses for these two groups.

Upward counterfactuals

We began by examining the prediction that affect should mediate the relationship between counterfactual thinking mode and motivation. The first requirement for mediation is to demonstrate a relationship between predictor and criterion, and this was achieved by examining whether mode (dummy coded as −1, reflection; +1, evaluation), by itself, predicted Set 2 persistence. As expected, mode did significantly predict Set 2 persistence, $\beta = .51$, $p < .001$. Second, we tested whether affect mediated the relationship between mode and Set 2 persistence. Satisfying the requirement for mediation, affect was related to mode, $\beta = -.46$, $p = .002$. Finally, we regressed Set 2 persistence on the mediator (affect) and the predictor (mode). As depicted in Fig. 4, affect was significantly related to Set 2 persistence, $\beta = -.46$, $p < .001$, consistent with its plausible mediational role and satisfying the third requirement for mediation. When affect was entered, the path from mode to Set 2 persistence remained significant,

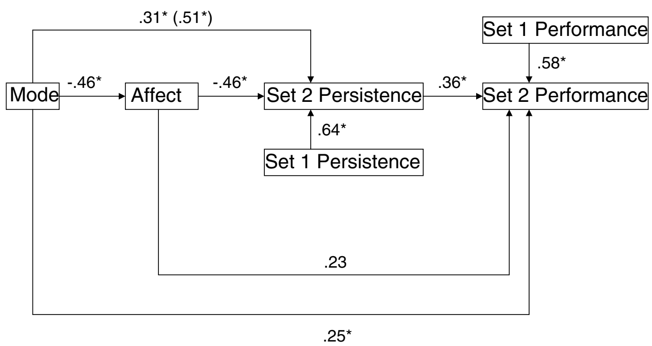

Fig. 4. Path model for upward counterfactual condition relating mode, affect, and persistence to performance. Note: Weights are standardized path coefficients adjusted for all other factors in the model. "*" denotes relationships that are significant at the $p < .05$ level.

$\beta = .31$, $p = .007$. However, a Sobel (1982) test indicated that the relationship between mode and Set 2 persistence was significantly reduced with affect included as a mediator, $z = 2.61$, $p = .009$.

Having established that the relationship between counterfactual thinking mode and enhanced persistence was partially accounted for by the influence of mode on affect, further analyses were conducted to determine how each of the study variables contributed to Set 2 anagram performance. To do so, we regressed Set 2 performance on mode, affect, and persistence. The results of this analysis are depicted in Fig. 4. As expected, Set 2 persistence was significantly related to Set 2 performance, $\beta = .36$, $p = .05$. Importantly, however, mode (i.e., upward evaluative processing) also exerted a significant and independent effect on Set 2 performance, $\beta = .25$, $p = .05$.

To further understand what aspects of upward evaluative processing may have influenced Set 2 performance above and beyond the effect of mode on Set 2 persistence (vis-à-vis affect), two independent judges, both of whom were blind to experimental condition, and one of whom was blind to the experimental hypotheses, coded the counterfactuals generated by each participant for evidence of useful and strategic inferences along a 3-point (−1, *not at all useful*; 0, *somewhat useful*; +1, *quite useful*) rating scale. An example of a counterfactual that received a "−1" (not at all useful) was, "Easily finding the unscrambled words amidst the jumble and writing down multiple correct answers," and an example of a counterfactual that received a "+1" (quite useful) was, "I can discover more words by finding commonly used words within the letters and then seeing if a prefix or suffix can be added. I also can try to find common letter combinations." Inter-rater reliability on this measure was high ($r = .88$), and thus the two coder's ratings were averaged.

