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dissertation entitled

EFFECTS OF IMPLICIT THEORIES OF ATTRIBUTE MALLEABILITY ON EFFORT AFTER FAILURE AND ACCEPTANCE OF PERFORMANCE FEEDBACK

presented by

Amani G. El-Alayli

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Psychology

Major professor

Date 8/9/2002

EFFECTS OF IMPLICIT THEORIES OF ATTRIBUTE MALLEABILITY ON EFFORT AFTER FAILURE AND ACCEPTANCE OF PERFORMANCE FEEDBACK

By

Amani G. El-Alayli

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Psychology

2002

ABSTRACT

EFFECTS OF IMPLICIT THEORIES OF ATTRIBUTE MALLEABILITY ON EFFORT AFTER FAILURE AND ACCEPTANCE OF PERFORMANCE FEEDBACK

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Amani G. El-Alayli

Two studies were performed to examine possible consequences of holding different implicit theories of attribute malleability. Study 1 tested whether matching implicit theories to congruent motivational climates would produce the most adaptive change in effort following failure. Implicit theory (entity or incremental) and motivational climate (performance or learning) were manipulated and task effort following initial failure was measured. It was hypothesized that entity theorists in a performance climate and incremental theorists in a learning climate would work the hardest after failure. Contrary to this proposed congruence model, participants always worked harder after failure, regardless of whether there was a match or mismatch between implicit theory and climate. Interestingly, males thrived more in a performance climate and females thrived more in a learning climate. Study 1 also found that participants expressed the most task interest when implicit theory and motivational climate were incongruent.

Study 2 examined whether entity theorists may be more threatened by negative feedback than incremental theorists. Implicit theories about an attribute and the credibility of a test that supposedly measured that attribute were manipulated. I hypothesized that only entity theorists would be less accepting of failure feedback when the test was described as low (versus high) in credibility. Implicit theory and test

credibility were not expected to affect acceptance of feedback when participants received success feedback. Moderate support was obtained for these predictions. Results from both studies are discussed, along with several supplemental findings.

ACKNOWLEDGEMENTS

I would very much like to thank my advisor, Dr. Lawrence Messé, for his invaluable assistance with this research. He has consistently been a wonderful source of expertise, knowledge, and social support during my years in graduate school. The completion of my degree would have been much more difficult and much less enjoyable without his guidance. I would also like to express my gratitude for the very helpful research suggestions that I received from my other committee members, Drs. Norbert Kerr, Richard Lucas, Rick DeShon, and John Seita. In addition, I thank Dr. Shira Gabriel for her interest and involvement in some of my research on implicit theories. Collaborating with her has been a valuable and enjoyable experience. I would also like to thank Matthew Gates, Peggy Chin, Deborah Abber, and Ernest Park, for being great friends and colleagues who were always there for me during my various academic endeavors. Their social support has truly been invaluable. Thanks everyone! ☺

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INTRODUCTION

Why is it that sometimes individuals feel bad and give up after failure while at other times they get excited and strive to do better in such situations? This question has implications for every domain of life where effort promotes success. Everyone has experienced moments of failure at some point in his or her life. And, most likely, everyone has engaged in different responses to such failures at different times. Sometimes people accept their failures and are motivated by the challenge of overcoming their obstacles. At other times, people might deny the validity of their failures, feel bad, or throw in the towel. The purpose of this research was to gain an understanding of when these different reactions might occur. In doing so, this work links research on implicit theories of personality (Dweck, 1999; Dweck & Leggett, 1988) to both motivational climate research (Ames, 1992; Ames & Archer, 1988) and research on persuasion and motivated message acceptance (Chen & Chaiken, 1999; Chen, Duckworth, & Chaiken, 1999; Kunda, 1990; 1999; Petty & Wegener, 1999).

There were two main purposes of this research. The first was to examine the possibility that congruence between implicit theories and motivational climate might lead to the most adaptive change in effort following failure. The second was to examine the effects of implicit theories on emotional and cognitive reactions to failure. While affect and task interest were also explored in this research, the primary focus was on the implications of implicit theories for the degree to which individuals are threatened by failure feedback and try to discount its validity when they have the opportunity to do so.

In reviewing the prior work that led to the present investigations, theory and research in the area of implicit theories is discussed first, followed by a description of the

congruence model, along with a review of relevant literature examining the effects of motivational climate and congruence on task effort. Afterwards, I discuss possible effects of implicit theories on emotional and cognitive reactions to failure, including the degree to which individuals will accept the validity of good and bad feedback that they receive about their ability. Acceptance of feedback is discussed in terms of its links with motivated cognition.

Implicit Theories of the Malleability of Personal Attributes

Dweck and Leggett (1988) proposed a model, based on years of research, that predicts when adaptive or maladaptive responses to failure are likely to take place (see also Dweck, 1999; Molden & Dweck, 2000). They suggest that the reactions people exhibit are based largely on the implicit theories that they hold about the controllability of personal attributes.[1] Individuals who believe that an attribute is fixed and uncontrollable are referred to as "entity theorists." Those who believe that an attribute is malleable and controllable are referred to as "incremental theorists." Traditionally this research has classified individuals as being either entity or incremental theorists, but more recent work suggests that implicit theories can be altered and can be domain-specific (Chiu, Hong, & Dweck, 1997; Dweck, 1999; El-Alayli & Baumgardner, in press; El-Alayli & Gabriel, 2002). In any case, entity and incremental theories tend to lead to the pursuit of different goals, which result in different "cognition-affect-behavior patterns." These patterns, in turn, have implications for behavioral, emotional, and cognitive reactions to failure.

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[1] I do not make the distinction between personality characteristics and competence-related abilities because Dweck's writings suggest that implicit theories about either would produce the same reactions to failure (see Dweck, 1999). Thus, the term "personal attributes" is used here to refer to either characteristics or abilities. In addition, theory and research regarding both characteristics and abilities are combined in the reviews of the literature on implicit theories and motivational climate.

Entity theorists tend to pursue "performance goals" (Dweck, 1999; Dweck & Elliott, 1983; Dweck & Leggett, 1988), which have also been referred to as ego-involved goals (e.g., Maehr & Nicholls, 1980) or ability-focused goals (e.g., Ames, 1984). This type of goal involves a desire to *demonstrate* one's competence to oneself and to others. Because they view personal attributes as fixed, entity theorists are more motivated to prove themselves than to improve themselves. This focus causes them to view achievement situations as occasions in which they must demonstrate their ability. Their drive to perform well may lead to feelings of pride (and perhaps relief) after success, because succeeding implies that one is competent on some apparently stable ability. However, this same pressure to perform has been shown to result in negative responses in the face of failure or setbacks, because entity theorists interpret their failure as indicating that they lack an ability over which they apparently have no control. Failure can even result in feelings of self-condemnation and perceived helplessness for entity theorists (Dweck, 1999).

Much research has shown that entity theories and performance goals result in a "helpless" cognition-affect-behavior pattern in the face of failure or perceived incompetence (Diener & Dweck, 1978; Dweck, 1999, Hong, Chiu, Dweck, Lin, & Wan, 1999).[2] Thinking that personal attributes are uncontrollable motivates individuals to try to demonstrate their competence, which generally results in feelings of helplessness when they are not able to do so. This helpless response to failure is characterized by self-disparagement, negative emotions, plunging expectations,

[2] However, some studies have shown performance goals (especially those with approach motivational tendencies) to be no different or even more adaptive than learning goals in certain situations or for certain individuals (see Barron & Harackiewicz, 2000; Harackiewicz, Barron, & Elliot, 1998; Hidi & Harackiewicz, 2000, Linnenbrink & Pintrich, 2000, Utman, 1997; for reviews). But, this work did not examine whether performance goals can also lead to more adaptive responses than learning goals after *failure,* which is the current focus.

avoidance of challenge, lower persistence, self-handicapping, and decrements in effort and performance (Dweck, 1999; Dweck & Sorich, 1999; see also Hong et al., 1999; Rhodewalt, 1994).

Incremental theorists, on the other hand, tend to adopt "learning goals" (Dweck, 1999; Dweck & Elliott, 1983; Dweck & Leggett, 1988), which have also been referred to as task goals (e.g., Maehr & Nicholls, 1980) or mastery goals (e.g., Ames, 1984; Ames & Archer, 1988). This type of goal motivates individuals to learn and seek self-improvement. Because incremental theorists believe that personal attributes can be changed, they tend to view achievement situations as opportunities for growth. When they experience failure or setbacks, they view these situations as exciting challenges rather than as indications of poor innate ability. Failure is not as threatening for incremental theorists because they are more likely to make effort attributions for their poor performance (Hong et al., 1999). As such, setbacks may actually increase incremental theorists' motivation toward mastery (Dweck, 1999; Dweck & Leggett, 1988; Hong et al., 1999).

There is ample evidence demonstrating that incremental theories and learning goals result in a "mastery-oriented" cognition-affect-behavior pattern after failure or perceived incompetence (Diener & Dweck, 1978; Dweck, 1999; Hong et al., 1999). Specifically, the belief that personal characteristics are changeable results in a focus on improvement, which causes individuals to work hard when they are challenged or think they lack knowledge or skills. This mastery-orientation after failure is characterized by optimism, positive affect, constructive self-instruction to aid improvement, a lack of self-blame, an interest in challenge, persistence, and sustained or enhanced effort and performance (Dweck, 1999; Dweck & Sorich, 1999; see also Hong et al., 1999).

Thus, holding an entity versus an incremental theory leads to very different reactions to failure. Entity beliefs lead to effort decrements and negative affect, whereas incremental beliefs lead to effort maintenance or enhancement and positive affect. Only those individuals who believe that they *can* improve (incremental theorists) may be expected to *try* to improve when they find out that they are not as competent or successful as they would like to be. In addition, only those who feel they cannot improve (entity theorists) should suffer emotionally upon learning that they lack some desirable ability or personality attribute.

Congruence Model Predictions for Task Effort

What might happen if entity and incremental theorists are placed in a situation in which improvement is not likely and only performance goals can be fulfilled? In such settings, there may be little reason for incremental theorists to increase or even sustain their effort after failure because the opportunity to learn and improve would not be available. Also, if entity theorists could accomplish their goal of demonstrating competence, perhaps they would actually increase their effort after failure in order to try to prove that they really do have the ability in question. Even if they believe that they cannot improve their ability, they might still be inclined to try to improve their *score* (their *apparent* ability). In order to consider these possibilities, an understanding of the research on motivational climate (Ames, 1992; Ames & Archer, 1988) is essential.

Motivational Climate

The "motivational climate" of an achievement situation may emphasize performance and/or learning goals (Ames, 1992; Ames & Archer, 1988). A predominantly performance-oriented climate is one that emphasizes the goal of

outperforming others and demonstrating high normative ability. This type of situation causes individuals to believe that success stems from high ability rather than high effort. In fact, hard work is seen as an indication of poor ability because it suggests that one needs to expend extra effort to make up for low aptitude. An example of a performance climate might be a situation in which individuals are given an IQ test and told that their scores would be shared with the rest of the group. Because test scores would reflect high *ability* on a *socially desirable* characteristic and would be made *public*, the goal of demonstrating competence would be quite salient. Such performance contexts have generally been associated with potentially maladaptive responses such as a focus on ability, negative task attitude, feelings of boredom, satisfaction derived only from outperforming others, low perceived ability, low effort during difficult tasks, and the belief that success only comes from high ability (e.g., Ames & Archer, 1988; Kavussanu & Roberts, 1996; Newton & Duda, 1999; Ntoumanis & Biddle, 1999; Solomon, 1996; Treasure, 1997; Treasure & Roberts, 1998).

