Motivation and Counterfactual Thinking:
The Moderating Role of Implicit Theories of Intelligence

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The Moderating Role of Implicit Theories of Intelligence

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ABSTRACT

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Two studies were conducted to examine the role of implicit theories of intelligence in the motivational consequences of performance-related counterfactual thinking. Overall, upward and downward counterfactuals generated in response to performance feedback differentially influenced incremental and entity theorists’ propensity to engage in remedial action. In Study 1 it was found that incremental theorists reported greater motivation for remedial action when generating upward compared to downward counterfactuals for imagined poor performance, whereas entity theorists reported less motivation for remedial action when generating upward as compared to downward counterfactuals. In study 2 it was found that incremental theorists perceived remedial action to be more useful and engaged in more remedial action following upward compared to downward counterfactuals, whereas counterfactual direction did not influence entity theorists’ perceptions of the usefulness of remedial action or actual engagement in remedial action. The results of these studies suggest that the perceived attainability of future improvement is an important moderator of the counterfactual direction and motivation link.
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OVERVIEW

Outcomes are often evaluated not only on the basis of what actually happened, but also on what one imagines might have happened if only something had been different. These “if only” or “what if” thoughts typify counterfactual thinking (e.g., Kahneman & Miller, 1986; Kahneman & Tversky, 1982). In the counterfactual thinking literature, an important distinction has been drawn between upward counterfactuals that identify how an outcome could have been better, and downward counterfactuals that identify how an outcome could have been worse (e.g., Markman, Gavanski, Sherman, & McMullen, 1993; Roese, 1994; Sanna, 1997). Much of this work has demonstrated affective contrast effects: considerations of better possible outcomes (upward counterfactuals) lead individuals to feel worse about actual outcomes, whereas considerations of a worse possible outcomes (downward counterfactuals) lead individuals to feel better about actual outcomes (e.g., Epstude & Roese, 2008; Markman, Ratcliff, Mizoguchi, Elizaga, & McMullen, 2007; Mellers, Schwartz, Ho, & Ritov, 1997). In turn, upward counterfactuals have been shown to enhance task motivation (e.g., Markman, McMullen, & Elizaga, 2008; Parks, Sanna, & Posey, 2003; Roese, 1994), as the salience of better alternative outcomes signal that improvement is necessary and highlight avenues by which better performance might be achieved (Kray, Galinsky, & Markman, 2009; Roese, 1997; Smallman & Roese, 2009), whereas downward counterfactuals have been shown to provide an affect-enhancing function that engenders satisfaction with the status quo (e.g., Markman, Mizoguchi, & McMullen, 2008; McMullen & Markman, 2000).
In considering the circumstances under which upward counterfactuals will most likely provide motivational and preparative benefits, some researchers have suggested that perceived opportunity acts as a “master moderator,” in that individuals should benefit more from upward counterfactual generation in contexts where it is believed that a task can be repeated (Beike, Markman, & Karadogan, 2009; Markman et al., 1993; Roese & Summerville, 2005), and when an outcome is the result of personally controllable actions (Markman & Weary, 1996; Nasco & Marsh, 1999; Roese & Olsen, 1995). One component of opportunity that has not been directly examined, however, is perceived attainability of improvement. Individuals differ in their lay beliefs about the possibility of improving their abilities. Some endorse an incremental theory of intelligence, believing that intelligence and abilities are malleable and can be improved, whereas others endorse an entity theory of intelligence, believing that they are born with a certain amount of intelligence and that ability is fixed and will remain stable over time (e.g., Dweck & Legget, 1988; Lockwood & Kunda, 1997; Nussbaum & Dweck, 2008).

Given incremental and entity theorists’ differing beliefs about attainability, it is proposed that their motivation and performance will be differentially influenced by the generation of upward and downward counterfactual thoughts following performance. On the one hand, it is predicted that incremental theorists will be more motivated by the generation of upward (versus downward) counterfactuals because such thoughts should increase perceived attainability. On the other hand, because upward counterfactuals can devalue evaluations of a given outcome, it is proposed that for entity theorists such
thoughts will highlight their inabilities and shortcomings and thereby lead them to withdraw effort. For entity theorists, then, it is predicted that downward (relative to upward) counterfactuals should elicit greater motivation because such thoughts serve to enhance outcome evaluations and thereby allow them to overcome threats posed by negative feedback.

Two studies were conducted to test these predictions. Employing scenarios, Study 1 found that incremental theorists reported being more motivated and perceived remedial action to be more useful after generating upward as compared to downward counterfactuals, whereas entity theorists reported being more motivated and perceived remedial action to be more useful after generating downward as opposed to upward counterfactuals. Study 2 demonstrated that incremental theorists perceived remedial action to be more useful and engaged in a greater degree of remedial action after generating upward as compared to downward counterfactuals. In contrast, entity theorists’ perceptions of the usefulness of remedial action and actual engagement in remedial action did not vary as a function of counterfactual direction.
INTRODUCTION

Evaluative Implications of Counterfactual Thinking

Although receiving behavior and performance feedback is commonplace, the means by which individuals determine whether this feedback reflects better versus worse performance, and whether improvement is necessary, are complex and multiply determined. In order to make such evaluative judgments, individuals find it useful to have a standard against which to compare. Comparison standards can take the form of other people (social comparisons: Festinger, 1954; Mussweiler, 2003; Wood, 1989) or one’s own past performance (temporal comparisons: Albert, 1977; Wilson & Ross, 2001; Zell & Alicke, 2009). Further, individuals are capable of mentally simulating standard information for comparison purposes by engaging in counterfactual thinking – the generation of imagined alternatives to reality. Drawing from the social comparison literature, Markman et al. (1993) distinguished between two directions of counterfactual thinking, whereby imagined comparison standards can be either upward (“it could have been better”) or downward (“it could have been worse”). For example, a student who obtains a B on a midterm exam can imagine what it might have been like to have received an A (upward counterfactual) or what it might have been like to have received a C (downward counterfactual) and then compare their performance to this imagined standard (Johnson, 1986; Roese, 1994, 1997).

The direction of counterfactual thinking has been shown to have predictable consequences for the evaluation of outcomes. Much of this research has demonstrated
affective contrast effects, by which evaluative judgments are displaced away from the counterfactual standard (Landman, 1987; Roese, 1994; Sanna, Turley-Ames, & Meier, 1999; but see Markman & McMullen, 2003, for a discussion of important exceptions). As such, considerations of upward counterfactuals often lead to diminished outcome satisfaction, whereas downward counterfactuals often enhance outcome satisfaction. Medvec, Madey and Gilovich (1995), for example, observed that Olympic athletes who won a bronze medal were more satisfied with their performance than were their silver medal-winning counterparts. Despite their objectively better performance, silver medalists apparently felt worse about their outcomes than did bronze medalists because for the former, the most salient counterfactual alternative was winning a gold medal (an upward counterfactual), whereas for the latter, it was the possibility of not having won a medal at all (a downward counterfactual; but see McGraw, Mellers, & Tetlock, 2004, for an alternative interpretation).