A Direction × Mode ANOVA performed on the strategic inference scores revealed a main effect of Direction, $F(1, 76) = 5.13$, $p = .03$, $\eta^2 = .06$, indicating that upward counterfactual thinking elicited relatively more strategic inferences ($M = -.21$, $SD = .78$) than did downward counterfactual thinking ($M = -.57$, $SD = .64$). The Mode main effect was not significant, $F(1, 76) = 1.49$, $p = .23$, $\eta^2 = .02$. Notably, the Direction × Mode interaction was also significant, $F(1, 76) = 7.74$, $p = .007$, $\eta^2 = .09$, indicating that whereas UE elicited more strategic inferences ($M = .09$, $SD = .73$) than did UR ($M = -.52$, $SD = .72$), $F(1, 76) = 8.65$, $p = .004$, $d = .84$, DR ($M = -.44$, $SD = .68$) and DE ($M = -.68$, $SD = .58$) did not significantly differ from one another, $F(1, 76) = 1.14$, $p = .29$, $d = .38$.

Two separate regression analyses were then performed to determine whether strategic inference scores in the upward counterfactual condition were associated with Set 2 persistence and Set 2 performance. First, when inference scores were allowed to predict Set 2 persistence while controlling for affect and Set 1 persistence, the analysis revealed a marginally significant positive association between the usefulness of the inferences derived from the counterfactual and subsequent persistence on the anagram task, $\beta = .18$, $p = .10$. Second, when inference scores were allowed to predict Set 2 performance while controlling for affect, Set 1 and Set 2 persistence, and Set 1 performance, the analysis revealed a significant positive association between the usefulness of the inferences derived from the counterfactual and subsequent performance on the anagram task, $\beta = .22$, $p = .05$. Importantly, the results of these analyses suggest that the strategic nature of the inferences derived from upward evaluative processing may partially account for enhanced persistence above and beyond the influence of affect (e.g., "I should have tried harder"), as well as enhanced performance above and beyond the influence of persistence vis-à-vis affect (e.g., "I should focus on finding common letter combinations").

Downward counterfactuals

For downward counterfactuals, we also examined whether affect mediated the relationship between counterfactual thinking mode and motivation. In the first step, mode was found to predict Set 2 persistence, $\beta = -.42$, $p = .003$, and in the second step, affect was related to mode, $\beta = .39$, $p = .02$. Third, Set 2 persistence was regressed on affect and mode, and affect was found to be significantly related to Set 2 persistence, $\beta = -.45$, $p = .001$ (see Fig. 5). When affect was entered, however, the path from mode to Set 2 persistence became nonsignificant, $\beta = -.24$, $p = .06$, and a Sobel (1982) test indicated that the relationship between mode and Set 2 persistence was significantly reduced with affect included as a mediator, $z = 2.05$, $p = .04$.

As before, to determine how each of the study variables contributed to enhanced Set 2 anagram performance we regressed Set 2 performance on mode, affect, and persistence. The results of this analysis are depicted in Fig. 5. As expected, Set 2 persistence was significantly related to Set 2 performance, $\beta = .35$, $p = .05$. In contrast to the anal-

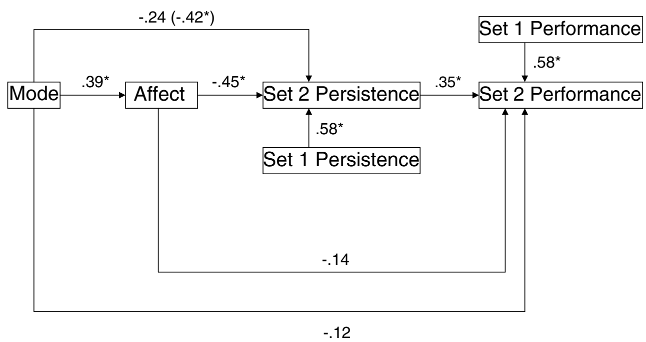

Fig. 5. Path model for downward counterfactual condition relating mode, affect, and persistence to performance. Note: Weights are standardized path coefficients adjusted for all other factors in the model. "*" denotes relationships that are significant at the $p < .05$ level.

yses conducted in the upward counterfactual condition, however, mode did not exert a significant effect on Set 2 performance when affect and persistence were controlled for, $\beta = -.12$, $p = .38$. Rather, it appears that for downward counterfactuals, mode indirectly affected performance through its influence on persistence (vis-à-vis affect).