In a predominantly learning-oriented climate, however, learning is emphasized, success is defined as personal improvement, and success is believed to result from hard work. In this context, much value is placed on effort, learning, improvement, and challenge. An example of such a climate might be a situation in which individuals are given problems to solve and are told that their goal should be to improve their analytical skills while working on the problems. If they are also told that working hard will lead to such improvements and there is little or no emphasis on scores or ability level, then the climate would be highly learning-oriented. Learning climates have been associated with adaptive responses such as positive affect, task satisfaction, intrinsic motivation, perceived competence, effective strategies, preference for challenge, high

effort and persistence during difficult tasks, and the belief that success is achieved through hard work (e.g., Ames & Archer, 1988; Kavussanu & Roberts, 1996; Newton & Duda, 1999; Ntoumanis & Biddle, 1999; Solomon, 1996; Treasure, 1997; Treasure & Roberts, 1998).

As mentioned, one focus of the current research is on task effort, particularly following failure. Research and theory on motivational climate suggest that failure or difficulty should lead to a reduction in effort in a performance climate, but sustained or increased effort in a learning climate. Some studies have shown, in fact, that perceived incompetence leads to performance decrements in performance climates but not in learning climates (Dweck, 1986; Elliot & Dweck, 1988; Jagacinski, Madden, & Reider, 2001). Note that these are precisely the behavioral responses expected to result from holding entity and incremental beliefs, respectively.

Integrating Implicit Theories and Motivational Climate

What would happen, then, when implicit theory beliefs are incongruent with the motivational climate? It is possible that the effects could cancel each other out. What might happen when beliefs and climate are congruent? Perhaps implicit theories and motivational climate have interactive, rather than merely additive, effects.

The current research suggests that the matching or person-environment fit hypothesis (Harackiewicz & Sansone, 1991; Pervin, 1968) may provide substantial insight into these issues. According to this perspective, a match between self and situation is expected to produce the most adaptive motivational response. This is because a match involves putting individuals in situations that facilitate the pursuit of their particular goals. Consistent with this idea, Smelser (1961) found that workers in two-person teams were most productive when assigned to task roles that were congruent with their personal level

of dominance. Similarly, Wilson, Aronoff, and Messé (1975) found that safety-oriented individuals (who need order and structure) performed best when in a hierarchical work structure, whereas esteem-oriented individuals performed best in an egalitarian situation. Thus, both studies found that a match between personality and situation led to the best outcome.

Perhaps the same would be true when beliefs about personality malleability are congruent with situational goals. Recall that incremental theorists pursue learning goals, whereas entity theorists pursue performance goals. Applying the matching hypothesis, then, one might expect an incremental theorist to thrive in a learning climate and an entity theorist to thrive in a performance climate, while neither would work as hard in a climate that does not match their implicit theories and associated goals. Thus, in the face of failure or difficulty, individuals would be expected to sustain or increase their effort when climate matches goals, but give up when climate is incongruent with goals. Indeed, some researchers posit that congruence is more predictive of achievement striving than either personality or situational variables alone (Pace & Stern, 1958; Wilson et al., 1975).

To date, only one study (El-Alayli & Baumgardner, in press) has considered the matching hypothesis as it applies to implicit theories of attribute malleability. In this study, the researchers manipulated participants' implicit theory beliefs regarding a bogus desirable personality characteristic called "social acuity." Participants in the entity condition were told that social acuity had been shown to be a fixed and stable trait, while those in the incremental condition were led to believe that social acuity was quite variable and changeable. Note that research (e.g., Chiu et al., 1997) has found that measuring or manipulating implicit theory beliefs produces the same results.

Participants were then told that they would be taking a series of "social acuity tests." For the first test, they looked at a picture, similar to those used in Murray's (1938) Thematic Apperception Test, and wrote a story about what might be happening in the scene. Afterwards, participants took a second bogus test, which involved answering multiple-choice questions regarding the characters presented in additional ambiguous pictures. The experimenter pretended to score this second test and gave participants bogus success or failure feedback regarding their level of social acuity as it compared to that of previous participants. Later, participants took a third bogus test which was identical to the first in format. The dependent measure was change in task effort from Test 1 to Test 3, which was measured as the number of words written for the third test minus the number of words written for the first one.

Contrary to most previous research (see Dweck, 1999), participants induced to hold entity beliefs increased their effort after failing, whereas those induced to hold incremental beliefs decreased their effort. The authors explained this finding in terms of the matching hypothesis described above. They had set up a highly performance-oriented motivational climate in their study. Participants were told that they would be taking tests that measured a socially desirable personality characteristic and that they would be getting their scores on these tests. Later they were given normative feedback regarding their apparent level of the trait. Consistent with the current perspective, the authors suggested that entity theorists displayed more effort than incremental theorists after failure because the setting was most suited for the pursuit of entity theorists' primary goal of outperforming others. After finding out that they did poorly on the test, entity theorists became more motivated to prove their competence on a subsequent test. Although they were told that they could not improve their social acuity ability, they still set out to improve their social acuity score.

Incremental theorists, on the other hand, had no reason to even sustain their effort because they were told that they would merely be getting tested during the session and would have no opportunity to learn anything or to improve their skills. Although these findings are consistent with the matching hypothesis, this study did not directly test the effects of congruence and incongruence, given that motivational climate was not manipulated.

There are, however, some recent studies in the goals literature that have manipulated motivational climate (or similar variables) in order to test the matching hypothesis as it applies to personal and situational goals. For example, Harackiewicz and Elliot (1998) told participants that they would be playing pinball in a study that focused either on "how well students play pinball compared to others" (performance context) or on "students' reactions to games and leisure activities" (neutral context). They also manipulated participants' personal goals by leading some to focus on outperforming others (performance goal) and others to focus on developing their pinball skills (learning goal). Participants in both goal conditions were also provided with some specific tips to help them pursue their instructed goal. Paralleling previous research, the results indicated that in the neutral context, mastery goals were more adaptive than performance goals. In the performance context, however, performance goals led to more enjoyment, more free-choice playing, and a greater desire to play pinball in the future than did mastery goals. This pattern of findings provides support for the idea that performance goals can, at least in some ways, be more adaptive than learning goals when the setting has a performance-orientation.

Other similar studies have measured rather than manipulated goals (Bell, Kozlowski, & Dobbins, 2001; Jagacinski et al., 2001). This work has yielded findings that are somewhat consistent with the matching hypothesis. Bell et al. (2001) found that

individuals with high learning goals performed better at a computer-based radar simulation task when the climate emphasized learning goals than when it emphasized performance goals, though this interaction was only marginally significant. Similarly, Jagacinski et al. (2001) found that individuals with high learning goals performed better at a brainstorming task when in a learning climate than when in a performance climate. Both studies found nonsignificant trends in highly performance-oriented individuals to perform better when in a performance context than in a learning context.

It is possible that the patterns in these two studies were not sufficiently strong because the researchers correlated general trait goals with very specific situational goals. According to Snyder and Ickes's (1985) notion of "criterion moderating variables," general measures are not likely to correlate well with specific measures. In spite of the mismatch of specificity, however, both studies still yielded patterns consistent with the matching hypothesis. It is likely that these interaction patterns would have been stronger had the researchers employed goal measures that were more specific to the ability or task at hand. Thus, I view these studies as rather consistent with the matching hypothesis predictions regarding task effort and performance.[3]

Still other research has suggested that person-environment fit may also cause performance goals to promote good grades in college classrooms (Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Harackiewicz, Barron, & Elliot, 1998; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000). For example, Harackiewicz et al. (2000) found that students' performance goals regarding an introductory psychology course were positively

[3] However, a study by Newton and Duda (1999) in which high-school volleyball players indicated their goals and perceptions of the motivational climate did not find support for the matching hypothesis. Specifically, goals and climate did not significantly interact to predict task effort. Unfortunately, the article did not provide the pattern of means, so it is not clear whether or not there was a trend in the direction of congruence promoting the most effort.

correlated with their grades in that course and in future psychology courses, whereas learning goals were unrelated to grades. The researchers suggested that the reason for this finding is that large lecture classes in college tend to focus on normative grading, where success is defined in terms of outperforming others. Because that type of climate is most congruent with the goals sought by performance-oriented individuals, they tend to thrive in such courses. In addition, those classes often rely on multiple-choice exams and thus require only superficial learning, which is more characteristic of performance-oriented students (Meece, Blumenfeld, & Hoyle, 1988; Wolters, Yu, & Pintrich, 1996). A study examining grades in college classes in which instructors created a learning-oriented climate in order to encourage student interest and enrollment found that learning goals were positively associated with class performance (Church, Elliot, & Gable, 2000).[4]

It is important to note, however, that some other studies examining grades have yielded results inconsistent with the matching hypothesis (Barron, Schwab, & Harackiewicz, 1999, as cited in Barron & Harackiewicz, 2000; Button, Mathieu, & Zajac, 1996; Phillips & Gully, 1997). Unfortunately, it is difficult to reconcile these inconsistencies since these investigations did not include a measure or manipulation of motivational climate in order to specifically test the congruence model. As mentioned, though, the few investigations that have examined congruence by manipulating

[4] However, this study also found "performance-approach" goals to be positively associated with graded performance, while "performance-avoidance" goals were negatively associated with grades. Performance-approach goals refer to a desire to demonstrate high ability and performance-avoidance goals refer to a desire to avoid demonstrating poor ability. Recent research suggests that it may be important to distinguish between both types of performance goals (e.g., Elliot & Church, 1997; Elliot & Harackiewicz, 1996) because it is mainly the performance-avoidance type that leads to maladaptive responses (Barron & Harackiewicz, 2000; Elliot & McGregor, 1999; Harackiewicz et al., 1998; Hidi & Harackiewicz, 2000, Linnenbrink & Pintrich, 2000, Midgley, Kaplan, & Middleton, 2001; Utman, 1997). Some researchers have suggested that it may also be important to make the approach-avoidance distinction with regard to learning goals as well (Elliot & McGregor, 2001; Linnenbrink & Pintrich, 2000).

motivational climate provide somewhat encouraging results (Bell et al., 2001, Harackiewicz & Elliot, 1998, Jagacinski et al., 2001).

Although the literature provides some support for the matching hypothesis in the context of motivation, there are some issues that remain to be addressed. For example, none of the goal studies discussed above examined whether performance goals can ever be more adaptive than learning goals after the experience of failure or perceived incompetence. They also did not investigate whether the matching hypothesis applies to the broader concept of implicit theories about the malleability of personal attributes. The only study that examined both implicit theories and reactions to failure while considering the effects of motivational climate (El-Alayli & Baumgardner, in press) did not actually manipulate motivational climate. As such, we cannot be certain that it was the performance-oriented climate that produced the unusual pattern of effort that was observed. Also, the study did not examine whether incremental theorists would demonstrate the same increase in effort in a learning context. For these reasons, it is worthwhile to specifically examine the potentially interactive effects of implicit theories and motivational climate on reactions to failure.

This research is important because work in this area has generally shown incremental theorists to have the most adaptive motivational responses to failure in achievement situations (Dweck, 1999; Dweck & Leggett, 1988). The current research examines a circumstance in which the reverse may be true—when the achievement context is most suited for the pursuit of performance goals. If entity theorists do, in fact, try harder after failure than incremental theorists in a performance climate, and the reverse is true in a learning climate, then this research would have strong implications for revising our well-established understanding of how implicit theories about attribute malleability affect effort.

The achievement goal and motivational climate literatures would be supplemented as well because it is not yet clear when performance goals and climates may be most adaptive. Thus, a major goal of the current research was to test the proposed congruence model as it applies to effort after failure.

Of course, congruence might not always produce an adaptive effort response following failure. Rather, it is likely that forces exist that moderate such congruence-based facilitation of effort. For example, the congruence model may apply more to matches between personality traits and situational factors than to matches between beliefs or goals and situations, given the few studies above that did not find a fit between a belief or goal and the environment to promote the most effort.

