Defensiveness Versus Remediation: Self-Theories and Modes of Self-Esteem Maintenance

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Defensiveness Versus Remediation: Self-Theories and Modes of Self-Esteem Maintenance

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How people maintain and repair their self-esteem has been a topic of widespread interest. In this article, the authors ask, What determines whether people will use direct, remedial actions, or defensive actions? In three studies, they tested the hypothesis that a belief in fixed intelligence (entity theory) would produce defensiveness, whereas a belief in improvable intelligence (incremental theory) would foster remediation. In each study, participants assigned to the entity condition opted for defensive self-esteem repair (downward comparison in Studies 1 and 3; a tutorial on already mastered material in Study 2), but those in the incremental condition opted for self-improvement (upward comparison in Studies 1 and 3; a tutorial on unmastered material in Study 2). Experiment 3 also linked these strategies to self-esteem repair; remedial strategies were the most effective in recovering lost self-esteem for those in the incremental condition, whereas defensive strategies were most effective for those in the entity condition.

Keywords: *defensiveness; remediation; self-esteem; theories of intelligence*

Over time, difficulties and setbacks are an inevitable part of experience in any domain. An important determinant of eventual success is how people deal with these difficulties and, in particular, whether they repair the deficiencies that led to them. However, in addition to dealing with the setback itself, people must also contend with the implications of the setback for their self-esteem, and sometimes these two responses are in conflict. As a result, people may sometimes pass up opportunities to repair deficiencies in order to tend to self-esteem concerns (e.g., Berglas & Jones, 1978; see Crocker & Park, 2004).

Much attention has been paid to defensive processes that can be used to safeguard and repair self-esteem. For example, people can dismiss the validity of negative feedback by rejecting it as inaccurate or biased (Baumeister, 1998; Kernis, 2003; Kunda, 1990). If undermining the feedback itself is impractical, people can compare their performance with relatively worse off others (Taylor & Lobel, 1989; Wills, 1981) or compensate for their shortcomings symbolically (Wicklund & Gollwitzer, 1982). Indeed, Tesser (2000) has documented such a wide range of mechanisms for self-esteem repair that he has labeled them a "self-zoo" of interchangeable processes. As noted, these processes also share an important shortcoming: They are defensive in nature (see Sherman & Cohen, 2002). Each of these processes is defensive because it restores lost self-esteem without addressing the underlying cause of the negative feedback. Instead, by employing these processes, people adjust to the problem psychologically rather than confronting it head on (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Heckhausen & Schultz, 1995; Rothbaum, Weisz, & Snyder, 1982). Research on

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defensive mechanisms, however, may paint an incomplete picture of self-esteem management processes, since in most defensiveness paradigms participants are not given the option of choosing a direct remedial response. In one study that did offer the possibility of directly responding to a threat, people did prefer a direct resolution to a defensive one (Stone, Wiegand, Cooper, & Aronson, 1997).

The aim of the current research is to explore what determines when people will respond to setbacks defensively and when they will actively pursue remedial strategies. We propose that one of the critical factors in determining this response is people's perception of the choices they have in responding to the situation (Heckhausen & Schulz, 1995; Lazarus & Folkman, 1984) and particularly whether they believe that direct improvement is possible (Heine et al., 2001, Study 3; Stone et al., 1997; Testa & Major, 1990). In keeping with Heckhausen and Schulz's (1995) contention that people generally resort to indirect psychological adjustment (secondary control) only when they perceive a direct option (primary control) to be impractical, we propose that people tend to respond defensively to negative feedback primarily when they perceive that an attempt to improve on a poor performance may be futile or will present a further risk to their self-esteem. However, when improvement seems possible and not unduly risky, people should opt to repair their self-esteem by directly confronting their poor performance.

Specifically, when receiving negative academic feedback, people's lay theories about the nature of intelligence—their beliefs about whether intelligence is fixed or improvable—should play an important role in their response to this feedback (Dweck, 1999). Building on this framework, in the current research we seek to experimentally assess whether indirect, defensive processes (secondary control) are prevalent when people hold an entity theory of intelligence (believing that intelligence cannot be changed) and whether more direct, remedial responses (primary control) will be more prevalent when people hold an incremental theory of intelligence (believing that intelligence can be improved).

Lay Theories of Intelligence and Remediation

Entity theorists have good reason to be wary of making efforts to remediate their shortcomings. From their perspective of fixed intelligence, exerting additional effort in order to master a task may not seem to be particularly effective. Moreover, in trying to improve they risk repeating the failure, which could confirm their inability and could further compromise their self-esteem. For incremental theorists the situation appears quite different. Negative feedback, while perhaps disappointing, is not an indictment of a permanent ability but is part of a learning process (Blackwell, Trzesniewski, & Dweck, 2007; Hong, Chiu, Dweck, Lin, & Wan, 1999). In a framework in which intelligence can be acquired, exerting additional effort is typically the means of doing so. Moreover, because additional failed efforts do not reflect on a permanent ability, attempts at remediation appear less risky. Therefore, although the self-esteem of both entity and incremental theorists might suffer as a result of important negative feedback, the relative attractiveness of direct remediation as a means of repairing self-esteem might be substantially different.

There is already evidence of important differences in entity and incremental theorists' willingness to pursue remedial strategies, but it has not been linked to self-esteem concerns. In a field study at the University of Hong Kong (Hong et al., 1999, Study 2), students who had performed poorly on their English proficiency examinations—a subject that is essential to success at the university because all classes are taught in English—were less interested in taking remedial English classes when they held an entity theory of intelligence than when they held an incremental theory. In a follow-up study, a similar response was found among participants who were experimentally induced to hold either an entity or an incremental theory of intelligence and given negative performance feedback (Hong et al., 1999, Study 3).

A consistent pattern was also apparent in a recent longitudinal study of students making the transition into middle school (Blackwell et al., 2007). In this study, incremental theorists were more likely than entity theorists to endorse working harder and spending more time studying next time in response to an academic setback, whereas entity theorists were more likely than incremental theorists to report that they would spend less time on the subject and would attempt to avoid it altogether in the future (Blackwell et al., 2007, Study 1). Taken together, these studies provide convergent evidence that incremental theorists are more inclined to pursue remedial strategies following a poor performance than are entity theorists.

The link between persistence after failure and the belief that skills can be developed is also supported by cross-cultural work (Heine et al., 2001; White & Lehman, 2005). In one study by Heine and his colleagues (Heine et al., 2001, Study 3), persistence on a difficult task was found to be a function of differences in cultural beliefs about the efficacy of effort. These results are consistent with the hypothesis that people's beliefs about the possibility of improvement play a role in determining whether or not they are willing to confront failure directly.