The Functional View of Counterfactual Thinking

Counterfactual thinking direction has been shown to not only have consequences for the evaluation of outcomes, but also for the motivation to improve upon outcomes in the future. The counterfactual literature has typically demonstrated that when faced with poor performance, consideration of upward counterfactual alternatives elicits greater motivation to improve upon performance in the future than does the consideration of downward counterfactual alternatives. For example, students who were asked to consider how their past poor academic performance could have been better indicated greater
intentions to perform success-facilitating behaviors in the future compared to those who had considered how their academic performance could have been worse (Roese, 1994; Experiment 2). Further, several studies have manipulated counterfactual direction and demonstrated that after receiving negative performance feedback, participants who generated upward counterfactuals subsequently outperformed those who generated downward counterfactuals (Markman et al., 2008; Parks et al., 2003; Roese, 1994).

Why might upward counterfactuals lead to greater motivation than downward counterfactuals? A key assumption is that upward counterfactual generation identifies discrepancies and thereby initiates behavioral regulation (Epstude & Roese, 2008; Markman, Karadogan, Lindberg, & Zell, 2009; Markman & McMullen, 2003; Summerville & Roese, 2008). First, because upward counterfactual comparisons typically lead individuals to feel worse about behavioral outcomes, perceived need for improvement is increased (McMullen, Markman, & Gavanski, 1995; Schwarz & Clore, 1983; Zeelenberg, 1999). Second, the content of upward counterfactual thoughts may suggest specific behaviors that can be implemented to improve performance in the future, as such thoughts have been theorized to trigger expectancies regarding the consequences of taking that action in the future (Roese & Olson, 1997; Smallman & Roese, 2009). For example, if a waiter considers that he would have received a larger tip if he had been friendlier toward his customer, this thought should translate into an expectation that his tips will improve if he is friendlier in the future. As Carroll and Shepperd (2009) assert, “…mental simulations serve as the basis for forming expectations that enable people to
prepare for the future. Expectations derived from mental simulations represent the mental translation of prior knowledge into preparedness for the future” (pp. 427). Further, because the content of counterfactual thoughts regarding performance outcomes typically mutate, or mentally alter, one’s own personal actions (e.g., Girotto, Legrenzi, & Rizzo, 1991; Markman, Gavanski, Sherman, & McMullen, 1995; N’Gbala & Branscombe, 1995), upward counterfactual thinking can enhance perceptions of control over past outcomes, and may in turn increase perceptions of control over similar future outcomes (Nasco & Marsh, 1999).

Downward counterfactual comparisons, in contrast, provide an affect-regulation function. Contemplating how one’s performance could have been worse (but in fact was not) serves to mitigate the impact of negative performance feedback and lessen dissatisfaction (e.g., Wohl & Enzle, 2003): “I could have done worse, so I’m not that bad off.” However, because downward counterfactuals lead individuals to feel better about their performance, such individuals may also become comfortable with the status quo (McMullen & Markman, 2000). Rather than motivating individuals to improve, considerations of potentially worse performance outcomes orient individuals toward the prevention of worse outcomes (Markman, McMullen, Elizaga, & Mizoguchi, 2006), resulting in motivation to do little more than maintain the present level of performance.

**Opportunity**

Overall, both upward and downward counterfactual thoughts provide functional benefits. However, although the affect-regulation function of downward counterfactuals
is certainly valuable (see, for example, White & Lehman, 2005), upward counterfactuals are often viewed as more functional in performance domains because of their potential to spur improvement. What has received less attention in the literature, however, is an examination of the boundary conditions surrounding the link between upward counterfactual thinking, motivation, and performance: Under what conditions will upward counterfactual thinking be more (versus less) likely to provide a performance-enhancing function? Epstude and Roese (2008) recently addressed this question by asserting that the “master moderator” of the upward counterfactual-motivation-performance link may be perceptions of future opportunity. According to their reasoning, the preparative, behavior-regulating function of upward counterfactuals can best be capitalized upon when opportunities for future action exist, whereas when such opportunities are unavailable, the affective-regulating function of downward counterfactuals will be more beneficial (see also Markman et al., 2009; Markman & McMullen, 2003).

Evidence for the moderating role of opportunity perceptions was provided by Markman et al. (1993). In their study, participants’ spoken thoughts were recorded after they received feedback on a hand of blackjack that was framed as a loss, a win, or a neutral outcome. Moreover, half of the participants expected to have additional opportunities to play, whereas the other half believed that they would have only one opportunity to play. According to the results, participants expecting to play additional hands spontaneously generated a greater proportion of upward to downward
counterfactuals in comparison to those who did not expect to play again (see also McMullen & Markman, 2002; Sanna, 1996). The authors concluded that individuals will opt for the potential preparative benefits of upward counterfactual thinking when future opportunities are perceived, but when no such opportunities are considered to be available, individuals will instead generate downward counterfactuals for the purposes of coping and maintaining positive affect (see also Lazarus & Folkman, 1984; Taylor & Schneider, 1989). Similarly, Roese and Olsen (1995) demonstrated that the perceived controllability of an outcome moderates counterfactual direction. Specifically, participants were more likely to generate upward than downward counterfactuals when another individual’s imagined failure was described as the result of deliberate actions (e.g., drinking too much coffee before going to sleep), but generated more downward than upward counterfactuals when that failure was described as the result of uncontrollable factors (e.g., having the flu).

\textit{Attainability}

Although repeatability and controllability have been shown to influence the direction of counterfactual thought, it is proposed that to maximize the preparative benefits of counterfactual thinking, individuals not only need to perceive that they will have an opportunity in the future to improve upon past mistakes, but they must also perceive that improvement is attainable. If one has both the opportunity to correct past mistakes \textit{and} perceives that improvement is attainable, then upward counterfactual generation may prove beneficial. On the other hand, if one perceives that they have an
opportunity to tackle a similar situation again, yet does not believe that improvement is truly attainable, the derogated outcome evaluations elicited by upward counterfactual thinking should result in diminished rather than enhanced motivation. Consider, for example, a student who receives a C on her midterm exam, and subsequently thinks about how much better it would have been if she had earned a B. If the student does not believe that her mathematical abilities can improve, the upward counterfactual merely serves to highlight the student’s shortcomings. Thus, the student will feel deflated and discouraged rather than motivated, and may even come to believe that further effort is a waste of resources. It is proposed that in such instances, the generation of downward counterfactuals may actually lead to greater motivation to persist on the task than will the generation of upward counterfactuals. Because considering that worse possible outcomes could have occurred serves to make individuals feel better about the outcomes they obtained, such thoughts may temper discouragement and mitigate subsequent effort withdrawal.