In addition, there may be some circumstances in which entity or incremental theorists would not work harder after failure even when in a climate suited for the pursuit of their goals. For example, entity theorists may not work harder after an initial failure if they see no hope for improving their apparent ability on subsequent tasks. This possibility is likely to be true when they believe that they worked as hard as they could have on an initial task that provided evidence of failure. In such situations there would be no reason to try to increase their effort later. Perhaps, then, congruence is most likely to promote an adaptive effort response by entity theorists when they can attribute their initial poor performance at least partially to a lack of effort.

Similarly, incremental theorists may not increase their effort if they see no way to improve their skills while performing subsequent tasks. They could think that improvement is a very slow process that cannot be accomplished by performing only a couple of tasks or that certain types of tasks are not as conducive to learning as others. Thus, congruence may only result in increased effort after failure by incremental theorists

when they truly believe that performing a subsequent task can improve their skills. The current research attempted to construct a situation that would facilitate the possible beneficial effects of congruence by attending to the issues above.

It is also noteworthy that, even if the congruence model does hold, increased effort may not always be adaptive. For instance, working hard could produce *decreased* performance on certain types of tasks, such as those involving mostly automatic processing. Also, increased effort may be maladaptive if there is no chance that one can benefit from their hard work. Just as overly high aspirations can lead to disappointment, so can high effort and persistence when one lacks the ability to ever succeed at a task. In addition, circumstances that promote high effort are not necessarily associated with favorable affect or task interest. The reverse may actually be true in some cases, a possibility discussed in the next section.

Emotional Responses to Failure and the Acceptance of Failure Feedback

The discussion thus far has focused mainly on behavioral responses to failure and setbacks. As mentioned earlier, another goal of the present research was to examine affective and cognitive responses to failure. Below I discuss the extent to which the congruence model might apply to such reactions. Following that is a discussion of the possibility that different implicit theories might result in different degrees of acceptance of ability feedback.

Affect and Task Interest Predictions as They Relate to the Congruence Model

Although entity theorists may at times exhibit a more adaptive behavioral response (i.e., high effort and performance) to failure, they are unlikely to reap more emotional benefits than incremental theorists. In fact, one might expect just the opposite. Individuals who view a personal attribute as uncontrollable may feel particularly bad after

experiencing failure in that domain. They would be forced to make ability attributions for their failure and would see no hope for future improvement in skills (Dweck, 1999; Dweck & Leggett, 1988; Molden & Dweck, 2000). Thus, it is likely that entity theorists would experience worse affect and lower task interest than incremental theorists after failure.

Entity theorists should even experience these negative reactions when in a climate that facilitates the pursuit of their dominant goals. El-Alayli and Baumgardner's (in press) study found that although entity theorists worked hard after failure in a performance climate, they also experienced less favorable affect than incremental theorists. The hard work entity theorists may display after failing in a performance climate may be the result of an anxiety-ridden pressure to restore one's public or private self-image rather than an exciting embrace of challenge. They might simply be trying to increase their score, even though they do not think that their actual ability level can be improved. Some of their motivation may also be driven by psychological reactance (Brehm & Brehm, 1981) as a result of learning that they may never be able to exhibit high ability. Entity theorists might work extra hard because they do not want to accept the threatening idea that they could have low ability in an area that cannot be improved. In either case, it is likely that their hard work would be accompanied by bad feelings and low task interest. As Linnenbrink and Pintrich (2000) suggest, motivational processes and affective processes do not necessarily go hand-in-hand.

Thus, the matching hypothesis is not likely to apply to the affective reactions of entity theorists. Instead, I propose that entity theorists would feel worse than incremental theorists after failure, as suggested by past research (Dweck, 1999), regardless of the motivational climate. People are not generally happy upon receiving failure feedback, but that information would have less of an impact for those who hold an incremental belief

because they would be more likely to make effort rather than ability attributions (Dweck, 1999; Molden & Dweck, 2000). Also, they would be comforted by the belief that they could eventually improve on the relevant dimension because of its apparent malleability.

Unlike entity theorists, perhaps incremental theorists' mood and interest would benefit from being placed in a climate congruent with their goals. When incremental theorists experience failure, they often view the setback as an exciting challenge. Thus, when placed in a context where their desire to conquer that challenge can be fulfilled, they will likely experience greater interest and more favorable affect. Their learning goals cannot be satisfied in a setting where one is merely able to exhibit their current ability level and has no opportunity to work on improving it. It is possible, then, that incremental theorists would experience both increased effort and improved affect and task interest after failing in a learning climate as opposed to a performance climate.

Thus, I predicted that entity theorists experiencing failure in a performance climate would try hard but would not experience favorable affect or task interest. Their benefits would only be evident in their behavioral response, not their affective response. However, incremental theorists are expected to benefit both behaviorally and affectively when in their congruent climate. It is likely that incremental theorists would feel better and have more task interest than entity theorists after failure in any type of climate, but that this difference would be especially evident in a learning climate.

Motivated Cognition and Acceptance of Feedback

People's emotional reactions to different types of ability feedback could also lead to motivated acceptance or rejection of that feedback. Research on implicit theories has not yet explored the possibility that entity and incremental beliefs might lead to different levels of acceptance of performance feedback. As mentioned above, entity theorists should

be more likely to be threatened by negative feedback because they would think that they lack a desirable attribute that can never be changed. Incremental theorists, on the other hand, should not be threatened by negative feedback because they would know that they could eventually improve on the relevant attribute. In fact, past research suggests that they are often excited about getting negative task feedback when they have the chance to face the same task again (Dweck, 1999). Given this interest in challenge, incremental theorists should be more welcoming of poor ability feedback than should entity theorists. Entity theorists, on the other hand, should seize any opportunity to discount the validity of the negative feedback that they receive.

A host of research has shown that people engage in motivated information processing when it is in their advantage to do so (e.g., Chen & Chaiken, 1999; Chen, Duckworth, & Chaiken, 1999; Kunda, 1990; 1999; Petty & Wegener, 1999). For example, research on self-biases has repeatedly demonstrated that normal, healthy individuals tend to distort reality in order to view themselves favorably (see Taylor & Brown, 1988, for a review). People have numerous tactics for maintaining favorable self-perceptions, such as their tendency to make strategic causal attributions, for example, by taking more credit for success than they take blame for failure (e.g., Green & Gross, 1979; Miller & Ross, 1975; Schlenker & Miller, 1977).

Kunda (1990) reviews a large and diverse body of literature that suggests that people often use different strategies for accessing, constructing, and evaluating beliefs, depending on the desired conclusions that they would like to reach. One caveat, however, is that people only draw their desired conclusion if they can find or construct some apparent justification for that conclusion. One example of this is research that found that people can find ways to avoid being persuaded by a strong counterattitudinal persuasive

message when the source of that message is a numerical minority, but not when it is a majority (El-Alayli, Park, Messé, & Kerr, 2002; Messé, El-Alayli, & Chugh, 2000). Only in the former condition can they use source information as a basis for engaging in biased message processing and directly discounting the persuasive message. People also make use of available stereotypes in order to find ways to justify their desired beliefs (see Kunda, 1999, for a review). For example, a study by Sinclair and Kunda (2000) found that students viewed female professors as less competent than male professors only after receiving negative evaluations from them. Students did not use this negative stereotype of women when they received positive evaluations from their female professors. In addition, students did not express the stereotype when they merely observed others getting negative feedback from a woman.

This past research provides strong evidence that motivated individuals would discount negative ability feedback when there is a discounting cue available. In addition to examining task effort, affect, and interest, the current research also sought to examine whether entity theorists are more likely than incremental theorists to discount poor feedback when they have an opportunity to do so, given that they may be more threatened by the feedback. For example, if individuals receive feedback from a test that was apparently developed by someone with little credibility in the area of test development, then they might reject the validity of the feedback if the test apparently measures a fixed attribute and they receive a bad score. However, when they receive a good score on a test measuring a fixed attribute, they might welcome the feedback and see it as valid in spite of the fact that it came from an unreliable source. Or, if they think the attribute measured by the test is apparently malleable, rather than fixed, then they might not be as motivated to use the available discounting cue to reject the feedback.

Thus, the current research proposes that entity theorists would be less accepting of failure feedback when it is provided by a source with low rather than high credibility because there would be less basis for rejecting the feedback in the latter circumstance. However, I expect that incremental theorists would not strategically use source credibility information in an attempt to reject failure feedback. In addition, both entity and incremental theorists should be very accepting of success feedback regardless of test credibility because it would be in their best interest to view that feedback as valid. This is consistent with research demonstrating people's tendencies to be self-enhancing (Taylor & Brown, 1988).

If test credibility results in different levels of acceptance of performance feedback, then subsequent task effort might also be affected. Recall that entity theorists are expected to work hard after failure when in a performance-oriented context. This might be less true when entity theorists are in a situation in which they can discount their negative ability feedback. If they can convince themselves that the feedback is not valid, then they might not feel the need to work harder to prove their competence. Thus, it is predicted that entity theorists would not work as hard after failure when a test is apparently low in credibility than when it is highly credible. If so, it is likely that this finding would be due to different levels of acceptance of the failure feedback.

The Current Investigations

The current research consisted of two studies that sought to address the issues discussed above. The primary goal of Study 1 was to examine whether congruence between implicit theories and motivational climate has a favorable, synergistic effect on task effort after failure. In addition, the first study included supplemental measures of affect and task interest to explore possible emotional reactions to failure. As mentioned

earlier, affect and interest are not always expected to coincide with task effort. Of particular interest is the possibility that entity theorists in a performance climate might exhibit high effort while also experiencing unfavorable affect and low task interest.

Study 1 manipulated implicit theory beliefs regarding a socially desirable attribute and set up a climate that emphasized either performance or learning goals. As mentioned earlier, previous research has successfully manipulated both implicit theories (e.g., Chiu et al., 1997) and motivational climate (e.g., Ntoumanis & Biddle, 1999) regarding specific attributes or tasks. Following these manipulations, participants learned that they scored low on a task measuring the relevant trait. Task effort was measured both before and after the manipulations and the failure feedback. Change in effort from the first to the second task was the primary dependent measure. Perceived changes in effort and performance were also assessed. As mentioned, measures of temporary affect and task interest were also included. Self-efficacy and academic goal orientation were also measured due to their potential for producing individual differences in participants' reactions to the feedback. As an additional supplemental measure, participants were also asked some questions that assessed their theories about the potential consequences of working hard on the tasks (e.g., getting a high score, having improved ability, etc).

The three main hypotheses for Study 1 are as follows:

Hypothesis 1.1: Entity theorists would work harder than incremental theorists when in a performance-oriented climate.

Hypothesis 1.2: Incremental theorists would work harder than entity theorists in a learning-oriented climate.

Hypothesis 1.3: Incremental beliefs would produce more favorable affect and higher task interest than entity beliefs, particularly in the learning climate, where incremental theorists might be excited by the challenging goal of increasing their competence.

The purpose of Study 2 was to examine whether entity theorists are more threatened by negative feedback than are incremental theorists, and whether it is this threat that is responsible for motivating entity theorists to work hard when performance goals are made salient. Entity and incremental beliefs were manipulated in the same way as in Study 1. Participants completed a task and received bogus feedback (failure or success) regarding their score while in a performance-oriented motivational climate. Participants were led to believe that their feedback was based on scores from a test that was either low or high in credibility. The low credibility information was expected to serve as a heuristic cue that threatened participants could use to discount negative feedback. Again, effort was measured both before and after the manipulations. Acceptance of the feedback was assessed before the second measure of effort. As in the first study, supplemental measures of self-efficacy, goal orientation, task interest, theories of effort, and perceived effort and performance were included.

The following hypotheses were posited:

Hypothesis 2.1: Entity theorists would be less accepting of the failure feedback when it came from a source low in credibility than one high in credibility.

Hypothesis 2.2: Incremental theorists would not discount failure feedback from a source low in credibility, because they would not feel as threatened by the feedback.