Overview of the Current Research

Building on Leary's idea that a drop in self-esteem serves as a signal that action is required (e.g., Leary, 2005), the present studies ask, What action? Leary contends that self-esteem acts as a "sociometer" that monitors one's level of social acceptance—when one's self-esteem drops, something must be done to regulate it. The sociometer's call to action, however, may lead to different responses depending on whether one believes its reading is a reflection of an adaptable reality—in which case one can try to make adjustments—or an immutable one—in which case the only available response is to tinker with the sociometer itself until it outputs the desired reading.

In the current research, we examine two of the paradigms in the self-zoo of defensive processes: downward social comparison (e.g., Tesser, 1988; Wills, 1981) and a form of symbolic self-esteem repair (Wicklund & Gollwitzer, 1982). In Study 1, we test our hypotheses in the context of social comparison, inducing either an entity or incremental theory of intelligence and then giving participants the chance to make upward or downward comparisons following negative feedback. In Study 2, after an initial test with mixed results, we offer entity and incremental participants a choice of tutorials: a remedial tutorial that will help them improve or one which guarantees success but little opportunity to improve. Finally, in Study 3 we return to social comparison to investigate whether the different responses of those in the entity and incremental theory conditions are indeed a response to self-esteem concerns and whether or not these responses are effective in repairing self-esteem.

EXPERIMENT 1

According to Wills's (1981) seminal review, people often compare themselves to relatively worse others in order to improve their subjective well-being, particularly following an ego threat. In contrast, an upward comparison offers the potential benefit of helping to improve performance (Festinger, 1954; Taylor & Lobel, 1989; White & Lehman, 2005) but can exacerbate a threat to self-esteem.

In Study 1, we manipulated participants' theories of intelligence, turning some people toward an entity theory and others toward an incremental theory. Following negative feedback on a very difficult task, participants in both conditions were presented with the option of engaging in either downward or upward social comparison. Downward comparisons would provide them with little useful information but would make them feel better about their own performance, while upward comparisons, although potentially threatening, would help them improve on the task in the future.

METHOD

Participants and Design

Twenty-nine undergraduates at an East Coast university (14 females and 15 males) were recruited to participate in a 30-min speed-reading study and paid $6 for their participation. The speed-reading context allowed us to carry out the theory inductions unobtrusively as well as to give participants plausible negative feedback on a task that could credibly be described as important. After giving written consent, participants completed the remainder of the study on the computer in a private cubicle.

Theory Induction

The first part of the study consisted of a "baseline" reading task in which participants were instructed to read a short *Psychology Today*–style scientific article at a comfortable pace and to answer questions on their comprehension of the materials. Participants were randomly assigned to read one of two articles, supporting either an entity (n = 14) or an incremental (n = 15) view of intelligence (Bergen, 1991). For example, in the entity theory condition, participants read that "current research shows that almost all of a person's intelligence is either inherited or determined at a very young age"; in the incremental theory condition, participants read parallel but opposite research concluding that "current research shows that intelligence can be increased substantially." The passage was followed by eight multiple-choice reading comprehension questions to ensure that participants read and understood the material. After this manipulation, participants in both conditions were treated identically.

Self-Esteem Threat

Next, in order to be able to present participants with self-esteem-threatening negative feedback, they were given a speed-reading test that was designed to be very difficult. Speed reading was presented as an important skill and indicative of general intellectual ability. Participants were given only 4 min to read a lengthy excerpt of a passage from Freud's *The Interpretation of Dreams*. The passage was selected to be confusing, and the 4-min time limit was far too short to allow much comprehension. Moreover, the eight multiple-choice reading comprehension questions were designed to be ambiguous in order to prevent participants from being certain of whether or not they had answered correctly. After a short delay, during which the computer was

ostensibly scoring the test, all participants were told that they had scored in the 37th percentile of students at their university. This predetermined score was selected to be low enough to be a threat to participants' self-esteem and yet leave open the possibility of both upward and downward comparison. In order to ensure that participants in both conditions had similar experiences, before proceeding to the comparisons, participants were asked whether they thought speed reading was useful and important, how well they thought they had done, and how much they would want to be a better speed reader, all on 7-point Likert-type scales.

Selection of Social Comparison Targets

Finally, participants were given the opportunity to engage in upward or downward comparisons in the context of reviewing strategies for success used by past participants who had achieved varying levels of performance. They were presented with a table listing eight past participants identified only by a participant identification number and their percentile score. There were three strategies associated with each past participant, and in order to review a strategy, participants simply had to click the link provided in the table and the strategy appeared on the right-hand side of the screen. The scores of the eight prior participants ranged from the 14th to the 98th percentile, spaced at roughly even intervals. Lower scoring participants were associated with less useful strategies, such as "I try to skim the text as quickly as possible while trying to understand as much as I can." In contrast, strategies associated with higher scoring participants were selected to be more instructive, for instance, "I read the first and last sentences of each paragraph the most carefully. Those usually have the most information, and I can skim the rest more quickly." Participants were told that they were free to review as many strategies as they liked and could move on to the next part of the study whenever they felt ready. They were not explicitly told whether or not there would be any further speed-reading tasks, but we ensured that there was sufficient time left in the session that this remained a distinct possibility.

When participants were finished reviewing strategies, they were told that the study was over, and they were fully debriefed about the goals and procedures of the study. Particular care was taken to explain that the theory induction article was fictitious and that there was no final consensus in the scientific community about the nature of intelligence but that intelligence was generally understood to have both stable and changeable qualities. Participants were also provided with references for further reading both about the nature of intelligence and research on the psychological effects of people's theories of intelligence. This debriefing procedure was followed in all subsequent studies. When probed, no participants reported suspicion that the theory induction article was intended to influence either their beliefs or actions.

RESULTS

Preliminary Analyses

Participants in both conditions scored equally well (M_{inc} = 7.67, M_{ent} = 7.79) on the eight-question reading comprehension test that followed the article used for the theory of intelligence induction, $t(27) = 0.60$, *ns*. These scores also ensured that participants had understood the article well.

There were no gender differences for any of the dependent variables, and all subsequent analyses are collapsed across gender.