Although the role of perceived attainability has not been explicitly investigated in counterfactual research (for a possible exception, see Sanna, 1997), indirect support for the current assertions has been provided by the social comparison literature (e.g., Lockwood & Kunda, 1997; Major, Testa, & Blyshima, 1991). In one study, participants experienced an initial failure on a writing task, and were then led to believe that it either was or was not possible to improve their performance on a second task (Testa & Major, 1990). Prior to engaging in the second writing task, participants were either exposed to
upward or downward social comparison information (i.e., the scores of participants who had performed better or worse on the first task). Results revealed that participants who believed that improvement was not possible and were exposed to upward social comparison information exhibited the least persistence on the second task. In line with the current proposal, this research indicates that upward comparison information can be motivationally debilitating even when the opportunity to repeat a task exists if individuals also believe that they lack the ability to improve. In such instances, the mood-enhancing effects of downward comparisons may prove more beneficial if they allow individuals to cope with the threatening implications of poor performance in domains where ability is perceived as fixed.

Implicit Theories of Intelligence

Individuals differ in their perceptions of attainability. Dweck has established a program of research indicating that there are pervasive individual differences in lay beliefs regarding the possibility of improving intelligence and related abilities that she refers to as implicit theories of intelligence (for a review, see Dweck, 2000). Some individuals endorse an incremental theory of intelligence, believing that intelligence is a malleable and fungible quality, whereas others endorse an entity theory of intelligence, perceiving it to be a fixed and immutable trait.

Although the current consensus in the literature is that both lay theories are at least partially correct, implicit theories of intelligence have been shown to influence reactions to poor performance. Whereas incremental theorists attribute poor performance
to lack of effort, entity theorists tend to attribute the same performance to a lack of ability (e.g., Butler, 2000; Hong, Chui, Dweck, Lin, & Wan, 1999). While no one is generally satisfied with receiving negative feedback about their performance, incremental theorists tend to display relatively adaptive reactions, viewing negative feedback as helpful information that may allow them to master a task. Entity theorists, in contrast, tend to become discouraged and threatened by negative performance feedback. For example, when Zhao, Mueller, and Dweck (1998) asked college students to imagine their reaction to receiving a poor GRE score, those identified as incremental theorists said they would be disappointed, but also indicated that they would consider new strategies and increase their effort in the future. Entity theorists, however, evinced more extreme and maladaptive reactions, noting that they would feel devastated and hopeless, and would likely change their major or even simply forget about graduate school.

Implicit theories of intelligence not only govern immediate reactions to negative feedback, but have also been shown to influence one’s motivation to engage in remedial action. Hong et al. (1999, Study 3) recorded Chinese high school students’ willingness to engage in a tutorial after receiving positive or negative feedback on an English comprehension task (an essential skill, as their college courses would be taught in English). Results revealed that an equal number of incremental theorists expressed willingness to complete the tutorial regardless of receiving satisfactory or unsatisfactory feedback (73.3% for each), but entity theorists were less likely to express interest in taking the tutorial after receiving unsatisfactory as opposed to satisfactory feedback.
(13.3% vs. 66.7%, respectively). Thus, entity theorists only appeared to be interested in engaging in a task designed to improve an essential skill when they believed that they were already performing adequately. On the other hand, if they learned that their performance was not up to par, they expressed little interest in an activity that might enhance their future performance.

Further, incremental and entity theorists have been shown to respond very differently to comparison information. Lockwood and Kunda (1997), for example, demonstrated that exposure to an academic “superstar” (an upward social comparison) elicited enhanced self-evaluations for incremental theorists, presumably because they believed that similar success was attainable for themselves, but elicited diminished self-evaluations for entity theorists, presumably because they believed that such success was unattainable (see also Blanton & Stapel, 2008). Moreover, incremental and entity theorists have been shown to use upward and downward social comparison information differently to repair self-esteem following poor performance. For example, Nussbaum and Dweck (2008) provided participants with negative performance feedback on a task ostensibly indicative of general intelligence, and then gave participants the opportunity to engage in social comparison (i.e. reviewing strategies used by past high- and low-performing participants). Results revealed that incremental theorists tended to review the strategies of participants who had performed better than they had (upward social comparisons), whereas entity theorists tended to review the strategies of participants who had performed worse than they had (downward social comparisons). In all, the use of
upward social comparisons allowed incremental theorists to recover self-esteem, whereas self-esteem recovery was accomplished for entity theorists via exposure to downward social comparison information.
THE PRESENT RESEARCH

The purpose of the present research is to demonstrate that attainability perceptions are an important moderator of the motivational functions of upward and downward counterfactual thinking. In light of incremental and entity theorists’ differing beliefs regarding the attainability of better outcomes, as well as their differential reactions to upward and downward social comparison information, it is proposed that individuals will respond differently to upward and downward performance-related counterfactuals as a function of their lay theories. Because incremental theorists perceive that future improvement is attainable, and upward counterfactuals both highlight a need for improvement and may specify avenues by which improvement can be attained, thoughts of how performance could have been better in the past should translate into thoughts that performance can improve in the future (see also Oettingen & Kappes, 2009). Thus, for incremental theorists, it is predicted that upward counterfactual thoughts regarding suboptimal performance should be inspiring and lead to greater subsequent task motivation and engagement via remedial action than should downward counterfactual thoughts.

In contrast, however, because entity theorists believe that their intelligence-related abilities are fixed, upward counterfactuals may elicit ability-related (i.e., stable) attributions for their poor performance (cf. Weiner, 1985). For entity theorists, then, upward counterfactuals should be more discouraging than motivating, even when opportunities are available to repeat the task. In light of research indicating that entity theorists tend to withdraw subsequent effort when perceived competence is low, the
derogated outcome evaluations elicited by upward counterfactuals should lead such individuals to be less likely to engage in remedial action. Instead, the mood-elevating consequences of downward counterfactual thinking may be better suited to aid entity theorists in alleviating the self-threat experienced in the face of less than optimal performance.