Hypothesis 2.3: Participants would be very accepting of the success feedback in all of the implicit theory and test credibility conditions.

Hypothesis 2.4: After failure, entity theorists would display a more adaptive effort response in the high credibility condition than in the low credibility condition, where they could discount the poor feedback

Hypothesis 2.5: The effect described in Hypothesis 2.4 would be mediated by acceptance of feedback.

Below I first describe the methodology and results of Study 1, followed by those of Study 2. I conclude each study section with a summary of the main findings from that study. Because the two studies were independently developed to explore interrelated consequences of holding entity and incremental beliefs, findings are not discussed until after results from both studies have been described, at which point some directions for future research and implications are also explored.

STUDY 1

Study 1 Method

Participants

The sample consisted of 172 students (69% female and 31% male, with a mean age of 19.5) enrolled in introductory psychology courses at Michigan State University. They received course credit for their participation in this study.

Design

The design was a 2 (entity or incremental implicit theory) × 2 (performance or learning motivational climate) × 2 (task order) between-subjects factorial, with an external control condition (also crossed with task order), in which no implicit theory or motivational climate information was provided. The primary dependent measure of task effort was assessed both before and after the implicit theory and motivational climate manipulations, and was thus employed as a within-subjects variable. Participants received failure feedback in all conditions.

Materials and Procedure

Up to four participants were greeted by an experimenter who led them to believe that the focus of the study was on "expansive thinking," a personal attribute fabricated for the purpose of this study. After signing a statement of informed consent, participants were told that they would be performing expansive thinking tasks on the computer. They were then separated into different mini-rooms, each equipped with a computer, and the doors were shut for privacy. The remainder of the study was performed on these computers, which were randomly assigned to present materials from one of the ten conditions.

On the first few screens, participants read an extensive description of expansive thinking. It was described as a characteristic that had recently gained popularity among psychologists. Participants read that expansive thinking included the ability to brainstorm, focus, hold various thoughts at the same time, think in diverse ways, and display persistent cognition with little fatigue. In addition, participants were led to believe that expansive thinking had been shown to be related to favorable life outcomes, such as higher productivity, more optimism, and even greater well-being. This information was included to arouse participants' interest and to present expansive thinking as a socially desirable characteristic. Refer to Appendix A for the exact wording of the description of expansive thinking with which participants were presented. Following this initial information, participants were told that they would be completing two expansive thinking tasks. For these tasks, they would be asked to generate as many uses as possible for a common object, such as a pencil, and that the uses can be as obvious or silly as they like. This type of task has been used successfully in previous research as a measure of effort or performance (Harkins, 1987; Harkins & Petty, 1982; Jagacinski et al., 2001).

Self-Efficacy. Participants then responded to four items that assessed their self-efficacy regarding the expansive thinking tasks, such as, "I know how to handle this task." These items were adapted from Sacco (1999). Participants responded to them on a scale from, 1, "strongly disagree," to 7, "strongly agree." Appendix B presents this and all other measures.

First Measure of Effort. Following the completion of the self-efficacy measure, participants received a more detailed set of instructions for their first expansive thinking task. It was emphasized that their goal should be to focus on the

quantity and not quality of their responses because only the former was related to expansive thinking. They were told that their responses could be as obvious or unusual as they like, so long as they were not extremely impractical or redundant. For the exact wording of these instructions, see Appendix A.

Participants then advanced to the next screen where they were asked to generate as many uses as they could for either a piece of paper or a piece of rope. Participants were given exactly 12 minutes to perform the task. Previous research suggests that 12 minutes is more than enough time for people to generate all of the uses that they can for an everyday object (Harkins, 1987; Harkins & Petty, 1982). Participants were instructed to wait until the computer advanced to the next screen if they finished before the time was up. The pre-manipulations measure of effort was the number of object uses generated while completing this initial expansive thinking task.

Implicit Theory Manipulation. When the 12 minutes passed, the computer advanced to the next screen, which introduced the implicit theory manipulation. Participants read one of two detailed descriptions of expansive thinking, which are presented in Appendix A. In the *entity condition*, they were informed that years of research have shown that expansive thinking is a largely genetic, uncontrollable, and stable personality characteristic. To emphasize this point, they read the following concluding statements:

> Thus, it is likely that your level of expansive thinking has already been established and will remain stable for most of your lifetime. In other words, if you are high in expansive thinking now, you always will be. If you are not very high, you will not have high skills in the future.

In the incremental condition, participants were informed that years of research have shown that expansive thinking has no genetic component, and is controllable, variable, and readily improved with practice and hard work. To conclude, they read:

> Thus, if you are not a very expansive thinker now, you can work at it to become higher in expansive thinking. And if you are currently high in expansive thinking, you may not always be that way if you do not nurture your skills.

A preliminary study was performed to confirm that participants would not have different perceptions of the attribute of "expansive thinking" depending on whether they received the entity or incremental information about the trait. That study and its findings are presented in detail in Appendix C.

Motivational Climate Manipulation. Motivational climate was induced on the next few screens. Again, Appendix A presents the exact wording for each of the conditions. Participants in the *performance climate* were told that the expansive thinking task they completed was actually a reliable *test* of expansive thinking *ability*. They were also told that they would be informed of how they scored on each of the expansive thinking tests as *compared to* other college students. To further emphasize performance, they were led to believe that they would later have the opportunity to discuss their scores with the experimenter and the other participants. Thus, the performance climate emphasized the demonstration of ability by presenting the tasks as reliable *tests* of *normative ability* that would be *scored* and possibly *discussed* in front of others. Learning goals were inhibited in this condition by telling participants that the tests provide no basis for the learning or improvement of expansive thinking skills.

In contrast, the *learning climate* emphasized the learning and practice of expansive thinking skills, rather than the testing of ability. Participants in this

condition were told that the expansive thinking task they completed was shown to be a reliable *training task* for *practicing* expansive thinking. They were led to believe that merely completing the *exercise* allows people to *increase their knowledge* about the process of expansive thinking. In addition, they were led to believe that they would later have the chance to talk to the experimenter and the other participants about the *strategies* that everyone used to help them generate many object uses. In this condition, participants were told that although they would be getting some general feedback from their first expansive thinking task, they would not be given any feedback regarding their performance on the next expansive thinking task. The task was described as an opportunity for participants to practice thinking expansively. Thus, learning goals were emphasized and performance goals were minimized.

There was also an external control condition where participants did not receive any implicit theory or motivational climate information. However, participants in this condition still received the failure feedback and all of the other information and measures.

Manipulation Checks. Next, participants completed a questionnaire that assessed the effectiveness of the manipulations. For example, to test the implicit theory manipulation, they were asked to indicate their agreement with six items such as, "It would be possible for me to somehow change my level of expansive thinking," and "I think expansive thinking is a stable and fixed personality characteristic." To test the motivational climate manipulation, they were asked to indicate their agreement with six additional items, including, "The expansive thinking tasks used in this study are exercises for practicing expansive thinking," and "The expansive thinking tasks used in this study are well-established tests of expansive thinking ability level."

Failure Feedback. Following this, participants were told that they could advance to the next screen to get some feedback from their first expansive thinking tasks. Upon doing so, the computer paused for a second, as if to calculate their score, and then participants in all conditions received the following feedback:

You scored _____ on the expansive thinking task.

VERY LOW
LOW √
MODERATE
HIGH
VERY HIGH

Thus, all participants experienced perceived incompetence.

Filler Items. Participants were then presented with four filler items to distract them from becoming suspicious about the feedback. They were asked questions such as, "I like to play sports," and "I like to read."

Demographics Questionnaire. Participants were then asked to answer a few questions about themselves. Among these were requests for their age, sex, race, and year in school. No predictions were made regarding these variables, but some research has shown males and females react differently to different types of goals (Bouffard, Boisvert, Vezeau, and Larouche, 1995).

Temporary Affect. Next, participants were given a measure of temporary affect. They were asked to indicate, on a 5-point scale from "not at all" to "extremely," how much they were currently feeling each of nine emotions: happy, joyful, pleased, enjoyment/fun, unhappy, depressed, frustrated, worried/anxious, angry/hostile. Both the positive and negative affect items have been shown to produce reliable composite scales, with internal consistency coefficients approaching .90 (Diener & Emmons, 1985; Diener & Larsen, 1984; Emmons & Diener, 1985). In addition, Larsen, Diener,

and Emmons (1983, as cited in Emmons & Diener, 1985) confirmed that these scales do not correlate with measures of social desirability. Moreover, evidence for convergent validity comes from research demonstrating that these scales correlate significantly with various other measures of subjective well-being (Larsen et al., 1983, as cited in Emmons & Diener, 1985).

Second Measure of Effort. Next, participants were asked to complete a second expansive thinking test, which was identical to the first in format. They were presented with the same set of instructions, but were asked to generate uses for a different object. In the first order condition, participants generated uses for a piece of paper for Task 1 and a piece of rope for Task 2. In the second order condition, these objects were reversed. The total number of items generated on the second task was used as the post-manipulations measure of effort.

Task Interest. Participants were then asked to answer some questions regarding their interest in expansive thinking. On a 1 to 7 scale from "strongly disagree" to "strongly agree," participants responded to items such as, "I don't care about the topic of expansive thinking," and "I think expansive thinking is an interesting personality characteristic." The nine interest items are presented in Appendix B.

Perceived Effort and Performance. Four items assessing perceived effort on the two expansive thinking tasks were included to get a measure of *perceived* change in effort. I thought it might be important to assess perceptions of effort in case they did not match actual effort estimates. Items assessing perceived performance were included to test the effectiveness of the failure feedback information and to get an idea of how participants believed they performed on the second task. Refer to Appendix B for the exact items.

Theories of Effort and Performance. As mentioned earlier, participants' theories about hard work on the expansive thinking tasks were assessed. These six items assessed the extent to which they believed that hard work would result higher skills, higher scores, and more favorable evaluations. In addition, some items assessed the degree to which participants focused on quantity or quality when performing the second expansive thinking task. These items can be seen in Appendix B.

Trait Goal Orientation. Participants then completed a 12-item scale that assessed their academic goal orientation. These were taken from Elliot & McGregor (2001). The items assessed performance and learning goals, the latter being referred to as "mastery goals." In addition, the scale makes the distinction between approach and avoidance goals. As mentioned earlier, research has recently determined that this distinction is important because the desire to perform well (performance approach goals) often results in more favorable outcomes than the motivation to avoid performing poorly (performance avoidance goals; Barron & Harackiewicz, 2000; Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Elliot & McGregor, 1999; Harackiewicz et al., 1998; Hidi & Harackiewicz, 2000; Linnenbrink & Pintrich, 2000; Midgley, Kaplan, & Middleton, 2001; Utman, 1997). Some researchers have suggested that it may also be important to make the approach-avoidance distinction with regard to mastery goals (Elliot & McGregor, 2001; Linnenbrink & Pintrich, 2000). Thus, all four types of goals were measured: performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance. Due to a procedural error, goal orientation data for many participants were not recorded properly. However, these participants were contacted via e-mail up to three weeks following their participation in the study, at which point many of them completed the goal orientation scale again.

Suspicion Measure. Next, participants were asked to describe what they believed was the purpose of the experiment. This item was used to identify suspicious participants.

Feedback Believability. In order to assess the believability of the failure feedback, participants were asked to indicate how believable their expansive thinking task feedback was on a scale from 1, "not at all believable," to 6, "extremely believable." Upon completing this final task, the participants were thoroughly debriefed, thanked, and dismissed.

Study 1 Results

In this section, I first describe some of the preliminary analyses performed on the Study 1 data. Following this, tests of the specific hypotheses regarding task effort, interest, and affect are discussed. The remainder of the section focused on supplemental analyses, such as individual difference effects on the main dependent measures, and the effects of the manipulations on some supplemental dependent measures. Following is a section that summarizes the main findings.