There were also no differences between the two conditions in their reports of how well they felt they had done on the test (on 7-point scales, with higher values reflecting more positive responses), $M_{incremental}$ = 3.73, SD = 0.93; M_{entity} = 3.64, SD = 1.34, $t(27) = -0.21$, *ns*; how helpful, M_{inc} = 4.40, SD = 1.35; M_{ent} = 4.07, SD = 1.07, $t(27) = -0.72$, *ns*, or important they believed speed reading to be, M_{inc} = 4.53, SD = 1.25; M_{ent} = 4.36, SD = 1.39; $t(27) = -0.36$, *ns;* or how much they would like to be a better speed reader, M_{inc} = 4.13, SD = 1.64; M_{ent} = 3.57, SD = 1.70, $t(27) = -0.91$, *ns*. Thus, it was not differences in any of these beliefs about speed reading that led to any subsequent differences in behavior by participants in the two conditions.[1]

Social Comparison Choices

Before proceeding to the analysis of which strategies participants chose to examine, we should note that on average, participants chose to examine approximately one third of the 24 available strategies (M = 8.76, SD = 4.82). Participants in the incremental condition (incremental participants) reviewed somewhat more strategies (M = 10.0, SD = 4.26) than those in the entity condition (entity participants; M = 7.4, SD = 5.12), but this difference was not significant, $t(27) = -1.46$, $p = .16$.

Recall that our central hypothesis was that participants would prefer to examine different strategies depending on whether they had been induced to have an entity or an incremental theory of intelligence. In order to test this hypothesis, we analyzed participants' choice of strategies in terms of the average level of strategy chosen, the first three strategies chosen, and the proportion of strategies chosen that were true downward comparisons. We began by comparing the average level of strategy that participants chose to examine. Because

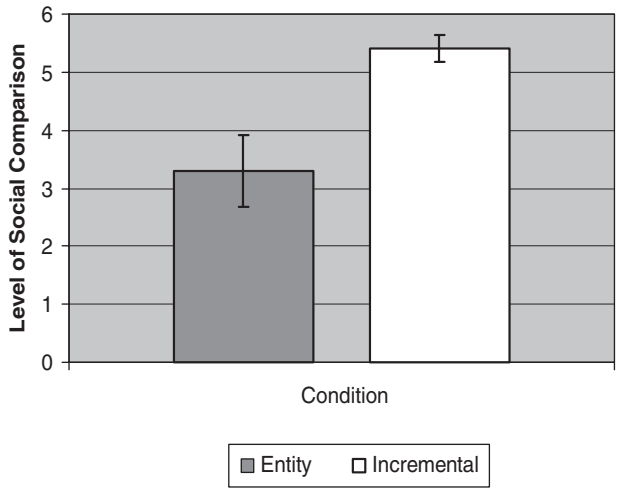

Figure 1 Mean Level of Strategy Selected by Participants in the Entity and Incremental Conditions (Study 1)

the social comparison targets' percentile scores were roughly evenly spaced, we coded the strategies associated with the lowest score a 1 and the one associated with the highest score an 8. By this measure, incremental participants chose to examine significantly "better" strategies (M = 5.41, SD = 0.92) than did entity participants (M = 3.30, SD = 2.33), $t(27) = -3.25$, $p < .01$, d = 1.2 (see Figure 1).

Simply comparing the average strategy, however, may obscure an important aspect of participants' social comparison choice. Participants choosing to examine the best (or worst) strategies first would have nowhere to go but down (or up) after exhausting the top (or bottom) choices, thus artificially moving the means closer together. Also, it is important to determine which strategies participants chose to examine first, since these should provide the best indication of their initial response to the opportunity to engage in social comparison following their poor performance. Therefore, we also compared the first three strategies that participants opted to examine. Comparing participants' first three choices, we found again that incremental participants opted to examine significantly better strategies (M = 7.11, SD = 1.40) than participants in the entity condition (M = 3.31, SD = 3.12), $t(27) = -4.29$, $p < .001$. Notably, incremental participants showed interest in even higher comparisons in their first three choices than in their overall choices, $t(14) = -4.49$, $p = .001$, but entity participants made equally low comparison choices throughout, $t(13) = -0.023$, *ns*.

Finally, it is important to note that because participants believed they had scored in the 37th percentile, not all choices below the midpoint of the scale were actually downward comparisons (their score placed them just above the third lowest of the eight scores). While it is true that entity participants did choose to examine the strategies of relatively poorer performers than incremental participants, we wanted to know to what extent participants in the two conditions (and entity participants in particular) were doing true downward comparisons, examining strategies of past participants scoring below the 37th percentile. On average, incremental participants' social comparison choices were true downwards comparison only 13% of the time, compared to 42% of entity participants' social comparison choices, $t(24) = 2.99$, $p < .01$.[2] Furthermore, looking only at participants' first three choices, we found that no incremental participant engaged in true downward comparison, while 45.5% of entity participants made at least one true downward comparison, $\chi^2(1, N = 29) = 6.47$, $p < .01$.

DISCUSSION

Consistent with our hypotheses, participants induced to hold entity and incremental theories of intelligence displayed different patterns of social comparison following negative feedback. Entity participants preferred to examine the strategies of relatively lower performers, with over 40% of their comparison targets being downward comparisons. As most research on defensiveness suggests, entity participants responded to negative feedback with a defensive self-esteem-restoring process. Incremental participants, however, responded in a different manner. Having been induced to believe in the malleability of intelligence, they engaged in very little downward comparison, choosing instead to examine the strategies of high performers and providing themselves with the opportunity to improve. These results complement the findings of Testa and Major (1990), who report that following an initial failure, participants were more interested in downward comparison information when they believed that they were unlikely to improve on a subsequent test than when they thought improvement was possible.

It is true, however, that it may not be particularly damaging to respond defensively to a setback on a task, such as speed reading, that may not figure prominently in one's life. It is considerably more costly to do so when one is performing poorly on a task that is vital to success in a domain central to one's identity. Therefore, in Experiment 2, participants were given feedback on just such an identity-relevant task and were then given the opportunity to do a tutorial that would help them improve on their shortcomings.

EXPERIMENT 2

Symbolic self-completion theory (Wicklund & Gollwitzer, 1982) predicts that when people's important identities are threatened, they can restore their self-esteem by seeking out symbols relevant to that identity that serve to re-establish the "completeness" of the threatened identity. For example, a doctor who makes an error diagnosing a patient might feel that her identity as a doctor has been threatened. To compensate, this doctor may resort to repairing her self-esteem symbolically by prominently displaying her medical school diploma or wearing a stethoscope around her neck. Important to note, these symbolic acts typically do nothing to improve the deficient skills that led to the failure. Instead of brushing up on the medical literature or re-examining the patient's file to discover the source of her error, the doctor has acted defensively, indirectly restoring her self-esteem.

Drawing on this theoretical framework, in the current study we again manipulated participants' theories of intelligence and, following negative feedback on a task in a self-defining area, presented them with the option to either directly redress their performance or defensively engage in symbolic self-esteem repair.