Overall, then, it is predicted that incremental theorists will demonstrate greater task motivation after considering upward (versus downward) performance-related counterfactuals, whereas entity theorists will demonstrate greater task motivation after considering downward (versus upward) performance-related counterfactuals.
STUDY 1

Overview

Participants imagined having received negative feedback on a test of their verbal intelligence, and subsequently receiving mildly negative feedback on a task related to their verbal intelligence. After generating upward or downward counterfactuals for their imagined poor performance, participants were asked to indicate their willingness to engage in a tutorial. It was predicted that for incremental theorists, the generation of upward counterfactuals would elicit greater motivation to engage in the tutorial than would downward counterfactuals. For those holding an entity theory, in contrast, it was predicted that the generation of upward counterfactuals would elicit less motivation to engage in the tutorial than would downward counterfactuals.

Method

Participants

Two hundred and thirty-eight introductory psychology students at Ohio University participated in exchange for partial course credit.

Procedure

Participants were told that the purpose of the study was to investigate the implications of using one’s imagination. They were first asked to imagine that they had just received a score of 56% on a test of their verbal intelligence, indicating that they have “poor verbal intelligence.” Participants then rated how satisfied, disappointed, relaxed, tense, motivated, and discouraged they would feel after receiving these results on
a scale ranging from 1 (“not at all”) to 9 (“extremely”). Next, participants were asked to imagine that they would be taking two versions of the Boggle Word Task (BWT), “…a task for which performance has been shown to depend highly upon one’s verbal intelligence.” Participants then imagined that after receiving their score on the first BWT, but before taking the second BWT, they would be given the option of taking a tutorial for which past research has shown mixed effectiveness.

After imagining that they had received a score of 59% on the first BWT (indicating poor performance), participants were instructed to generate counterfactuals about their performance. Specifically, participants were assigned to generate either upward (“imagine how your score on the first BWT could have been better”) or downward (“imagine how your score on the first BWT could have been worse”) counterfactuals. Participants then rated how satisfied, disappointed, relaxed, tense, motivated, and discouraged they would feel about their first BWT score on a scale ranging from 1 (“not at all”) to 9 (“extremely”).

Next, participants were prompted to rate their likelihood of taking the tutorial (e.g. “how useful do you expect that the tutorial would be for you?” and “how likely is it that you would take the tutorial?”) on the same nine-point scales. Additionally, participants rated the amount of effort that they would expend on the tutorial (i.e., “How much time would you spend on the tutorial?” and “How much effort would you put into the tutorial?”) on nine-point scales ranging from 1 (“very little”) to 9 (“a lot”). Participants then rated how well they expected to perform on the second BWT (i.e.,
“Compared to your score on the first BWT, how do you expect to perform on the second BWT?” on a nine-point scale ranging from 1 (“worse”) to 9 (“better”). Finally, participants completed the Theories of Intelligence Scale (Dweck, 2000) by rating their agreement with four statements (e.g., “You can learn new things, but you can’t really change your basic intelligence level”) on six-point scales ranging from 1 (“strongly agree”) to 6 (“strongly disagree”). Participants were then debriefed and thanked for their participation.

Results

Preliminary Analyses.

All analyses were conducted using participants’ mean intelligence theory scores as a continuous variable ($M = 3.91$, $SD = 1.10$), with lower scores reflecting greater endorsement of an entity theory of intelligence and higher scores reflecting greater endorsement of an incremental theory of intelligence. However, of the 238 participants, only 18% were identified as true entity theorists (i.e., mean scores below 3.5 on the 6-point scale; see Dweck, 2000). Because of concerns that employing a sample with a substantial majority of incremental theorists (relative to entity theorists) might skew the results of correlation and regression analyses, only data from the first twenty participants identified as incremental and entity theorists in each counterfactual condition were used.

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1 19 entity theorists were obtained for the downward counterfactual condition.
in the reported analyses. Descriptive statistics for the major variables are provided as Table 1.

**Reactions to Baseline Intelligence Feedback.** Correlation analyses revealed no significant relationships between participants’ mean intelligence theory scores and self-reports of how disappointed (\(M = 7.27\)), discouraged (\(M = 5.38\)), tense (\(M = 5.78\)), motivated (\(M = 5.14\)), relaxed (\(M = 3.08\)), or satisfied (\(M = 2.09\)) they expected to feel upon receiving the initial negative verbal intelligence test feedback, all \(rs < .10\). As expected, all participants viewed the baseline intelligence information as generally negative and upsetting, regardless of intelligence theory.

**Motivation**

**General motivation.** The central hypothesis was that the influence of counterfactual direction on subsequent task motivation would be moderated by implicit theories. To examine this hypothesis, counterfactual direction (dummy coded as 1 = upward; 2 = downward), intelligence theory scores, and their interaction were regressed on participants’ self-reported (general) motivation for the second BWT. As predicted, a significant Direction X Theory interaction emerged, \(\beta = -1.271, p < .01\). Simple slope tests indicated that the slopes for both incremental and entity theorists were significantly different from zero [incremental: simple slope = -1.42, \(t(76) = -2.16, p < .05\); entity: simple slope = 1.38, \(t(76) = 2.10, p < .05\)]. As depicted in Figure 1, incremental theorists reported feeling more motivated following the generation of upward as compared to

\(^2\) All reported results remain significant when the entire sample is employed.
downward counterfactuals, whereas entity theorists reported feeling more motivated following the generation of downward as compared to upward counterfactuals. No significant main effects or interactions were found for any of the other reaction variables (i.e., satisfied, disappointed, relaxed, tense, and discouraged), indicating that the influence of counterfactual direction was specific to incremental and entity theorists’ self-reported motivation, rather than mood or outcome satisfaction.

Motivation for remedial action. In addition to general motivation, it was predicted that upward and downward counterfactuals would differentially influence incremental and entity theorists’ motivation to engage in remedial action (i.e., interest in taking the BWT tutorial). To examine this hypothesis, counterfactual direction, intelligence theory scores, and their interaction were regressed on each of the four BWT tutorial variables. A significant Direction X Theory interaction was revealed for participants’ ratings of the perceived usefulness of the BWT tutorial, $\beta = -1.272, p < .01$. Simple slope tests indicated that the slopes for both incremental and entity theorists were significantly different from zero [incremental: simple slope = -1.13, $t(76) = -2.06, p < .05$; entity: simple slope = 1.29, $t(76) = 2.37, p < .05$]. As depicted in Figure 2, incremental theorists reported expecting the tutorial to be more useful after generating upward as compared to downward counterfactuals, whereas entity theorists reported expecting the tutorial to be more useful after generating downward as compared to upward counterfactuals. No significant main or interaction effects were obtained on self-report measures of the likelihood of taking the tutorial, expected time spent on the
tutorial, or expected effort put into the tutorial. Further, no significant main or interaction effects were revealed for participants’ performance expectations for the second BWT.