Preliminary Inspection of the Data

Data Exclusion

Data from 20 participants had to be eliminated based on their responses to the open-ended item that asked them to describe the purpose of the study. Sixteen of these participants believed that the feedback was fictitious and/or thought the research examined the effects of feedback score on change in *effort*. Five participants guessed correctly that the research examined the effects of different types of implicit theory information on participants' general reactions and/or change in effort. Two participants were aware of the motivational climate induction. Note that some participants fell in two or more of the

categories of suspicion. Of the 20 participants that were eliminated, three were in the control condition, seven were in the entity, performance condition, six were in the entity, learning condition, one was in the incremental, performance condition, and three were in the incremental, learning condition.

Scale Construction

Task Interest. The nine items assessing interest in expansive thinking were coded such that higher scores indicated more interest, and were averaged to form a composite (M = 5.21, SD = 1.03, Cronbach's α = .89).

Temporary Affect. A Principal Components Analysis with Varimax Rotation was performed on the nine affect items, with the rotation criterion specified as Eigenvalues greater than 1.0. Two factors emerged, the first of which consisted of the positive affect items: happy, joyful, pleased, and enjoyment/fun (Eigenvalue = 3.18, and factor loadings = .85 to .90). These items were averaged to form an index of positive affect (M = 2.52, SD = 1.02, Cronbach's α = .90). The second factor consisted of the negative affect items: depressed, frustrated, worried/anxious, angry/hostile, and unhappy (Eigenvalue = 2.95, and factor loadings = .70 to .82). These items were averaged to form an index of negative affect (M = 1.68, SD = 0.69, Cronbach's α = .82).

Self-Efficacy. The four items assessing self-efficacy were averaged to form a composite, with higher scores indicating greater self-efficacy regarding the expansive thinking tasks (M = 6.18, SD = 0.75, and Cronbach's α = .90).

Goal Orientation. A Principal Components Analysis with Varimax Rotation was performed on the 12 achievement orientation items, with the minimum Eigenvalue specified as 1.0. The analysis revealed three factors, rather than the four described by

Elliot and McGregor (2001). The first factor included all of the mastery approach and mastery avoidance items (items 4 to 9), which were averaged to form a general mastery goal orientation factor (Eigenvalue = 3.48, factor loadings = .70 to .82, M = 4.93, SD = 1.09, and Cronbach's α = .85). The second factor consisted of the performance avoidance items (items 10 to 12), which were averaged to form a composite (Eigenvalue = 2.20, factor loadings = .76 to .84, M = 5.23, SD = 1.34, and Cronbach's α = .77). The third factor consisted of the performance approach items (items 1 to 3), which were also averaged to form a composite (Eigenvalue = 2.33, factor loadings = .81 to .91, M = 4.53, SD = 1.30, and Cronbach's α = .83). None of the 12 items had high loadings (greater than .5) on more than one factor.

Because I was only interested in trait variance in goal orientation, I examined whether there were any condition effects on any of the goal composites. Implicit theory × motivational climate × order ANOVAs were performed on each goal orientation measure. The only significant finding was an order × climate interaction on performance avoidance goals. To eliminate state variance in this measure, performance avoidance scores were standardized within each of the four order × climate conditions.

Manipulation Checks

Implicit Theory Manipulation. The six implicit theory manipulation check items were coded such that higher scores indicated more incremental beliefs about expansive thinking. They were then averaged to form a composite (Cronbach's α = .85). An implicit theory × motivational climate × order ANOVA including the external control group was performed on this composite to examine the effectiveness of the implicit theory manipulation. In other words, a ten condition one-way ANOVA was performed with

contrast analyses used to test for all possible effects and interactions. As expected, participants in the incremental theory condition held more incremental beliefs ($M = 5.65$, $SD = 0.86$) than those in the entity theory condition ($M = 3.70$, $SD = 1.25$), $F(1, 142) = 113.71$, $p < .0001$. In addition, both the incremental and entity theory condition means differed significantly from that in the control condition ($M = 4.96$, $SD = 0.78$), $F(1, 142) = 31.42$, $p < 0001$, and $F(1, 142) = 10.01$, $p < 005$, respectively. Thus, the manipulation was successful. There were no other effects or interactions on the implicit theory manipulation check index.

Motivational Climate Manipulation. When combined, the six motivational climate manipulation check items had poor internal consistency (Cronbach's $\alpha = .38$). A Principal Components Analysis with Varimax Rotation and Eigenvalues specified as greater than 1 was performed on the items to examine whether the performance and learning climate items loaded on separate factors. Results yielded the predicted factor structure. The performance climate items (7, 9, and 11) all grouped together, with factor loadings ranging from .61 to .76 and an Eigenvalue of 1.70. The learning climate items (8, 10, and 12, with item 10 reverse-scored) formed a second factor, with loadings from .67 to .71 and an Eigenvalue of 1.52. Although both composites were still rather low in reliability ($\alpha = .52$ and .47, respectively), the reliability was improved so composites were created by averaging each set of items.

An implicit theory × motivational climate × order ANOVA including the external control group was performed on each composite to examine the effectiveness of the motivational climate manipulation. As expected, participants in the performance climate condition perceived the situation as having a stronger emphasis on performance goals ($M = 6.19$, $SD = 0.81$) than did participants in either the learning climate ($M = 5.08$, $SD = 0.86$),

$F(1, 142) = 51.31$, $p < .0001$, or the control condition ($M = 4.90$, $SD = 0.97$), $F(1, 142) = 46.35$, $p < .0001$. Participants in the performance climate also viewed the situation as having less of an emphasis on learning goals ($M = 4.37$, $SD = 1.44$) than did participants in the learning climate ($M = 5.17$, $SD = 1.04$), $F(1, 142) = 13.33$, $p < .0001$, or those in the control ($M = 4.93$, $SD = 0.90$), $F(1, 142) = 4.84$, $p < .05$. The learning climate and control condition means did not differ significantly for either motivational climate index. Thus, it appears that the learning climate was more similar to a no-specified-climate control than was the performance climate.

There were also some other condition effects on the two motivational climate indices. For example, implicit theory had an effect on perceptions of a learning climate. Specifically, incremental theorists perceived the situation as having more of an emphasis on learning ($M = 5.05$, $SD = 1.34$) than did entity theorists ($M = 4.42$, $SD = 1.20$), $F(1, 142) = 8.10$, $p = .005$. This is consistent with the notion that incremental beliefs promote learning goals. Implicit theory also influenced perceptions of a performance climate. Specifically, participants in both the entity and incremental conditions perceived more of a performance-orientation in the climate than did participants in the control condition ($M = 4.90$, $SD = 0.97$), Fs (1, 142) = 12.86 and 17.19, respectively, ps $< .0001$. The only other significant finding for the motivational climate manipulation checks was an unexpected implicit theory × motivational climate × order interaction on the performance climate index, $F(1, 142) = 7.56$, $p < .01$. However, the performance climate induction elicited stronger perceptions of a performance-oriented climate than the learning climate induction in each of the four implicit theory × order conditions, Fs(1, 32 to 33) = 3.62 to 37.02, ps = .07 to .0001. Thus, although there were other influences on participants' perceptions of the motivational climate, the learning and performance climate inductions did have their

intended effects. Participants in the performance climate perceived the situation as one that placed more emphasis on performing and less emphasis on learning than participants in the learning climate.

Failure Feedback. Recall that participants in all conditions received failure feedback on their first expansive thinking task. Near the end of the study, participants were asked to estimate their performance on the first task. On a scale from 1 to 5, participants' average response was 2.47 (SD = 1.02), where 2 indicated that they thought they performed "somewhat poorly" and 3 referred to an "average" level of performance. Also, participants' mean estimated percentile rank was 42.94 (SD = 15.50). When asked the believability of the feedback, participants' mean response was 3.54 (SD = 1.09), where 3 was "somewhat believable" and 4 was "believable." Thus, on average, participants seemed to believe that they performed rather poorly on the first expansive thinking task.

Tests of Hypotheses

Task Effort

Hypotheses 1.1 and 1.2. It was hypothesized that entity beliefs paired with a performance climate and incremental beliefs paired with a learning climate would result in the most adaptive change in effort after failure. Task effort was measured as the number of object uses generated on each of the expansive thinking tasks. Unexpectedly, participants found it easier to generate uses for a piece of paper (M = 35.51) than for a piece of rope (M = 28.73). To neutralize this difference, the number of object uses listed was standardized within each of the two objects. Thus, all effort scores reported herein will be in z-score units.

A Repeated Measures ANOVA was performed on standardized task effort, with measurement time (Task 1 versus Task 2) as the within-subjects variable and implicit

theory, motivational climate, and order as between-subjects factors. The predicted measurement time × implicit theory × motivational climate interaction was not significant, $F(1, 112) = 0.07$, $p = .80$ (see **Table 1.1** for change in effort means). The only significant finding was a main effect of measurement time, $F(1, 112) = 161.68$, $p < .0001$, such that participants increased their effort from Task 1 ($M = -0.46$, $SD = 0.79$) to Task 2 ($M = 0.43$, $SD = 1.07$). This pattern was also evident in the control condition, with participants working harder on the second task ($M = 0.31$, $SD = 0.93$) than on the first ($M = -0.36$, $SD = 0.75$), $F(1, 30) = 21.83$, $p < .0001$. Thus, failure seemed to inspire all participants to work harder after failure, although the finding could also be due to other factors, such as a practice effect. In sum, Study 1 did not support the congruence model predictions regarding task effort.

Table 1.1

Mean Standardized Change in Effort as a Function of Motivational Climate and Implicit Theory

	Implicit Theory			
Motivational Climate	Entity		Incremental	
Performance	0.83	(0.72, 27)	0.90	(0.72, 33)
Learning	0.89	(0.77, 28)	0.90	(0.78, 32)
Control		0.66	(0.79, 31)	

Note. Change in effort was measured as the number of uses generated on Task 2 minus the number of uses generated on Task 1, after scores were standardized within each object (paper or rope). Standard deviations and sample sizes are in parentheses.

Feedback believability was significantly correlated with change in effort, $r(151) = .16$, $p < .05$, whereas self-efficacy, mastery goal orientation, performance approach goal orientation, and performance avoidance goal orientation were not. Nevertheless, a series of measurement time × implicit theory × motivational climate × order ANCOVAs were performed to examine whether taking into account variance due to any of these variables might reveal more about the effects of the manipulations on change in effort. The measurement time main effect became nonsignificant when either self-efficacy, mastery goal orientation, or performance approach goal orientation was entered as a covariate. None of the previously nonsignificant findings became significant in any of the ANCOVAs and none of the covariates was significant.

Task Interest

Hypothesis 1.3. It was also predicted that incremental theorists would show more interest in expansive thinking than would entity theorists, particularly in the learning-oriented climate. To examine this, an implicit theory × motivational climate × order ANOVA was performed on the interest measure. There was an unexpected order main effect, $F(1, 113) = 6.71$, $p = .01$, such that participants showed greater task interest in the second order condition, where they generated object uses for a piece of rope before generating object uses for a piece of paper. Perhaps this is because participants had just performed the easier paper object task just before interest was assessed. Because the task was 12 minutes long, it is not surprising that participants might have been more interested in the easier "paper" task, for which it would have taken more time to run out of possible object uses. To eliminate this difference in interest, scores on the interest variable were standardized within each order condition ($M = -0.04$, $SD = 0.99$).

The same 3-way ANOVA was performed on the standardized interest scores and there were no longer any significant effects involving order. The predicted implicit theory main effect was not significant, $F(1, 113) = 0.09$, $p = .77$. Incremental theorists expressed no more task interest ($M = -0.03$, $SD = 1.07$) than did entity theorists ($M = 0.01$, $SD = 0.88$). There was, however, an implicit theory × motivational climate interaction, $F(1, 113) = 8.35$, $p = .005$. The pattern of means presented in **Table 1.2** suggests that participants were more interested in the expansive thinking tasks when implicit theory and motivational climate were incongruent. Interest was particularly low in the incremental theory, learning climate condition, where it was expected to be highest. Thus, the hypothesis regarding task interest was not supported. There were no other significant findings from the ANOVA.