METHOD

Twenty-six undergraduates at a West Coast university (13 female and 13 male) were recruited with an e-mail advertising a psychology study for engineering majors. All participants reported planning to major in engineering and had taken at least two classes required for the major (M = 7.8, SD = 7.3). After signing the consent form, participants were informed that the study sought to compare engineers' spatial-reasoning abilities with those of nonengineers. They were asked to confirm their identity by checking a box labeled "I am an engineer" in order to make salient their commitment to the identity.

Theory Induction

Before completing the engineering test, participants were given a reading comprehension exercise, ostensibly for the purposes of having a comparison point with nonengineers outside the domain of spatial reasoning. As in Study 1, the reading comprehension exercise was an article followed by an eight-question test intended to induce a theory of intelligence. Participants were randomly assigned to either the entity theory (n = 15) or the incremental theory (n = 11) condition. After this manipulation, participants in both conditions were treated identically.

Engineering Test and Tutorial Selection

The engineering test was described as a four-part test of spatial-reasoning abilities that had been found to be predictive of academic success as an engineer. It was emphasized that each of the four modules was important and that good engineers were proficient in all four. The test actually consisted of spatial-reasoning exercises from the dental admissions test administered to prospective students of dentistry. These tests were particularly useful for our purposes because it was difficult to determine whether one had answered correctly or incorrectly with any degree of certainty, making both high and low scores plausible. One of the tests, for instance, required participants to rank four similar angles in order of acuteness. Participants were given 20 min to complete the test, which consisted of five questions in each of the four modules. The experimenter returned after 20 min and graded the test. Participants then received predetermined feedback, scoring a perfect 5 out of 5 on three of the modules but only 2 out of 5 on a fourth module.

Following the feedback, participants were told that as a part of the study they would have the opportunity to do a tutorial for only one of the four modules. After completing the tutorial of their choosing, they would be given another test on the material specific to the module they had chosen. They were also told that they would receive a certificate that would indicate their score on the posttutorial test. Thus, participants could choose either a tutorial on one of three already mastered modules, which would assure them of a certificate with a high score but would teach them little, or they could choose the tutorial on the failed module, which did not guarantee success, but provided them with an opportunity to improve.

Participants were asked about their interest in doing each of the four tutorials, as well as in the tutorials as a whole, on a 9-point Likert-type scale, with higher numbers indicating more positive responses. Then they were asked to choose one tutorial to complete. They were also asked to rate how well they thought they had done on the test, the importance of the abilities being tested, and how much they desired to improve. After answering these questions, participants were informed that the experiment was over and they were fully debriefed.

RESULTS

Preliminary Analyses

Participants in both conditions scored equally well (M_{inc} = 7.40, SD = 0.65; M_{ent} = 7.27, SD = 0.65) on the

eight-question reading comprehension test that followed the article used for the theory of intelligence induction, $t(24) = 0.50$, *ns*. These scores also ensured that participants had understood the article well. Although there were some gender differences in the data, such as the number of engineering classes taken by males and females, none of these differences interacted with the dependent variables of interest.[3]

There were also no differences between the two conditions in their reports of how well they felt they had done on the test, $M_{inc} = 4.64$, $SD = 0.51$; $M_{ent} = 4.80$, $SD = 1.15$, $t(24) = 0.44$, *ns*; how good they felt following the test, $M_{inc} = 4.00$, $SD = 1.18$; $M_{ent} = 4.67$, $SD = 0.90$, $t(24) = 1.64$, *ns;* how important they believed the test to be, $M_{inc} = 4.00$, $SD = 1.27$; $M_{ent} = 3.93$, $SD = 1.34$, $t(24) = -0.13$, *ns*; or how much they would like to improve, $M_{inc} = 5.27$, $SD = 0.79$; $M_{ent} = 5.27$, $SD = 0.80$, $t(24) = -0.02$, *ns*. There were also no differences between conditions in terms of individual difference variables including SAT scores or grade point average (GPA), but there was a trend for entity participants to have taken more engineering classes ($M = 9.7$, $SD = 8.73$) than incremental participants ($M = 5.3$, $SD = 3.80$), $t(24) = -2.03$, $p = .055$. Although random assignment failed to equalize the two conditions in this regard, the relative advantage of those in the entity condition in terms of coursework worked against our hypotheses.

Interest in Remediation

There was no difference between the two conditions in terms of either participants' self-reported interest in completing a tutorial or their interest in any of the three tutorials for the modules on which they had succeeded (all *p*s > .5). Incremental participants, however, expressed significantly more interest in the tutorial for the module on which they had performed poorly ($M = 7.73$, $SD = 1.27$) than did entity participants ($M = 6.13$, $SD = 2.00$), $t(24) = -2.32$, $p < .05$, $d = 0.90$. This pattern was also evident in participants' ultimate choice of tutorials, with 91% of incremental participants choosing to do the tutorial for the module on which they had a low score, but only 53% of entity participants making the same choice, $\chi^2(1, N = 26) = 4.21$, $p < .05$ (see Figure 2).

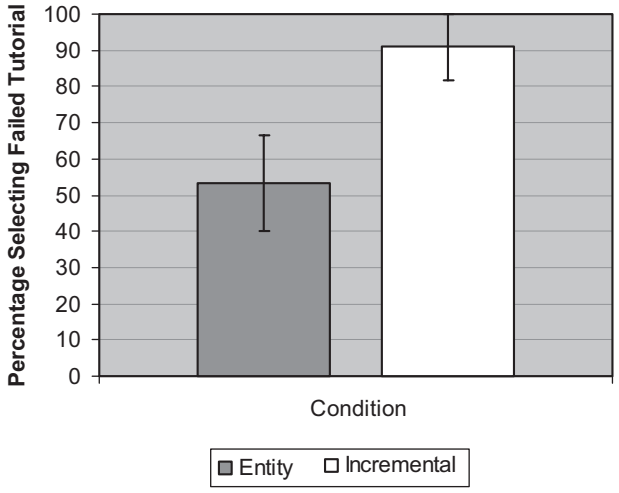

Figure 2 Percentage of Participants Selecting the Failed Tutorial in the Entity and Incremental Conditions (Study 2)

DISCUSSION

Despite having a useful tutorial available, almost half of engineering majors induced to hold an entity theory of intelligence still opted for a defensive, "symbolic" response to their performance. Instead of repairing a deficit that had been presented as an important determinant of success in their field, they chose to respond by selecting a tutorial that guaranteed success and could thereby, we propose, repair their damaged self-esteem. This pattern was almost entirely absent among incremental participants, with over 90% of them choosing the tutorial for the module on which they needed help.