Discussion

As predicted, the generation of upward and downward counterfactuals differentially influenced the motivation of individuals holding incremental and entity theories of intelligence. Although all participants reported relatively negative reactions to imagining initially negative intelligence feedback, incremental theorists reported being more motivated after considering how their performance on a related task could have been better (versus worse), whereas entity theorists reported feeling more motivated after considering how their performance could have been worse (versus better).

Further, counterfactual direction was shown to differentially influence incremental and entity theorists’ perceptions of how useful it would be to take remedial action. Incremental theorists expected the tutorial to be more useful following the generation of upward counterfactuals, whereas entity theorists expected the tutorial to be more useful following the generation of downward counterfactuals. Although no relationship was found between participants’ implicit theories and self-reported likelihood of taking the tutorial, time expected to be spent on the tutorial, or effort expected to be expended on the tutorial, it is suggested that this is may be the result of using a scenario-based paradigm, a limitation that will be addressed in Study 2.
STUDY 2

The purpose of Study 2 is to replicate and extend the findings of Study 1 by examining incremental and entity theorists’ engagement in remedial action and performance after generating counterfactuals. If counterfactual direction differentially influences incremental and entity theorists’ perceptions of the usefulness of remedial action, as the results of Study 1 suggest, it is hypothesized that this will in turn influence the magnitude of effort expended when engaging in remedial action. Specifically, it is predicted that the generation of upward counterfactuals will lead incremental theorists to expend more effort on remedial action than will the generation of downward counterfactuals, whereas downward counterfactuals will lead entity theorists to expend more effort on remedial action than will upward counterfactuals. It is further predicted that this increased motivation to engage in remedial action will in turn influence behavior, such that the performance of incremental theorists will improve more following the generation of upward (versus downward) counterfactuals, whereas the performance of entity theorists will improve more following the generation of downward (versus upward) counterfactuals.

A secondary aim of Study 2 is to investigate the possible influence of counterfactual direction on the selection of specific achievement goals pursued by incremental and entity theorists. Previous research has demonstrated that beliefs about the malleability of intelligence tend to orient individuals toward different types of achievement goals (Dweck, 2000). Believing that their intelligence is malleable and thus
improvable, incremental theorists tend to pursue learning or mastery goals (i.e., where the goal is to increase competence). Entity theorists, in contrast, believing that their intelligence is fixed, tend to pursue performance goals (i.e., where the goal is to demonstrate competence to self and others).

Early work investigating the motivational effects of achievement goals showed that whereas the pursuit of mastery goals consistently led to adaptive consequences regarding task involvement and persistence, the pursuit of performance goals sometimes led to maladaptive consequences and sometimes led to adaptive consequences (for a review, see Elliot, 2005). To address this ambiguity, Elliot and Harackiewicz (1996) incorporated the approach-avoidance dichotomy into the achievement goal construct, distinguishing between performance-approach goals (i.e., the desire to demonstrate competence) and performance-avoidance goals (i.e., the desire to avoid demonstrating incompetence). Research employing this trichotomous achievement goal framework has demonstrated that the pursuit of performance-approach goals is linked with increased task engagement, persistence, and performance, whereas the pursuit of performance-avoidance goals is linked with effort withdrawal and hindered performance (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; McGregor & Elliot, 2002). Further, perceptions of competence have been shown to be an important antecedent to the adoption of approach- and avoidance-oriented performance goals. Although individuals often simultaneously hold performance-approach and performance-avoidance achievement goals, high perceptions of task competence have been shown to strengthen
the pursuit of performance-approach relative to performance-avoidance goals, whereas low perceptions of task competence have been shown to strengthen the pursuit of performance-avoidance relative to performance-approach goals (Elliot & Church, 1997).

Given that downward counterfactuals typically lead to more positive evaluations of negative outcomes, it seems plausible that the generation of downward counterfactuals would enhance competence perceptions and, in turn, orient entity theorists toward performance-approach goals. Conversely, because upward counterfactuals typically lead to the derogation of outcome evaluations, the generation of upward counterfactuals may decrease perceptions of competence and, in turn, orient entity theorists toward performance-avoidance goals. In line with the achievement goal literature, if the generation of downward counterfactuals enhances entity theorists’ pursuit of performance-approach goals, this should strengthen task engagement and enhance performance, whereas if the generation of upward counterfactuals enhances entity theorists’ pursuit of performance-avoidance goals, this should weaken task engagement and diminish performance.

A different pattern might be expected for incremental theorists. Because incremental theorists are typically oriented toward mastery goals, and those holding mastery goals have been shown to persist longer after receiving negative performance feedback (Elliot, McGregor, & Gable, 1999), it might be expected that the lowered outcome evaluations that are elicited by upward counterfactuals would increase the pursuit of mastery goals. In other words, because upward counterfactuals tend to diminish
outcome evaluations, the generation of upward counterfactuals should lead incremental theorists to see a greater need for improvement and strengthen their pursuit of mastery goals, thereby enhancing task engagement and improving performance.

In summary, the aims of the proposed study are three-fold. The first aim is to conceptually replicate the results of Study 1. To this end, it is predicted that for entity theorists, the generation of downward counterfactuals will lead to greater motivation as assessed by engagement in remedial action than will upward counterfactuals, whereas the reverse will be true for incremental theorists. The second aim is to examine the influence of counterfactual direction on performance. Specifically, it is predicted that for entity theorists, the generation of downward counterfactuals will enhance performance to a greater extent than will upward counterfactuals, but that the reverse will be true of incremental theorists. Finally, the study will examine the influence of counterfactual direction on the specific achievement goals pursued by incremental and entity theorists (see Figure 3 for an overview of the proposed model).

Overview

The procedure followed that of Study 1, except that participants’ actual engagement in remedial action and performance were assessed. Participants were provided with feedback indicating that they have poor verbal intelligence, and then received negative feedback on a task ostensibly related to verbal intelligence (the BWT). After generating either upward or downward counterfactuals about their performance on the task, participants then completed several measures regarding their reactions to the
feedback, their current achievement goals, and their performance expectations on a second trial of the task. Participants were then given an opportunity to engage in a tutorial designed to potentially improve their performance prior to completing a second BWT trial. A procedural flow-chart is represented in Figure 4.

Method

Participants

A total of 89 undergraduate psychology students at Ohio University participated in partial fulfillment of a course requirement. During a mass prescreening, participants completed the four-item Theories of Intelligence Scale (Dweck, 2000), the twelve-item Achievement Goal Measure (Elliot & McGregor, 2001), and indicated their prior experience playing the game Boggle on a nine-point scale ranging from 1 (“never played”) to 9 (“play very often”). Only participants that indicated having little prior experience with the game Boggle (i.e., those indicating either a “1” or a “2” on the 9-point scale) were eligible to participate in order to avoid the extraneous influence of experience level. One participant was excluded from analyses for failing to provide accurate identification information necessary to obtain prescreen data. Two participants were excluded from analyses for scoring higher than three standard deviations above the mean on the tutorial measure. Altogether, 86 participants were included in the analyses.