Table 1.2

Mean Standardized Task Interest as a Function of Motivational Climate and Implicit Theory

	Implicit Theory	
Motivational Climate	Entity	Incremental
Performance	-0.20_{ab}* (0.79, 27)	0.26_{b}* (0.98, 33)
Learning	0.22_{b} (0.93, 28)	-0.32_{a} (1.01, 33)
Control	-0.15_{ab} (1.01, 31)	

Note. Task interest was calculated as the mean of nine items assessing task interest. Scores were standardized within order conditions. Means that do not share subscripts differ significantly at $p < .05$. Means with a * are marginally different from one another, $p = .07$. Standard deviations and sample sizes are in parentheses.

Temporary Affect

Hypothesis 1.3. Hypothesis 1.3 also predicted that incremental beliefs would lead to more favorable affect than would entity beliefs, particularly in the learning climate. Implicit theory × motivational climate × order ANOVAs were performed on the positive and negative affect composites. Contrary to predictions, neither analysis yielded any significant effects or interactions. Incremental theorists experienced no more positive affect ($M = 2.55$, $SD = 1.04$) and no less negative affect ($M = 1.63$, $SD = 0.58$) than did entity theorists (Ms = 2.61 and 1.66, SDs = 1.03 and 0.66), Fs (1, 113) = 0.12 and 0.06, ps = .73 and .81, respectively. Thus, the analyses did not yield any support for Hypotheses 1.1, 1.2, or 1.3.

Individual Difference Effects

Task Effort

Participant Sex. A measurement time × implicit theory × motivational climate × participant sex Repeated Measures ANOVA was performed to examine possible gender effects on effort. This analysis yielded a significant measurement time × motivational climate × participant sex interaction, $F(1, 112) = 16.05$, $p < .0001$. **Table 1.3** presents the mean change in effort scores (i.e., the standardized number of object uses generated during Task 2 minus the number for Task 1). Interestingly, males worked hardest after failure when in a performance-oriented climate, whereas females worked hardest after failure when in a learning-oriented climate. As seen in the table, simple effects tests revealed that these patterns were significant. No other interactions involving participant sex were significant.

Some supplemental analyses were performed to examine the basis for the interaction described above. Potential participant sex effects on self-efficacy and the goal

Table 1.3

Mean Standardized Change in Effort as a Function of Motivational Climate and Participant Sex

	Participant Sex			
Motivational Climate	Males		Females	
Performance	1.14_{a}	(0.77, 17)	0.77_{b}*	(0.67, 43)
Learning	0.41_{bc}*	(0.52, 20)	1.14_{a}	(0.77, 40)
Control	1.00_{acd}	(0.82, 9)	0.52_{bd}	(0.75, 22)

Note. Change in effort was measured as the number of uses generated on Task 2 minus the number of uses generated on Task 1, after scores were standardized within each object (paper or rope). Within the experimental conditions, means that do not share subscripts differ significantly at $p < .05$. Means with a * are marginally different from one another, $p = .08$. Standard deviations and sample sizes are in parentheses.

orientation scales were examined. Sex had no effect on any of the goal orientation measures. However, there was a marginally significant participant sex effect on self-efficacy, such that males tended to have higher self-efficacy ($M = 6.35$, $SD = 0.70$) than did females ($M = 6.11$, $SD = 0.76$), $t(150) = 1.88$, $p = .06$. However, when self-efficacy was entered as a covariate into the ANOVA described above, it did not have any impact on the significant measurement time × motivational climate × participant sex interaction.

Self-Efficacy. Self-efficacy was entered as a continuous predictor in a measurement time × implicit theory × motivational climate Repeated Measures General Linear Model analysis examining task effort. The only significant finding involving self-efficacy was an implicit theory × self-efficacy interaction, $F(1, 112) = 6.42$, $p = .01$. In other words, implicit theory and self-efficacy interacted to affect *overall* task effort, but not

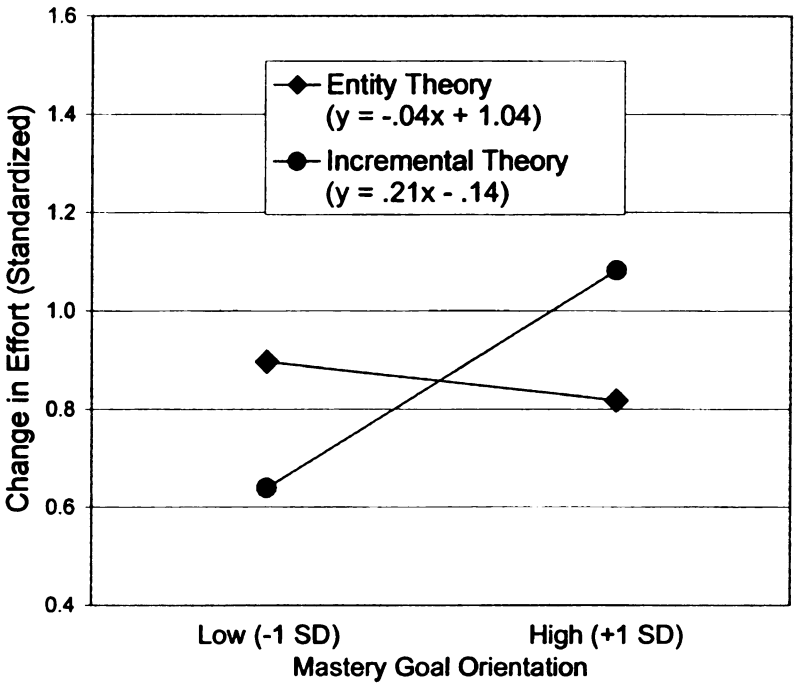
change in effort from Task 1 to Task 2. Note that any such differences on Task 1 effort could only be due to chance, given that implicit theory was manipulated *after* participants had performed the first task. Thus, analyses were performed separately on Task 1 and Task 2 effort in order to examine which task was responsible for the effect. Surprisingly, the interaction was significant in both analyses. Because the Task 1 finding must have been due to chance, the Task 2 finding is likely to have been due to chance as well. As such, this interaction is not discussed further.

Goal Orientation. To examine the effects of goal orientation on effort, three measurement time × implicit theory × motivational climate General Linear Model analyses were performed, each with one of the goal orientation factors entered as a continuous predictor. There were two significant findings involving mastery goal orientation. These were a measurement time × implicit theory × mastery goals interaction, $F(1, 94) = 4.01$, $p < .05$, and a measurement time × motivational climate × mastery goals interaction, $F(1, 94) = 5.04$, $p < .05$. The former is shown in **Figure 1.1**, with change in effort on the y-axis. Consistent with the notion of congruence, participants with a stronger mastery goal orientation showed a greater increase in effort after failure in the incremental theory condition, but not in the entity theory condition. **Figure 1.2** illustrates the interaction involving motivational climate. Contrary to the notion of congruence, a stronger mastery goal orientation was associated with a greater increase in effort after failure in the performance climate, but not in the learning climate.

The analysis examining the performance avoidance goal orientation did not yield any significant main effects or interactions involving that variable. However, the analysis examining performance approach goal orientation revealed a significant motivational climate × performance approach goals interaction, $F(1, 94) = 7.17$, $p < .01$. As with the

Figure 1.1

Predicted Standardized Change in Effort as a Function of Mastery Goal Orientation and Implicit Theory



Note. Change in effort was measured as the number of uses generated on Task 2 minus the number of uses generated on Task 1, after scores were standardized within each object (paper or rope). Mean mastery goal orientation in the experimental conditions was 4.85 on the 1 to 7 scale (SD = 1.08). Predicted mean change in effort scores in the no implicit theory, no motivational climate control condition were 0.75 (at -1 SD) and 0.64 (at +1 SD).

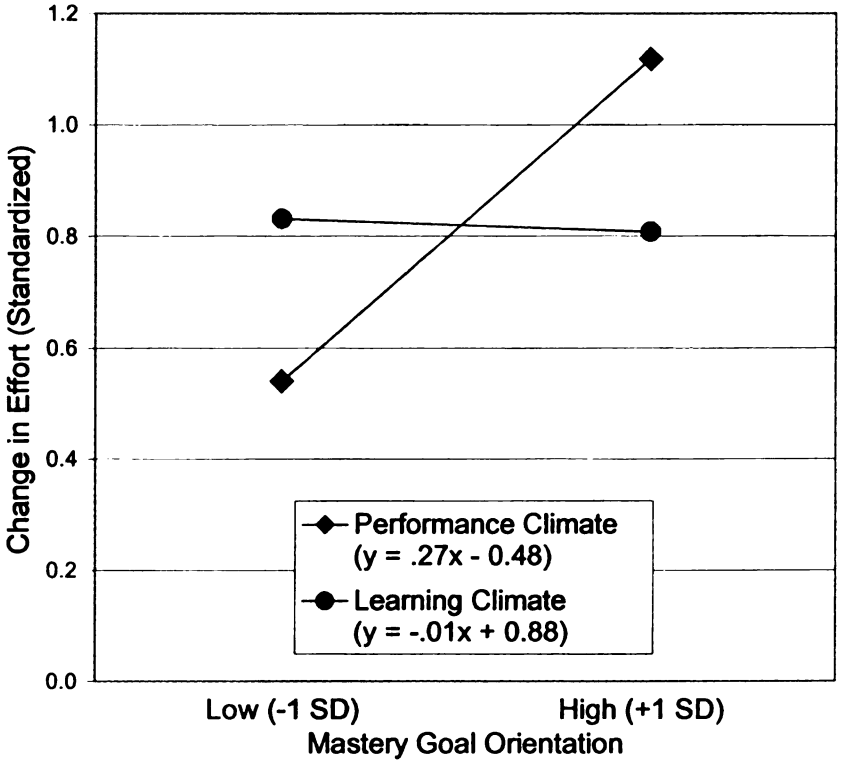
self-efficacy × implicit theory interaction, separate analyses were performed for Task 1 and Task 2 effort to explore this interaction further. Both analyses revealed a significant climate × performance approach goals interaction. Because the finding for Task 1 effort (and probably Task 2 effort) is reasonably assumed to be due to chance, the interaction is not discussed further.

Task Interest

Participant Sex. The potential effects of participant sex on interest were examined by performing an implicit theory × motivational climate × participant sex ANOVA on

Figure 1.2

Predicted Standardized Change in Effort as a Function of Mastery Goal Orientation and Motivational Climate



Note. Change in effort was measured as the number of uses generated on Task 2 minus the number of uses generated on Task 1, after scores were standardized within each object (paper or rope). Mean mastery orientation was 4.85 on the 1 to 7 scale (SD = 1.08). Predicted mean change in effort scores were 0.75 (-1 SD) and 0.64 (+1 SD) in the no implicit theory, no motivational climate control condition.

task interest. The three-way interaction was significant, $F(1, 97) = 5.54, p < .05$. Examination of the means shows that the pattern described earlier (incongruence promoting the most interest) was demonstrated only by male participants. Female participants did not appear to be affected by implicit theory or motivational climate information. The simple interaction was significant for males, $F(1, 113) = 12.59, p = .001$, but not for females, $F(1, 113) = 0.95, p = .33$. As seen in **Table 1.4**, males induced to have

Table 1.4

Mean Standardized Task Interest as a Function of Motivational Climate and Implicit Theory

	Implicit Theory			
Motivational Climate	Entity		Incremental	
		Males		
Performance	-0.28 $_{ac}$	(0.82, 7)	0.43 $_{ab}$	(0.46, 10)
Learning	0.71 $_{b}$	(0.64, 10)	-0.83 $_{c}$	(1.21, 10)
Control		0.35 $_{a}$	(0.83, 9)	
		Females		
Performance	-0.18	(0.80, 20)	0.18	(1.14, 23)
Learning	-0.06	(0.97, 18)	-0.10	(1.00, 23)
Control		-0.35	(1.02, 22)	

Note. Task interest was calculated as the mean of nine items assessing interest in expansive thinking, the expansive thinking tasks, and the experiment itself. Higher scores indicate greater interest. Within the group of male participants, means that do not share subscripts differ significantly at $p < .05$. Standard deviations and sample sizes are in parentheses.

an entity theory about expansive thinking had more task interest in a learning climate than in a performance climate, but the reverse was true for males induced to hold an incremental theory.