EXPERIMENT 3

In Study 3, we employed a procedure similar to that in Study 1, but we also introduced two extensions designed to link our findings to self-esteem and to clarify the processes underlying participants' behavior. First, to test the hypothesis that participants' responses were indeed related to their self-esteem concerns, we tracked participants' state self-esteem during the course of the experiment. If our reasoning is correct, then participants in both the entity and the incremental conditions should experience a drop in self-esteem following negative feedback, and the greater the drop in self-esteem, the more likely they should be to pursue characteristic self-esteem-maintenance strategies. Moreover, tracking self-esteem allowed us to test whether these divergent responses in the entity and incremental theory conditions were effective in repairing self-esteem.

Study 3 also included two new conditions designed to rule out alternative hypotheses, including a positive feedback condition and a condition in which participants were given a distracter task rather than the opportunity to engage in social comparison. We included the positive feedback condition to test whether our participants' different social comparison preferences were actually a response to negative feedback or whether they would

have behaved similarly regardless of the valence of feedback. The distracter-task condition was included to confirm that it was in fact the social comparison process that helped repair participants' self-esteem and not merely the distraction of doing another task or the simple passage of time.

In replicating Study 1 with these additional measures and conditions, we were able to more carefully test our hypotheses in a 3 (positive feedback vs. negative feedback vs. negative feedback without social comparison) × 2 (entity theory vs. incremental theory) design. We anticipated that the more that entity participants lost self-esteem, the more they would engage in downward comparison. We also expected that the more they employed this defensive response, the more they would recover lost self-esteem. For incremental participants, we anticipated that the more their self-esteem dropped in response to negative feedback, the more they should engage in upward comparison, and the more they engaged in upward comparison (with its skill-building information), the more they would recover self-esteem.

Moreover, if our hypotheses are correct, then we should not see this divergent pattern of social comparison from entity and incremental participants when they receive positive feedback, because in this condition their self-esteem is not under threat. Finally, if it is actually the opportunity to be defensive or to seek improvement that allows participants to recover self-esteem, then self-esteem should not be recovered when instead of social comparison, participants do a distracter task.

METHOD

Participants and Design

Eighty undergraduates at a West Coast university (38 females and 42 males) were recruited to participate in exchange for course credit. The basic design of the study was identical to Study 1 but included two new conditions (positive feedback and distraction) and the tracking of participants' self-esteem.

Self-Esteem Tracking

Participants' state self-esteem was measured using the performance subscale of Heatherton and Polivy's (1991) State Self-Esteem Scale at three different points: first, at the very outset of the study (Time 1), then immediately following feedback on the speed-reading task (Time 2), and finally at the end of the study (Time 3).

The performance subscale of Heatherton and Polivy's (1991) State Self-Esteem Scale measures participants' current self-esteem and is more situationally responsive than a typical trait self-esteem scale, allowing us to observe changes in self-esteem throughout the course of the study. The "performance" component scale solicits participants' agreement with seven statements such as "I feel as smart as others," "I feel confident that I understand things," and "I feel like I'm not doing well" (reverse scored), on a 7-point scale. The full version of the scale also includes subscales for social and appearance self-esteem; these scales were not included in the present research.

Theory Induction

As in Studies 1 and 2, participants were randomly assigned to do a "baseline" reading exercise that was a scientific article supporting either an entity or an incremental theory of intelligence. After reading the article, they were given a five-question reading comprehension test that allowed us to ensure that they read the article carefully.

Self-Esteem Threat

Recall that we had three conditions for entity and incremental participants: one in which participants received negative feedback (a replication of Study 1; $n_{ent} = 13$, $n_{inc} = 15$), one in which participants received positive feedback ($n_{ent} = 13$, $n_{inc} = 13$), and one in which participants received negative feedback but completed a distracter task instead of the social comparison task ($n_{ent} = 13$, $n_{inc} = 13$). Accordingly, participants in the first and third condition received feedback that they had scored in the 37th percentile on the speed-reading test. Participants in the positive feedback condition were told that they had scored in the 91st percentile.

Selection of Social Comparison Targets

The strategy-review portion of the study was slightly adjusted in Study 3. Instead of allowing participants an unlimited number of social comparisons, we sought to equate the number of strategies participants examined. Thus, the computer program automatically moved on after participants had reviewed five strategies. In addition, there were now nine levels of strategy to choose from, rather than eight as in Study 1, providing an additional downward comparison option.

Participants in the distracter-task condition were not given the opportunity to review any strategies. Instead, they completed a task that required them to concentrate on words that appeared on the screen and to click as soon as a target word appeared. The task was designed to take roughly the same amount of time as the strategy review. It was also selected to require concentration in order to minimize participants' opportunity to engage in alternate means of self-esteem repair.

TABLE 1: Self-Esteem Levels and Social Comparison by Condition

	Feedback Condition					
	Positive Feedback and Social Comparison		*Negative Feedback and Social Comparison*		*Negative Feedback and No Social Comparison*	
Theory	*Incremental*	*Entity*	*Incremental*	*Entity*	*Incremental*	*Entity*
n	13	13	15	13	13	13
Baseline self-esteem (Time 1)	43.08	45.46	45.67	43.38	45.08	44.46
Self-esteem after feedback (Time 2)	42.38	42.62	36.73	34.69	36.54	36.92
Final self-esteem (Time 3)	43.00	43.08	43.60	41.85	39.85	37.46
Level of social comparison (1-9)	5.34_a	5.11_a	6.63_b	3.06_c		

NOTE: Means in the same row with different subscripts are significantly different from one another at the $p < .05$ level.

RESULTS

Preliminary Analyses

Because there were no significant differences between males and females, all subsequent analyses are collapsed across gender.

Participants in both the entity ($M = 4.77$, $SD = 0.43$) and the incremental ($M = 4.88$, $SD = 0.33$) conditions scored extremely well on the five-question test following the theory induction, and their scores did not differ from one another, $t(78) = -1.28$, *ns*.

Selection of Social Comparison Targets

We first sought to determine whether the results of Study 3 replicated those in Study 1. In Study 3, after negative feedback, incremental participants again chose to review better strategies ($M = 6.63$, $SD = 1.26$) than entity participants ($M = 3.06$, $SD = 2.29$), $t(26) = 5.21$, $p < .001$, $d = 1.9$. When we examined only true downward comparisons (i.e., scores of 3 or lower) we also found that, on average, incremental participants' social comparison choices were true downward comparisons 5% of the time, compared to 49% of entity participants' social comparison choices, $t(26) = 3.63$, $p < .001$. In addition, only 20% of incremental participants engaged in any true downward comparison at all, as compared to 69% of entity participants, $\chi^2(1, N = 28) = 6.89$, $p < .01$.