Procedure

Verbal intelligence feedback. Participants arrived at the lab, were seated at a computer terminal, and completed an informed consent form. Next, participants were
informed that they had been specially selected to participate in this study based on their scores on a verbal intelligence measure that they completed during the mass prescreening session. All participants then received feedback indicating that they had scored in the 46th percentile of students at Ohio University, indicating “moderately poor verbal intelligence” (see Figure 5). Participants were then asked to rate how satisfied, disappointed, relaxed, tense, motivated, and discouraged they felt in response to this feedback on scales ranging from of 1 (“not at all”) to 9 (“extremely”).

**Boggle word task (BWT) #1.** Participants were then informed that they would complete two trials of the Boggle Word Task (BWT), a task on which performance ostensibly depends highly on one’s verbal intelligence. Boggle is a word game in which players connect adjacent letters in a 4 X 4 matrix to find as many words as possible using contiguous letters. Points are assigned based on the length of the words found, with longer words being assigned higher point values. Past studies have shown that college students find this activity to be interesting and challenging (e.g., Tauer & Harackiewicz, 1999).

Participants were further informed that after receiving their score on the first BWT, but prior to completing the second BWT, they would be given the option to complete a tutorial consisting of up to ten practice trials, although it was also noted that past research has (ostensibly) produced mixed evidence for the effectiveness of the tutorial. After learning the rules and viewing a sample puzzle, participants were given three minutes to complete the first Boggle puzzle trial. Upon completion, all participants
were given false feedback indicating that they had placed in the 47\textsuperscript{th} percentile among Ohio University students, again indicating that they have “moderately poor verbal intelligence” (see Figure 6).

*Counterfactual manipulation.* Depending on the condition to which they had been randomly assigned, participants were then asked to generate either upward counterfactuals (“think about your performance and compare it to how it could have been better”) or downward counterfactuals (“think about your performance and compare it to how it could have been worse”). After generating counterfactuals, participants rated several reaction adjectives (satisfied, disappointed, relaxed, tense, motivated, and discouraged) regarding their BWT performance on scales ranging from 1 (“not at all”) to 9 (“extremely”).

*Achievement goals.* Next, participants’ task-specific achievement goals were assessed using a modified version of the Achievement Goal Questionnaire (Elliot & McGregor, 2001). Specifically, participants answered questions regarding their orientation toward performance-approach goals (e.g., “My goal for the second BWT is to get a better score than most of the other participants”), performance-avoidance goals (e.g., “My goal is to avoid demonstrating that I have poor verbal skills”), and mastery goals (e.g., “The desire to completely master my verbal skills is what is motivating me”).

*Expectations and remedial action.* Participants then rated their expected performance on the second BWT trial on a scale ranging from 1 (“worse”) to 9 (“better”). Additionally, participants indicated the percentile score they expected to achieve on the
second BWT. After indicating how useful they expected the practice to be (on a seven point scale ranging from 1 = “not at all” to 7 = “very much”), participants chose the number of practice puzzles to complete (between 0 and 10), and then completed the selected number of practice puzzles.

_Boggle Word Task (BWT) #2._ Finally, participants were given three minutes to complete the second Boggle trial. After completing the puzzle, participants were funnel debriefed and thanked for their participation.

**Results**

_Preliminary Analyses_

All analyses were conducted using participants’ mean intelligence theory scores as a continuous variable (\(M = 3.98, SD = 1.27\)), with lower scores reflecting greater endorsement of an entity theory of intelligence and higher scores reflecting greater endorsement of an incremental theory of intelligence. Descriptive statistics for the major variables are provided as Table 2.

Correlation analyses revealed no significant relationships between participants’ mean intelligence theory scores and self-reported reaction (disappointed, discouraged, tense, motivated, relaxed, and satisfied) to the initial intelligence test feedback, all \(rs < .20\). Further, no significant effects were obtained for self-reported reaction following counterfactual generation, nor for participants’ expectations regarding their performance on the second BWT.
Remedial Action

The first aim of the present study was to replicate and extend the results of Study 1. To this end, it was first hypothesized that counterfactual direction would differentially influence incremental and entity theorists’ propensity to engage in remedial action (i.e. via the practice tutorial). Specifically, it was predicted that incremental theorists would be more likely to engage in remedial action after generating upward as compared downward counterfactuals, whereas entity theorists would be more likely to engage in remedial action after generating downward as compared to upward counterfactuals.

To first test this hypothesis, participants’ perceptions of the usefulness of practice were examined as a function of counterfactual condition and intelligence theory. Counterfactual direction (dummy coded as 1 = upward; 2 = downward), intelligence theory scores, and their interaction were regressed on participants’ Likert ratings of the perceived usefulness of practice. As predicted, and consistent with Study 1, a significant Direction X Theory interaction emerged, $\beta = -1.125$, $p < .05$. Simple slope tests indicated that the slope for incremental theorists was significantly different from zero [simple slope = -1.34, $t(83) = -2.35, p < .05$], whereas the slope for entity theorists was not, [simple slope = 0.57, $t(83) = 0.98, p = .33$]. As seen in Figure 7, incremental theorists reported perceiving the remedial action to be more useful after generating upward counterfactuals than after generating downward counterfactuals, whereas entity theorists’ perceptions of usefulness did not vary as a function of counterfactual direction.
As a second test of this hypothesis, participants’ actual engagement in remedial action was examined. Counterfactual direction (dummy coded as 1 = upward; 2 = downward), intelligence theory scores, and their interaction were regressed on the number of practice puzzles participants chose to complete. As expected, a significant Direction X Theory interaction emerged, \( \beta = -1.984, p = .05 \). Simple slope tests indicated that the slope for incremental theorists was significantly different from zero [simple slope = -1.09, \( t(83) = -2.26, p < .05 \)], whereas the slope for entity theorists was not, [simple slope = 0.29, \( t(83) = 0.59, p = .56 \)]. As depicted in Figure 8, incremental theorists chose to complete more practice puzzles after generating upward as compared to downward counterfactuals, whereas the amount of practice puzzles chosen by entity theorists did not vary as a function of counterfactual direction. Further, simple slope tests revealed that the slope for downward counterfactuals was significantly different from zero, [simple slope = -0.44, \( t(83) = -2.55, p < .05 \)] indicating that entity theorists chose to complete more practice puzzles after generating downward counterfactuals compared to their incremental theorist counterparts.