Self-Efficacy. An implicit theory × motivational climate General Linear Model analysis was also performed with self-efficacy entered as a continuous predictor. The only

significant finding was a self-efficacy main effect, $F(1, 113) = 11.58, p = .001$. Specifically, higher self-efficacy was associated with greater task interest, $r(121) = .32$.

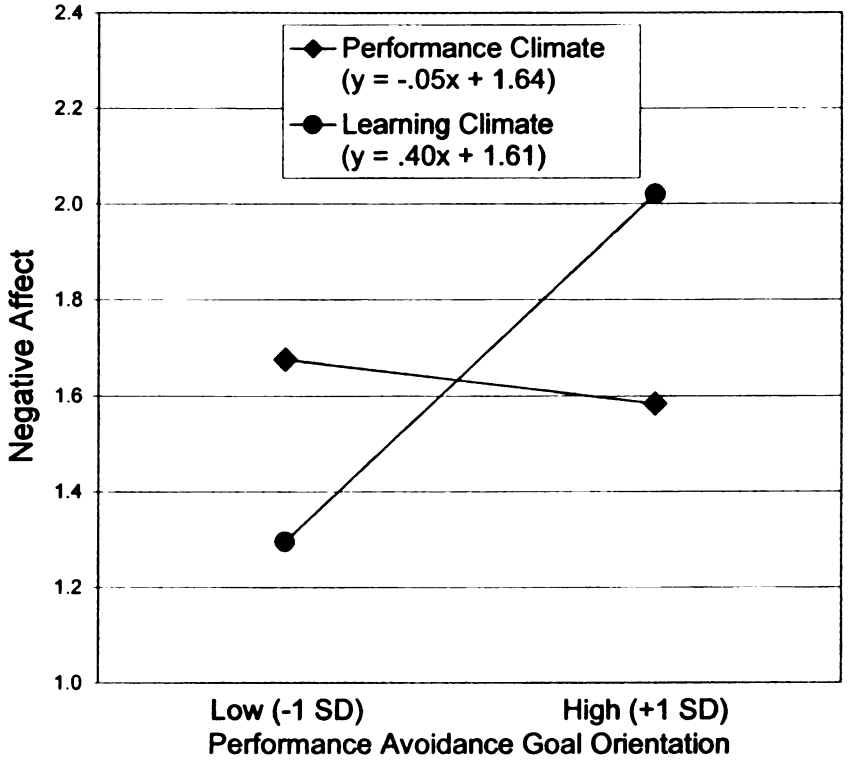
Goal Orientation. To examine goal orientation effects, implicit theory × motivational climate General Linear Model analyses were performed separately with mastery, performance avoidance, and performance approach goal orientation included as continuous predictors. A significant main effect of mastery goals was obtained, $F(1, 95) = 9.11, p < .005$, such that higher mastery goal orientation was associated with more interest in the expansive thinking tasks, $r(103) = .29$. The analyses examining performance avoidance and performance approach goals resulted in no significant main effects or interactions involving these variables.

Temporary Affect

Participant Sex, Self-Efficacy, and Goal Orientation. The potential effects of the individual difference variables on positive and negative affect were also examined. None of these variables had any impact on positive mood. With regard to negative mood, however, there was a significant motivational climate × performance avoidance goals interaction, $F(1, 95) = 4.52, p < .05$. As seen in **Figure 1.3**, stronger performance avoidance goal orientation was associated with more negative affect in the learning climate, but not in the performance climate. There was also a significant a main effect of performance approach goals, $F(1, 95) = 6.67, p = .01$, such that a greater endorsement of this type of goal was associated with more negative affect, $r(103) = .19$. There were no other main effects or interactions involving the individual difference variables.

Figure 1.3

Effects of Motivational Climate and Standardized Performance Avoidance Goal Orientation on Negative Affect



Note. Negative affect was measured as the mean of five items assessed on a scale from 1 to 7. Mean standardized performance avoidance goals in the experimental conditions was 0.12 (*SD* = 0.91). Predicted mean negative affect was 1.90 (-1 SD) and 1.70 (+1 SD) in the no implicit theory, no motivational climate control condition.

Supplemental Dependent Measures

Theories of Effort and Performance

Recall that participants responded to six items that assessed their theories regarding task effort and its consequences. Means for these items (presented in Appendix B) were 4.67 (*SD* = 1.34), 5.25 (*SD* = 1.20), 4.91 (*SD* = 1.43), 4.18 (*SD* = 1.63), 3.54 (*SD* = 1.76), 4.32 (*SD* = 1.66), respectively. Implicit theory × motivational climate ANOVAs were performed on each item to examine whether there were any condition effects on effort

theories. None of the analyses yielded any significant main effects or interactions. Thus, participants' perceptions of the consequences of hard work and their methods for increasing task effort did not appear to differ as a function of the manipulations.

Perceived Effort and Performance

I thought it would also be interesting to examine condition effects on *perceived* changes in effort and performance from Task 1 to Task 2. Recall that two items assessed perceived effort for Task 1. Because they were highly correlated, $r(152) = .78$, $p < .0001$, they were averaged to form one overall estimate ($M = 3.02$, $SD = 1.00$). The same was done for the two items that assessed perceived effort for Task 2 ($M = 3.56$, $SD = 0.85$), $r(152) = .72$, $p < .0001$. Following this, a measure of change in perceived effort was computed as Task 2 perceived effort minus Task 1 perceived effort. Thus, positive scores indicated an increase in perceived effort from Task 1 to Task 2. An implicit theory × motivational climate ANOVA performed on this change in effort index yielded no significant findings.

A participant sex × implicit theory × motivational climate ANOVA was performed on perceived change in effort to examine possible gender effects. A significant motivational climate × participant sex interaction emerged, $F(1, 113) = 10.35$, $p < .005$. In the performance climate, males perceived a greater increase in effort after failure ($M = 0.97$, $SD = 0.91$, $n = 17$) than did females ($M = 0.40$, $SD = 0.88$, $n = 43$), $F(1, 117) = 5.36$, $p < .05$. In the learning climate, however, females estimated a bigger increase in task effort ($M = 0.68$, $SD = 0.88$, $n = 41$) than did males ($M = 0.18$, $SD = 0.78$, $n = 20$), $F(117) = 4.61$, $p < .05$. These patterns were similar to the *actual* changes in effort displayed by males and females. The mean change in perceived effort in the no implicit theory, no motivational climate information control was 0.53 ($SD = 1.14$).

Change in perceived performance was computed as participants' estimated percentile rank for Task 2 minus that for Task 1 ($M = 14.21$, $SD = 15.98$). An implicit theory × motivational climate ANOVA performed on this change in performance index revealed no significant findings. However, when participant sex was entered into the model, a significant motivational climate × participant sex interaction emerged, $F(1, 97) = 7.83$, $p < .01$. Males in the performance climate estimated a greater increase in performance across the two tasks ($M = 23.11$, $SD = 14.02$, $n = 17$) than did females in the performance climate ($M = 10.63$, $SD = 15.63$, $n = 43$) or males in a learning climate ($M = 11.08$, $SD = 17.32$, $n = 20$), $Fs(1, 117) = 8.45$ and 5.48, respectively, $ps < .05$. Mean change in performance in the no implicit theory, no motivational climate information control was 14.19 ($SD = 17.03$).

Summary of Study 1 Findings

The primary purpose of Study 1 was to examine whether congruence between implicit theories of task-relevant attribute malleability and motivational climate would promote the most effort after failure. Hypothesis 1.1 predicted that entity beliefs would lead to the most adaptive motivational response after failure when the motivational climate emphasized performance goals. Hypothesis 1.2 predicted that incremental beliefs would result in the most effort after failure when the climate emphasized the goals of learning and self-improvement. Neither hypothesis was supported. Participants in all conditions worked much harder after learning that they failed the first expansive thinking task. The only effort finding consistent with the notion of congruence was that people who have a stronger academic mastery goal orientation worked harder after failure when induced to hold an incremental theory about expansive thinking, as opposed to an entity theory.

However, a stronger mastery goal orientation also led to a more adaptive effort response in the incongruent performance climate than in the congruent learning climate.

Hypothesis 1.3 predicted that incremental theorists would be more interested in expansive thinking and would experience more favorable affect than entity theorists, particularly when the climate facilitated the pursuit of learning goals. This hypothesis was not supported. In fact, interest was particularly low in the incremental theory, learning climate condition. Participants seemed to be most interested in expansive thinking when in the incongruent conditions, i.e., the entity theory, learning climate condition and the incremental theory, performance climate condition. However, this only seemed to be true for male participants. The manipulations had no effects on temporary affect. In all, there was no support for the hypotheses posed for Study 1. Some possible reasons for this Study's findings are advanced in the general discussion section.

STUDY 2

While the purpose of the first study was mainly to examine the effects of implicit theories and motivational climate on task effort, interest, and affect, the second study focused on the degree to which individuals accept feedback regarding their level of ability. Specifically, Study 2 sought to examine whether entity theorists might be more threatened by negative feedback than incremental theorists, even in a performance climate, where they might sometimes expend extra effort. It was hypothesized that entity theorists would be less accepting of failure feedback when it was based on a test that was apparently low in credibility than one high in credibility. This was not expected to be true for incremental theorists, who need no reason to discount negative feedback. It was also predicted that entity theorists would work harder after failure when the test was high, as opposed to low, in credibility. And, if so, this effect was expected to be mediated by acceptance of feedback.

Study 2 Method

Participants

Participants were 205 undergraduate students (55% female and 45% male, with a mean age of 19.6) who participated in the study to receive course credit for an introductory psychology course.

Design

The design was a 2 (entity or incremental theory) × 2 (low or high test credibility) × 2 (failure or success feedback) × 2 (task order) between-subjects factorial. The motivational climate was always performance-oriented and effort was measured both

before and after the manipulations. Acceptance of feedback was measured just before the second measure of effort.

Materials and Procedure

The procedure for this study was very similar to that in Study 1. Again, participants were tested in groups of up to four people. The experimenter greeted them and told them that they would be performing expansive thinking tasks on the computer. Then each participant was led to his or her own room equipped with a computer and the doors were shut for privacy. The computers were randomly assigned to implement one of the 16 conditions. Participants began by reading a few screens that described expansive thinking in the same way as in Study 1. Following this initial information, participants were told that they would be completing two expansive thinking tasks, as in Study 1.

Self-Efficacy. Participants then responded to the four self-efficacy items described earlier and presented in Appendix B.

First Measure of Effort. Next, participants were given the more detailed task instructions described in Study 1 and were asked to generate as many uses as they could for either a piece of paper or a piece of rope. Unlike in Study 1, participants were given as little or as much time as they wanted to complete the task. This change was made to give participants more flexibility with regard to how much they wanted to work on the tasks. Thus, the last two paragraphs in the task instructions described in Appendix A were deleted and replaced with the following:

> Please continue when you are ready to start the task.
>
> List as many uses as you can for a "piece of paper" / "piece of rope" Each use should be listed on a separate line. Do not waste time numbering your

responses. Simply hit <Enter> after each one. You may use as little or as much time as you like on this task.