Next, in order to test whether the differences in social comparison preferences between entity and incremental participants depended on feedback, we conducted a 2 (theory: entity vs. incremental) × 2 (feedback: positive vs. negative) ANOVA. There was no main effect of feedback condition, $F(1, 50) < 1$, *ns*, but there was a significant main effect for theory of intelligence, $F(1, 50) = 12.31$, $p = .001$. However, this effect was qualified by the hypothesized interaction between feedback and theory, $F(1, 50) = 9.50$, $p < .01$. When participants received positive feedback, there was no difference between the entity and incremental conditions in terms of social comparison preferences (incremental participants, $M = 5.34$, $SD = 2.13$; entity participants, $M = 5.11$, $SD = 2.18$), $t(24) = -0.273$, *ns*. After negative feedback, incremental participants preferred higher social comparisons ($M = 6.63$, $SD = 1.26$) than participants in the entity condition ($M = 3.06$, $SD = 2.29$), $t(26) = -5.21$, $p = .001$ (see Table 1). These differences offer initial evidence that negative feedback led entity and incremental participants to adopt different social comparison strategies.

Self-Esteem Threat and Social Comparison Choices

Given this initial experimental evidence that negative feedback played a causal role in participants' social comparison choices, we sought to determine how changes in self-esteem affected these choices and whether these social comparisons were effective in restoring lost self-esteem. Our analytical strategy was to begin by examining the effect of theory and feedback condition on self-esteem changes over time. We then examine differences between participants in the entity and incremental conditions in terms of (a) how self-esteem affected their social comparison choices and (b) how these social comparison choices in turn affected their level of self-esteem.

Accordingly, our first step was to conduct an omnibus 3 × 3 × 2 repeated-measures ANOVA comparing levels of state self-esteem at three time intervals as a function of feedback condition (positive feedback, negative feedback, and distraction) and theory of intelligence condition (entity and incremental). The main effect of time, $F(2, 148) = 22.77$, $p < .001$, was qualified by the two-way interaction between time and feedback, $F(4, 148) = 4.43$, $p = .002$. Neither the two-way interaction between time and theory, $F(2, 148) = .22$, *ns*, nor the three-way interaction between time, theory, and feedback, $F(4, 148) = .25$, *ns*, was significant. In other words, state self-esteem changed over time as a function

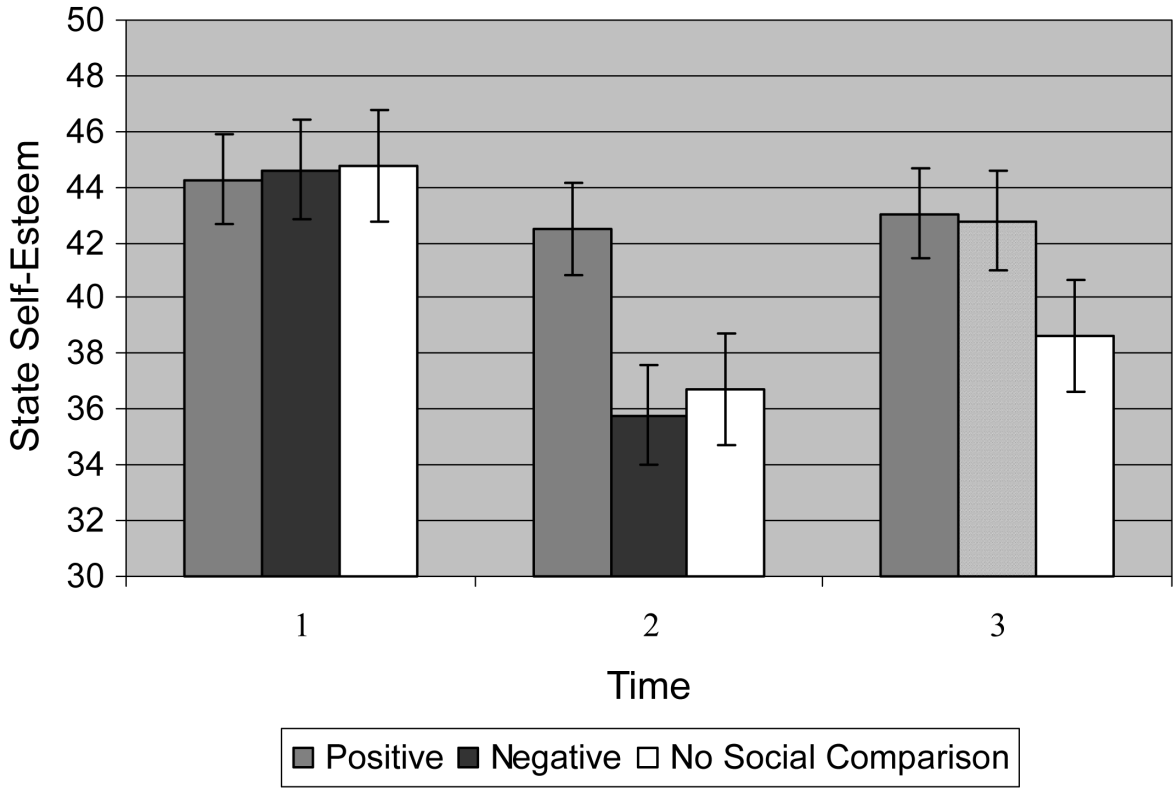

Figure 3 Feedback Condition. Level of State Self-Esteem (out of 49) at Baseline (Time 1), Following Feedback (Time 2), and Following Social Comparison or Distracter Task (Time 3) Among Participants in Each of the Three Feedback Conditions: Positive Feedback and Social Comparison, Negative Feedback and Social Comparison, and Negative Feedback With No Social Comparison (Study 3)

of feedback condition but independent of theory condition (see Figure 3). Additional *t* tests confirmed that there were no differences in self-esteem as a function of theory condition in any of the feedback conditions at any time, all *t*s < 1, *p*s > .40 (see Table 1).

Follow-up analyses revealed that at Time 1 (baseline), there were no self-esteem differences among the conditions, $F(2, 77) = .02$, *ns*. At Time 2 (immediately following feedback), a planned contrast indicated that participants in the two conditions that received negative feedback had lower self-esteem than those who received positive feedback $t(77) = -2.44$, $p = .02$. This was, in essence, a manipulation check confirming that participants' self-esteem dropped following negative feedback. Finally, at Time 3 (following social comparison), a planned contrast revealed that as hypothesized, participants who had the opportunity to engage in social comparison had significantly higher self-esteem than those who were given a distracter task instead $t(77) = 2.13$, $p = .04$. As can be seen from Figure 3, all participants receiving negative feedback experienced a drop in self-esteem, but only those who had the opportunity to engage in social comparison recovered their self-esteem by Time 3.