**Performance**

The second aim of the present research was to examine the differential influence of counterfactual direction on the task performance of entity and incremental theorists. Specifically, it was predicted that incremental theorists’ BWT performance would improve to a greater degree after generating upward as compared to downward counterfactuals, whereas the reverse would be true for entity theorists. Preliminary
analyses indicated that there was no significant relationship between participants’ intelligence theory score and performance on the first BWT \((p > .3)\), with the average number of points earned being 9.79 \((SD = 5.83)\). Further, amount of practice was unrelated to performance \((p >.05)\).

To test this hypothesis, a hierarchical regression analyses was conducted with points earned in the second BWT as the dependent variable. Points earned on the first BWT was entered in the first step, direction and intelligence theory scores was entered in the second step, and the Direction X Theory interaction was entered in the third step. As would be expected, a significant positive main effect of points earned on the first BWT emerged \((\beta = .693, p < .001)\) indicating that, on average, participants’ performance improved from the first BWT to the second BWT. However, because no other main or interaction effects emerged \((all ps > .4)\), this hypothesis was not supported.

**Test of the Models**

The third aim of the present study was to examine the influence of counterfactuals on the specific achievement goals pursued by incremental and entity theorists (see Figure 3). To this end, it was first postulated that for incremental theorists, the generation of upward counterfactuals would strengthen mastery achievement goals and, in turn, increase engagement in remedial action and performance, whereas downward counterfactuals would reduce mastery achievement goals and, in turn, reduce engagement in remedial action and performance. A regression analysis in which task-specific mastery goal scores were regressed on condition, controlling for baseline mastery achievement
goals obtained during the prescreen, revealed no significant effects of condition ($p > .05$). However, a regression analysis in which task-specific mastery goals (i.e., controlling for baseline mastery goals), was regressed on practice amount was marginally significant ($\beta = .335, p = .061$). Although mastery motivation was positively associated with engagement in remedial action, as predicted, mastery motivation was not influenced by counterfactual direction. Therefore this model did not receive support.

Second, for entity theorists it was postulated that downward counterfactuals would enhance the pursuit of performance-approach goals and, in turn increase engagement in remedial action and performance, whereas upward counterfactuals would enhance the pursuit of performance-avoidance goals and, in turn, decrease engagement in remedial and performance. Separate regression analyses were conducted in which each task-specific performance goal (either performance-approach or performance–avoidance), controlling for the corresponding baseline performance goal, was regressed on condition. These analyses revealed no significant effects (all $ps > .05$). Additional regression analyses indicated that task-specific performance motivations, controlling for corresponding baseline performance motivations, were not significantly associated with practice amount ($ps > .05$). Therefore, this model did not receive support.

**Discussion**

As predicted, and consistent with Study 1, the generation of upward and downward counterfactuals differentially influenced incremental and entity theorists’ propensity to engage in remedial action. Incremental theorists perceived remedial action
to be more useful and engaged in a greater degree of remedial action when generating upward as compared to downward counterfactuals. In contrast, neither entity theorists’ perceptions of the usefulness of remedial action, nor their actual engagement in remedial action varied as a function of counterfactual direction. On the other hand, neither remedial action nor counterfactual direction influenced task performance, and hypotheses regarding the role of specific achievement goals were not supported.
GENERAL DISCUSSION

Two studies demonstrated that counterfactual direction differentially influences the motivation of entity and incremental theorists. Whereas previous research has demonstrated that downward counterfactuals lead to less task motivation compared to upward counterfactuals, the current research indicates that this is more typically the case for incremental theorists for whom intelligence is perceived to be malleable. For entity theorists who perceive intelligence to be a fixed construct, in contrast, downward counterfactuals were equally (if not more) motivating compared to upward counterfactuals.

Specifically, the results of Study 1 suggest that the generation of downward counterfactuals leads incremental theorists to perceive remedial action to be less useful and to report being less motivated to improve future performance compared to the generation of upward counterfactuals. For entity theorists, on the other hand, the generation of downward counterfactuals enhanced perceptions of the usefulness of remedial action and increased motivation to improve future performance compared to the generation of upward counterfactuals. Study 2 was designed to conceptually replicate and extend the results of Study 1 using a behavioral measure of motivation. Consistent with Study 1, incremental theorists perceived remedial action to be less useful following the generation of downward as compared to upward counterfactuals, whereas the reverse was true for entity theorists. Further, generating downward counterfactuals led incremental theorists to pursue less remedial action compared to upward counterfactuals.
Unlike Study 1, however, for entity theorists the generation of downward counterfactuals led to neither differential perceptions of the usefulness of remedial action nor differences in levels of engagement in remedial action compared to the generation of upward counterfactuals.

Although the results of Study 2 supported the general hypothesis that counterfactual direction would influence the motivation of incremental and entity theorists differently, several of the more specific hypotheses were not supported. A central prediction was that downward counterfactuals would lead entity theorists to engage in more remedial action than would upward counterfactuals. This hypothesis was based on the premise that the consideration of a better possible outcome coupled with a belief that future improvement is unattainable would lead entity theorists to become discouraged and withdraw further effort, whereas the consideration of a worse possible outcome would lead them to feel more satisfied with a level of ability that they did not believe they could alter. Although this hypothesis was supported in Study 1, the results of Study 2 revealed no significant differences in the motivation of entity theorists as a function of counterfactual direction.

There are several possible explanations for the null effect reported in Study 2. First, participants’ perceptions of general intelligence may not have translated into specific perceptions of verbal intelligence. That is, participants’ theories of intelligence were assessed with regard to intelligence in general, rather than verbal intelligence in particular, which the task was purported to tap. It is possible, then, that although entity
theorists perceived their general intelligence to be fixed, they may not have perceived their verbal abilities to be fixed. This explanation seems untenable, however, given that differences between incremental and entity theorists were found in Study 2 on this general measure. Moreover, the literature on general lay intelligence theories typically shows effects using tasks involving a variety of specific types of intelligence. For example, research has shown that lay perceptions of general intelligence lead to differential effects for entity and incremental theorists in the specific domains of reading ability (Nussbaum et al., 2008), spatial ability, (Nussbaum et al., 2008), conceptual ability (Hong et al., 1999), and mathematical ability (Butler, 2000).