Discussion

A study was conducted to examine the consequences of engaging in reflective and evaluative processing of upward and downward counterfactuals. Participants generated counterfactuals about their performance on an initial set of anagrams, and then their persistence and performance on a second set of anagrams was measured. Consistent with predictions, evaluative processing of upward counterfactuals elicited a larger increase in persistence and better performance than did reflective processing of upward counterfactuals, whereas reflective processing of downward counterfactuals elicited a larger increase in persistence and better performance than did evaluative processing of downward counterfactuals. Moreover, path analyses indicated that whereas the relationship between counterfactual thinking and persistence was accounted for by (negative) emotional responses following upward and downward counterfactual generation, the relationship between counterfactual thinking and performance was accounted for by enhanced persistence following reflective processing of downward counterfactuals (vis-à-vis affect), but was accounted for by both enhanced persistence (vis-à-vis affect) *and* strategic thinking following evaluative processing of upward counterfactuals.

The results of the path analysis conducted in the upward counterfactual condition revealed that the relationship between mode and persistence was mediated by negative affect. As depicted in Fig. 4, however, an independent, marginally significant *positive* relationship ($\beta = .23$, $p = .10$) also emerged between affect and Set 2 performance, suggesting that the affect derived from upward simulations may affect performance through two distinct mechanisms. On the one hand, UE may lead individuals to feel more aroused, thereby enhancing task persistence and task performance. Alternatively, however, the feelings of relaxation produced by UR may also enhance performance (despite the decrease in persistence), perhaps by facilitating the development of more creative solutions. In support, empirical studies consistently report a relationship between positive mood and creativity (e.g., Hirt, Levine, McDonald, Melton, & Martin, 1997; Isen, 1987). Likewise, Collins (1996; see also Lockwood and Kunda, 1997) described how upward comparisons can be inspirational to the extent that people believe that they possess the ability to perform at the level of the comparison standard. In contrast, however, DE may not confer the same performance benefits as UR (see Fig. 5) because it merely conveys acceptance of the status quo.[1]

It is useful to draw connections between the REM (Markman & McMullen, 2003) and the IGoA and TEMPO models described by Sanna and colleagues (Sanna et al., 2003; Sanna, Carter, & Burkley, 2005). Employing REM terminology, all three models suggest that UE involves self-improvement, DE involves mood-repair, and UR involves indulging. An area of divergence between the REM and the other two models, however, involves the consequences of DR. Whereas the REM suggests that DR can serve as a "wake-up call" (McMullen & Markman, 2000), the others suggest that DR elicits maladaptive dwelling and rumination. One possibility, supported by recent research (Markman et al., 2006), is that DR is more functional for prevention- than promotion-oriented individuals (e.g., Higgins, 2006).

Finally, future research might examine the downstream consequences of manipulating positive and negative moods in participants who have been directed to adopt an evaluative versus reflective processing style. Whereas placing participants in negative moods while asking them to adopt an evaluative processing mode might elicit upward counterfactuals but asking them to adopt a reflective mode might elicit downward counterfactuals, placing participants in positive moods while asking them to adopt a reflective mode might elicit upward counterfactuals but asking them to adopt an evaluative mode might elicit downward counterfactuals. Such predictions can be made on the basis of research demonstrating reciprocal relations between mental simulations and affect (e.g., Sanna, 2000), and could extend the REM by suggesting common causal processes.[2] We hypothesize that such effects would have performance consequences that are consistent with the results of the present study.

[1] Although the REM predicts that negative affect should engender greater persistence, the optimism literature (e.g., Nes & Segerstrom, 2006) suggests that not being overcome by negative affect is better for persistence, particularly in the long term (e.g., not dropping out of school). Future research might address the possibility that negative affect is motivating only to the extent that it does not decrease self-efficacy.

[2] We thank an anonymous reviewer for suggesting this possibility.

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