Having established that self-esteem levels followed the predicted patterns according to feedback condition, we next focused specifically on the negative feedback condition, which replicated Study 1, and examined the relationship between social comparison and self-esteem change in that condition as a function of our theory of intelligence manipulation. Accordingly, we tested the hypotheses that (a) participants' drop in self-esteem would predict their social comparison choices and that this would be moderated by condition and (b) that participants' social comparison choices would in turn predict the rebound in their self-esteem levels and that this, too, would be moderated by condition. In other words, we predicted that participants would restore their self-esteem following negative feedback using social comparison, but that entity participants would do this using downward comparison, while incremental theorists would use upward comparison.

First, we tested the hypothesis that participants' social comparison choices would be a function of the degree to which their self-esteem dropped (operationalized as self-esteem at Time 2 – Time 1), but that this effect would be moderated by our manipulation of their

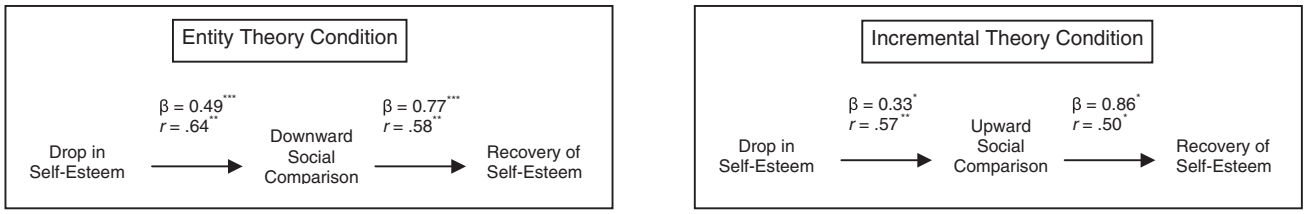

Figure 4 The Relationship Between Drop in Self-Esteem and Social Comparison and the Relationship Between Social Comparison and the Recovery of Self-Esteem for Participants Receiving Negative Feedback in the Entity Theory (4a) and Incremental Theory (4b) Conditions (Study 3)
* $p < .10$. ** $p < .05$. *** $p < .01$.

theory of intelligence. We conducted an ordinary least squares (OLS) regression analysis that included participants' theory of intelligence (dummy coded 0 for the incremental condition and 1 for the entity condition) and the drop in participants' self-esteem (mean centered, $M = -8.82$), as well as the interaction between these two variables, as predictors of their social comparison choices. There was a marginally significant main effect of self-esteem drop, $\beta = -0.33$, $t(24) = -1.82$, $p = .08$, and a significant main effect of theory, $\beta = -0.72$, $t(24) = -6.38$, $p = .001$, in predicting social comparison choices. However, these main effects were qualified by a significant interaction between theory of intelligence and self-esteem drop, $\beta = 0.64$, $t(24) = 3.53$, $p = .002$. Following Aiken and West (1991), we conducted simple slopes analyses to determine how participants' theory of intelligence moderated the effect of self-esteem drop on their social comparison choices. As hypothesized, for participants in the entity condition, self-esteem drop was a significant predictor of social comparison, $\beta = 0.49$, $t(24) = 3.41$, $p = .002$; the more their self-esteem dropped, the more downward comparisons they made (see Figure 4a). For participants in the incremental condition, the effect of self-esteem drop had a marginally significant, but *opposite*, effect on social comparison choices, $\beta = -0.33$, $t(24) = -1.82$, $p = .08$; the more their self-esteem dropped, the more upward comparisons they made (see Figure 4b).

Self-Esteem Repair and Social Comparison Choices

Although entity and incremental participants responded to self-esteem threat by making different social comparison choices, we wanted to know whether or not these choices were effective in actually repairing self-esteem (operationalized as self-esteem at Time 3 – Time 2). We again conducted an OLS regression analysis that included participants' theory (dummy coded 0 for the incremental condition and 1 for the entity condition) and their social comparison choices (mean centered, $M = 4.97$), as well as the interaction between these two variables, as predictors of the improvement in their state self-esteem following social comparison. There was a marginally significant main effect of social comparison choices, $\beta = 0.86$, $t(24) = 1.81$, $p = .08$, and no main effect of theory, $\beta = 0.01$, $t(24) = 0.04$, *ns*. These effects were qualified by a significant interaction between theory of intelligence and social comparison choices, $\beta = -1.16$, $t(24) = -2.94$, $p = .01$. The simple slopes analyses revealed that for participants in the entity condition, *downward* social comparison was a significant predictor of self-esteem recovery, $\beta = -0.77$, $t(24) = -2.72$, $p = .01$; the lower these participants' social comparison targets, the more their self-esteem rose (see Figure 4a). The opposite was true for participants in the incremental condition, for whom *upward* social comparison choices were a marginally significant predictor of self-esteem recovery, $\beta = 0.86$, $t(24) = 1.81$, $p = .08$; the higher their social comparison targets, the more self-esteem they recovered (see Figure 4b).

DISCUSSION

Studies 1 and 2 revealed that following negative feedback, entity participants tended to respond defensively while incremental participants preferred to directly address the cause of their poor performance. In Study 3, we found support for the hypothesis that these different responses are a reaction to threatened self-esteem and that both are effective means of restoring self-esteem for those who employ them.

Among entity participants who received negative feedback, the more their self-esteem dropped, the lower were their social comparison targets; they responded to the threat by defensively comparing themselves to others who had performed relatively poorly. As it turns out, this was an effective response for entity participants, as the lower their social comparison targets, the more their self-esteem was restored (i.e., the more they once again agreed with statements such as "I feel confident I understand

things"). As a group, entity participants' self-esteem returned to its original level when they were given the opportunity to engage in social comparison, but not when they simply did a distracter task.

We found a parallel pattern among incremental participants. For these participants, the more their self-esteem dropped after negative feedback, the higher their comparison targets became. Although it would be reasonable to expect that engaging in these upward comparisons might harm incremental participants' self-esteem (e.g., Morse & Gergen, 1970; but see Taylor & Lobel, 1989; Testa & Major, 1990), it actually did the opposite. There was a trend for incremental participants to regain self-esteem the more they engaged in upward comparison and, like entity participants, their self-esteem returned to its original level when they were given the opportunity to do social comparison, but not when they did a distracter task. It appears that after having their self-esteem deflated by a poor performance, incremental participants' self-esteem was restored by engaging in remedial learning—though whether it was the actual learning or the mere process of attempting to learn that had this effect, our data cannot determine. Thus, both entity and incremental participants have at their disposal effective, though different, means of restoring self-esteem through social comparison.

GENERAL DISCUSSION

In the current set of studies, our manipulation of participants' theories of intelligence appears to have changed their assessments of the best way to respond to a setback. In three studies, we found that following negative feedback, participants' decisions to either try to improve or to simply make themselves feel better depended on whether they had been induced to believe that intelligence was fixed or malleable. We also confirmed that these decisions were a response to the experience of decreased self-esteem and that participants induced to hold entity and incremental theories were both able to restore their self-esteem to its original level, although in different ways.