A more likely explanation is that the predicted deflating implications of upward counterfactuals for entity theorists may have been diminished through the spontaneous activation of self-enhancement and/or self-protection mechanisms. That is, if upward counterfactuals led entity theorists to feel worse about a lack of ability that they perceived to be immutable, this may have threatened their core self-esteem. Entity theorists may have then engaged in mood reparation strategies, perhaps even spontaneously generating downward counterfactuals that diminished the negative affect evoked by upward counterfactuals. Indeed, entity theorists have been shown to spontaneously engage in downward comparisons as a means of effectively improving self-esteem in the face of threatening negative feedback, even when upward comparisons are equally available (Nussbaum et al., 2008). Additionally, individuals appear to be more likely to generate
downward than upward counterfactuals when self-enhancement motivations are activated (White & Lehman, 2005).

Self-enhancement and self-protection motives may also explain why the differential effects of upward and downward counterfactuals for entity theorists were found in Study 1 but not in Study 2. That is, simply imagining a failure (Study 1) may not have been as psychologically impactful as experiencing a failure (Study 2) with regard to evoking compensatory reactions. Further research is needed to determine if upward counterfactuals evoke spontaneous mood and self-esteem reparation strategies for those who perceive improvement to be unattainable, and whether this may eliminate the negative implications of upward counterfactuals.

**Limitations**

One important limitation of this research is that engagement in remedial action was found to be unrelated to subsequent task performance. That is, in Study 2, practice did not improve Boggle performance on the second task. Even incremental theorists, for whom upward counterfactuals led to greater engagement in remedial action, did not display performance differences as a function of counterfactual direction. In many real-world contexts, however, remedial action can often be expected to lead to improved performance. For example, increased studying often results in improved test scores for students.

One possible reason for the lack of correspondence between practice and performance is that, overall, participants chose to complete very few practice puzzles. In
fact, of ten possible practice puzzles, less than half of participants chose to complete more than one ($M = 1.74$, $SD = 1.61$). Thus, the lack of a relationship between practice and performance is likely attributable to the restricted range of participants chosen practice amount. To better investigate the links between counterfactual direction, remedial action and performance, future research would require a wider distribution of practice choice among participants. This could potentially be achieved by providing a moderate performance incentive.

**Implications**

Despite this limitation, the results of these studies do have important implications for the counterfactual literature. Previous research has demonstrated that the generation of downward counterfactuals diminishes task motivation (e.g. Markman et al., 2008; Roese, 1994). This research suggests that the negative affect elicited by thinking about how one could have performed better is offset by enhanced persistence and performance, whereas the positive affect elicited by thinking about how one could have performed worse improves affect but may also elicit complacency.

Based on this previous research, it is tempting to suggest that people should avoid generating mood-enhancing downward counterfactuals that engender complacency, and instead elect to endure the negative affect elicited by upward counterfactuals in order to improve performance. However, the results of the current studies suggest that this need not always be the case. Although incremental theorists were less motivated by downward than upward counterfactuals, entity theorists were as motivated, if not more motivated, by
downward as by upward counterfactuals, and at levels comparable to the motivation of incremental theorists who generated upward counterfactuals.

More broadly, it appears that the typical finding that downward counterfactuals are less motivating than upward counterfactuals may depend on perceptions of improvement attainability (Beike et al., 2009; Lockwood & Kunda, 1997; Roese & Summerville, 2005; Sanna, 1997). Whereas the typical effect may apply to those who perceive success to be attainable (incremental theorists), those who perceive improvement to be unattainable (entity theorists) may actually benefit more from generating downward compared to upward counterfactuals. For these individuals, the mood-enhancing benefits of thinking about how an outcome could have been worse do not appear to be offset by a reduction in motivation. Instead, they may be able to have their mood-reparation cake and eat it too.

Future research would benefit from exploring additional individual difference and contextual variables related to perceptions of improvement attainability. For example, people with low self-esteem, depression, pessimistic dispositions, or an external locus of control might perceive improvement to be less controllable and less attainable than their high self-esteem, non-depressed, optimistic, and internal locus counterparts (cf. Major, Testa, & Bylsma, 1991; Markman & Weary, 1996; Sanna, 1996; Roese & Olsen, 1993; 1995), and therefore may be more likely to reap both affective and motivational benefits of downward counterfactuals.
Summary

The results of the present research suggest that perceived attainability of future improvement is an important moderator of the counterfactual direction and motivation link. Despite previous research suggesting that downward counterfactuals will elicit lower levels of task motivation than will upward counterfactuals, the current research suggests that this may only be true when perceived attainability of improvement is high. When attainability perceptions are low, however, the de-motivating effects of downward counterfactuals are not evident. Future research will benefit from exploring the possibility that the generation of upward counterfactuals by individuals who perceive improvement to be unattainable may be threatening enough to evoke spontaneous self-enhancement and self-protection strategies (Sanna, Chang, & Meier, 2001). For example, it might be interesting to compare the effects of upward counterfactuals on individuals who possess varying degrees of effective coping strategies when success seems unattainable (Lyubomirsky & Nolen-Hoeksema, 1993). Overall, the present research contributes to our understanding of how individuals are motivated by the way they think, thereby promoting future thinking strategies that can empower individuals to perform better, achieve more, and feel better about themselves.
REFERENCES


TABLES

Table 1

*Descriptive Statistics for the Major Variables of Study 1*

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<thead>
<tr>
<th>Variable</th>
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<th>SD</th>
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Table 2

*Descriptive Statistics for the Major Variables of Study 2*

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<tr>
<td>BWT #2 Points</td>
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**Figure 1.** Mean self-reported motivation as a function of counterfactual direction and implicit intelligence theory.
Figure 2. Mean perceived usefulness of tutorial as a function of counterfactual direction and implicit intelligence theory.
Figure 3. Proposed model.
Figure 4. Overview of procedure.
<table>
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<tr>
<th>Percentile Range</th>
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<tr>
<td>76th - 100th</td>
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</tr>
<tr>
<td>51st - 75th</td>
<td>Moderately Good Verbal Intelligence</td>
</tr>
<tr>
<td>26th - 50th</td>
<td>Moderately Poor Verbal Intelligence</td>
</tr>
<tr>
<td>1st - 25th</td>
<td>Very Poor Verbal Intelligence</td>
</tr>
</tbody>
</table>

*Figure 5. Verbal intelligence test feedback.*
Figure 6. BWT #1 feedback.

<table>
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<th>Range</th>
<th>Performance</th>
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<td>51st - 75th</td>
<td>Moderately Good Performance</td>
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<td>26th - 50th</td>
<td>Moderately Poor Performance</td>
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<tr>
<td>1st - 25th</td>
<td>Very Poor Performance</td>
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</table>
Figure 7. Mean perceived usefulness of practice as a function of counterfactual direction and implicit intelligence theory.
Figure 8. Mean practice amount as a function of counterfactual direction and implicit intelligence theory.