It is not always easy to improve following a setback, nor obvious how to do so; in such cases, defensive self-esteem repair strategies can be a reasonable course of action. However, each of the current studies was carefully designed to present participants with a clear opportunity to either improve or to respond defensively by engaging in either downward comparison (Studies 1 and 3) or symbolic self-esteem repair (Study 2). Attempting to improve was a salient option but, at least in the eyes of many entity participants, it was not their preferred option.

Consequences for Self-Esteem

In Study 3, we measured the consequences of entity and incremental participants' responses for self-esteem repair. As noted, both responses were effective—entity and incremental participants who engaged in social comparison recovered lost self-esteem, while participants who did a distracter task did not. Entity participants recovered more self-esteem the lower their social comparison targets. It is worth noting that although they spent much of their time examining ineffective strategies, entity participants subsequently expressed renewed confidence in their abilities and understanding nonetheless. For incremental participants, in contrast, self-esteem tended to recover more the higher their social comparison targets. Ultimately, although both responses restored participants' self-esteem to the same level as before negative feedback, incremental participants gave themselves an opportunity to directly improve their abilities while entity participants did not.

These results are in line with the work of Crocker and her colleagues (Crocker, Brook, Niiya, & Villacorta, 2006; Crocker & Park, 2004) who suggest that the pursuit of self-esteem can have costly consequences. In particular, for participants in the entity condition, the cost of repairing their self-esteem was the sacrificing of an opportunity to learn from their mistakes. As the results of Study 3 indicate, the more negatively these participants' self-esteem was affected by their initial failure, the more they resorted to self-esteem-repairing downward social comparisons at the expense of learning. Moreover, the response of participants in the incremental condition also supports Crocker's contention that an incremental theory can make self-esteem pursuit less costly (e.g., Crocker & Park, 2004; Niiya, Crocker, & Bartmess, 2004). Participants in the incremental condition also responded to their initial setback by repairing their self-esteem, but they did so without costing themselves the opportunity to improve.

Different Meanings of Self-Esteem?

Entity and incremental theories can be seen as reflecting two fundamentally different perspectives on the self: a static self with fixed traits versus a dynamic self capable of constant development (Dweck, Higgins, & Grant, 2003; Molden & Dweck, 2006). In both systems, self-esteem reflects the judgment that one is competent. However, in an entity self-system, self-esteem comes from validating one's fixed competence; in an incremental self-system, self-esteem comes from assessing one's acquired competence. Negative feedback is a threat to both kinds of self-esteem because it signals that the desired level of competence is lacking. However, as we have shown, when self-esteem is

threatened, different responses are required. In the entity self-system, with no clear way to change one's level of underlying ability, the most direct and effective thing people can do is to re-adjust their thinking about their ability, and defensive processes fit the bill. In an incremental self-system, the most direct and effective thing people can do is to work to bring their skills into line with the level of competence they desire.

The Limitations of Self-Improvement

As noted, because all three of the current studies were designed to compel participants to choose between an available remedial response and a defensive one, striving for self-improvement could be considered the more adaptive response in each case. However, there are certainly instances in which disengagement may be a better response than prolonged persistence in a futile effort to improve (Wrosch, Scheier, Carver, & Schulz, 2003; Wrosch, Scheier, Miller, Schulz, & Carver, 2003; Wrosch, Schulz, & Heckhausen, 2004), or instances in which dealing with the psychological effects of failure may be more important than dealing with the failure itself. At times, dealing with the psychological effects of failure may be a prelude to coping with the actual failure. Indeed, the stress and coping literature (e.g., Lazarus & Folkman, 1984) maintains that dealing with stress—of which negative feedback can be one instance—usually requires a mix of problem-focused coping (directly addressing the source of the stress) and emotion-focused coping (dealing with the emotions resulting from the stress). Thus, employing defensive processes to repair one's self-esteem may be adaptive when a direct response is either impossible or when protecting self-esteem sustains motivation and facilitates later attempts at engaging one's problems (Nussbaum & Steele, 2007; Sherman & Cohen, 2006; Wayment & Taylor, 1995; Wood, Taylor, & Lichtman, 1985; see also Heckhausen & Schulz, 1995; Rothbaum et al., 1982).

The Evaluative Context

In the current studies, we manipulated participants' theories of intelligence by directly targeting their beliefs. We suggest, however, that similar effects could result from a manipulation of participants' evaluative context, either by creating an environment that primes one theory or the other (Ross, Nussbaum, & Dweck, n.d.) or by creating an environment in which people feel their fixed intelligence is being judged or their malleable intelligence is being cultivated (Murphy & Dweck, 2006). Whether in a classroom, a hospital, or a boardroom, the theory of intelligence conveyed in a setting may function to reduce or exacerbate defensive behaviors. If, when facing the critical gaze of a board of directors, CEOs are unwilling to admit to past mistakes and distort their company's true profits, the results could be costly. If, fearing the disapproval of their mentors, surgical interns defensively dismiss criticism of their techniques or diagnoses, the results could be even worse. We contend that the evaluative context can play an important role in determining the way negative feedback is interpreted and whether one tries to learn from it or responds to it defensively instead. While an evaluative context focused on nurturing development may not be ideal for every setting, it may be effective in reducing defensiveness in settings where learning is valued and the goal is to minimize lost opportunities to improve.

In conclusion, defensiveness can stand in the way of learning and thus have serious consequences in classrooms and workplaces. This research shows that an incremental theory has a role to play in leading people away from defensiveness and toward confronting and addressing their shortcomings.

NOTES

1. In reporting their attitudes toward speed reading, participants had an apparent opportunity to restore self-esteem by disparaging the importance of speed reading. However, their willingness and ability to pursue this route of self-esteem repair was constrained by the fact that they had been told, immediately prior to the test, that it was a valid and important indicator of competence and a predictor of future success.

2. Three participants in the entity condition made no social comparisons and were therefore excluded from this analysis.

3. Females reported having taken marginally fewer engineering-related classes ($M = 5.1$) than males ($M = 10.5$), $t(24) = 2.02$, $p = .06$. Females also reported greater interest in doing a generic tutorial ($M = 7.5$) than did males ($M = 5.6$), $t(24) = -2.57$, $p < .05$, and were marginally more interested in the tutorial for the module they had done poorly on ($M = 7.5$) than were males ($M = 6.2$), $t(24) = 0.08$. However, females made up a similar percentage of participants in the entity condition (53%) as in the incremental condition (45%), and gender does not interact with any of the dependent variables of interest.

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