Once again, effort was measured as the total number of object uses that were generated.

Implicit Theory Manipulation. When participants completed the task, they proceeded to the next screens, where they were presented with the entity and incremental information that was used in Study 1 and is shown in Appendix A. In the *entity* condition, they were told that expansive thinking is uncontrollable. In the *incremental* condition, they were told that it is controllable.

Test Credibility Manipulation. Following this, the credibility of the test was manipulated. In the *high credibility* condition, participants were told that the test was developed by "Dr. Robert Morton and his colleagues at Yale." Furthermore, Dr. Morton was described as being experienced in test construction and as well-respected in the field of personality. In addition, participants were led to believe that the expansive thinking test he developed had been well-tested and validated through years of research. In the *low credibility* condition, participants were told that the test was developed by "Melanie Clark, a graduate student at Wisconsin State University." Participants were led to believe that she developed the test to assist her advisor in his research. In addition, Melanie was described as having little experience in test construction and as someone whose work was questionable. Participants in the low credibility condition were also told that there had not yet been enough research to validate the expansive thinking test. For the exact wording of this manipulation, refer to Appendix A.

Motivational Climate. A motivational climate emphasizing performance goals was employed because a main focus of the study was to examine the conditions in

which entity theorists might thrive motivationally but suffer emotionally. The information that was provided was similar that used for the performance climate condition in the initial study. Although entity theorists did not work harder than incremental theorists in Study 1, it was still possible that Study 2 would yield this pattern of findings given the difference in the task, as described earlier, and the emphasis on normative ability in the feedback manipulation, as described below.

Implicit Theory and Test Credibility Manipulation Checks. Following this, participants completed the same implicit theory manipulation check questions that were used in Study 1. They were also presented with items that assessed the effectiveness of the credibility manipulation. They indicated their agreement with five items such as, "The test I took was a well-established measure of expansive thinking ability," and "The person who developed this expansive thinking test probably does not have much experience in this area." Appendix B presents all five items.

Feedback Manipulation. Following this, participants received bogus feedback regarding their score on the first expansive thinking test. All participants were told that they received a score of 71% on the test. Those in the *failure* condition were led to believe that the average score from other college students taking the test was 90%. Those in the *success* condition were told that the average was 54%. For clarification, participants were told that their level of expansive thinking was relatively low or high as compared to other students. This type of social comparison feedback is similar to that used by El-Alayli and Baumgardner (in press). Because normative feedback is strongly associated with performance goals, it was not feasible to use this type of feedback in Study 1, where there was to be minimal emphasis on performance goals in the learning climate.

Filler items. The same four filler items used in Study 1 were presented to participants at this point in the study.

Demographics Questionnaire. Participants then indicated their demographic information, as in Study 1.

Acceptance of Feedback. The primary dependent measure of this study was the extent to which participants accepted their feedback score as valid. Participants were asked to indicate their agreement with items such as, "I am not very good at thinking expansively," "I think the feedback I received regarding my expansive thinking ability is indicative of my true ability level," and "I think that the person who made this expansive thinking test did not really know what they were doing." Responses were on a scale from 1, "strongly disagree," to 7, "strongly agree." The complete measure can be seen in Appendix B.

Second Measure of Effort. Following this, participants were asked to complete a second expansive thinking test, which was nearly identical to the second task in Study 1. The only difference was that participants in this study had as little or as much time as they liked to complete the task, as for the first task in this study. The total number of items generated for the second task was used as post-manipulations measure of effort.

Task Interest. Participants then responded to the nine items that assessed interest in expansive thinking. As noted earlier, this measure is presented in Appendix B.

Perceived Effort and Performance. As in Study 1, eight items were included to assess perceived effort and performance, which are shown in Appendix B. The

perceived performance item responses were used as a manipulation check for the failure and success feedback.

Theories of Effort and Performance. Again, participants completed the 6-item measure that assessed their theories about working hard on the expansive thinking tasks, as seen in Appendix B.

Trait Goal Orientation. Participants then completed the 12-item goal orientation measure (Elliot & McGregor, 2001) that was used in Study 1 and is shown in Appendix B.

Suspicion Measure. Following this, participants were asked to describe what they believed was the purpose of the experiment. Again, this item was used to identify suspicious participants.

Feedback Believability. As in Study 1, participants were asked to indicate the believability of their expansive thinking test feedback. Upon completing this final task, participants were thoroughly debriefed, thanked, and dismissed.

Study 2 Results

This results section is organized in the same way as that for Study 1. First I discuss the preliminary data analyses, then the tests of the hypotheses, followed by a section on individual differences. Afterwards, I report the analyses examining the supplemental dependent measures. The section is then followed by a summary of the main findings.

Preliminary Inspection of the Data

Data Exclusion

Data from 28 participants were eliminated due to clear suspicion, as evidenced by their descriptions of the purpose of the study. Twenty-two of these participants were either

aware that their expansive thinking feedback was fictitious or knew that the study examined the effects of feedback score on task effort. Additionally, two participants were either suspicious about the implicit theory information or aware that the study examined the effects of implicit theory on change in effort. One participant was suspicious about the credibility information. In addition, three participants knew that the study examined the effects of a performance climate induction on change in effort. Of the 28 participants that were excluded, one was in the entity, low credibility, failure condition, six were in each of the three other failure conditions, one was in the entity, low credibility, success condition, two were in the incremental, low credibility, success condition, and three were in each of the remaining two success conditions.

Scale Construction

Acceptance of Feedback. An acceptance of feedback measure was created from the six items that were included to assess that variable. Items were coded such that higher scores indicated greater acceptance. Item 1, "I believe that my true level of expansive thinking ability is quite high," was reverse scored only for participants in the failure condition. Item 2, "I am not very good at thinking expansively," was reverse-scored only for participants in the success condition. The six items were then averaged to form a composite ($M = 4.38$, $SD = 1.29$, Cronbach's $\alpha = .86$).

Task Interest. Interest in the expansive thinking tasks was measured the same way as in Study 1. Once again, the nine interest items were coded such that higher scores indicated more interest, and were averaged to form an overall index of interest ($M = 5.37$, $SD = 1.00$, $n = 177$, Cronbach's $\alpha = .91$).

Self-Efficacy. As in Study 1, the four self-efficacy items were averaged to form a composite ($M = 6.22$, $SD = 0.71$, $n = 177$, Cronbach's $\alpha = .89$).

Goal Orientation. A Principal Components Analysis with Varimax Rotation and Eigenvalues specified as greater than 1.0 was performed on the goal orientation items. The analysis resulted in the same factor structure obtained in Study 1. The first factor consisted of the mastery goal items, which were averaged to form a composite (Eigenvalue = 3.63, factor loadings = .70 to .80, $M = 4.84$, $SD = 1.07$, and Cronbach's $\alpha = .87$). The second was the performance avoidance goals factor (Eigenvalue = 2.10, factor loadings = .59 to .91, $M = 5.06$, $SD = 1.29$, and Cronbach's $\alpha = .73$). The third was the performance approach goals factor (Eigenvalue = 2.57, factor loadings = .82 to .91, $M = 4.81$, $SD = 1.35$, and Cronbach's $\alpha = .86$). None of the 12 items had high loadings (greater than .5) on more than one factor.

Implicit theory × test credibility × feedback score × order ANOVAs were performed on each of the goal orientation composites. Although goal orientation is a trait measure, there were some condition effects on participants' reported goals. There was a significant implicit theory × test credibility interaction on mastery goal orientation, $F(1, 161) = 7.88$, $p < .01$. The pattern of the means suggests that entity theorists reported a stronger mastery orientation than incremental theorists in the low test credibility condition, whereas the reverse was true in the high credibility condition. There was also a significant implicit theory × feedback score interaction on reported performance avoidance goal orientation, $F(1, 161) = 4.64$, $p < .05$. The pattern suggests that an entity theory led to stronger performance avoidance goals than did an incremental theory when failure feedback was given. The reverse seemed to be true in the success feedback condition. There was also a feedback score × order interaction on performance approach goal orientation, $F(1, 161) = 5.55$, $p < .05$.

Although it is interesting that there were condition effects on general academic achievement orientation, that was not the focus of the current investigation. The reason for including the goal orientation measure was to examine its potential effects on the dependent variables. Thus, I standardized the goal orientation scores in order to eliminate state variance that occurred as a result of the manipulations. The mastery goal orientation scores were standardized within each of the four implicit theory × feedback score conditions. Likewise, the performance avoidance goal scores were standardized within implicit theory × feedback score conditions. In addition, the performance approach goal scores were standardized within feedback score × order conditions. All goal orientation scores examined in subsequent analyses are in the form of z-scores. Following standardization, there were no condition effects at all on any of the goal orientation measures.

Manipulation Checks

Implicit Theory Manipulation. As in Study 1, the six implicit theory manipulation check items were coded such that higher scores signified greater endorsement of incremental beliefs regarding expansive thinking. The items were then averaged to form a composite (Cronbach's $\alpha = .92$). An implicit theory × test credibility × feedback score × order ANOVA was then performed on this composite. As expected, a significant main effect of implicit theory emerged, $F(1, 161) = 250.81$, $p < .0001$. Participants in the incremental condition held more incremental beliefs ($M = 5.77$, $SD = 0.84$) than did those in the entity condition ($M = 3.23$, $SD = 1.30$). There was also a significant main effect of feedback, $F(1, 161) = 5.28$, $p < .05$. Participants in the failure condition had more incremental beliefs ($M = 4.63$, $SD = 1.51$) than did those in the success condition ($M =$

4.37, $SD = 1.81$). This is consistent with the notion that holding an entity belief about a desirable attribute that one lacks is more threatening than holding an incremental belief.

There was also an unexpected implicit theory × test credibility × order interaction, $F(1, 161) = 4.61, p < .05$. Examination of the means suggests that the implicit theory manipulation was stronger in the low credibility than in the high credibility condition, only for the first order condition, where participants had already completed the paper task. The reverse seemed to be true for the second order condition, where participants had already completed the rope task. Note, however, that the incremental induction led to significantly stronger incremental beliefs than the entity induction in all of the test credibility × order conditions, Fs(1, 36 to 45) = 37.41 to 78.74, ps < .0001.

Test Credibility Manipulation. The five items assessing test credibility were coded such that higher scores indicated stronger beliefs in the validity of the expansive thinking test. They were then averaged to form a composite (Cronbach's $\alpha = .75$). A four-way ANOVA performed on this variable resulted in a significant main effect of test credibility, $F(1, 161) = 51.50, p < .0001$. Participants in the low credibility condition believed the test was less valid ($M = 3.87$, $SD = 1.08$) than did participants in the high credibility condition ($M = 4.90$, $SD = 0.96$). There was also a main effect of order, $F(1, 161) = 4.00, p < .05$, which was qualified by a significant test credibility × order interaction, $F(1, 161) = 7.12, p < .01$. Specifically, the test credibility manipulation was stronger in the second order condition, where participants had already completed the "rope" task but had not yet completed the "paper' task. Note, though, that the mean difference on the credibility manipulation check was significant in both the first and the second order conditions, $F(1,91) = 10.53, p < .005$, and $F(1, 82) = 45.31, p < .0001$.

Feedback Manipulation. There were two items asking participants to estimate their performance on Task 1. The first was assessed on a scale from, 1 "[I performed] very poorly," to 5 "[I performed] very well." An implicit theory × test credibility × feedback × order ANOVA was performed on this item. As expected, participants had a lower perceived performance in the failure condition ($M = 2.30$, $SD = 1.00$) than in the success condition ($M = 3.54$, $SD = 0.84$), $F(1, 161) = 74.83$, $p < .0001$. There were no other condition effects on this item.

The second feedback manipulation check item asked participants to estimate their percentile rank for their performance on the first task. Another four-way ANOVA was performed on this item. Once again, a significant main effect of feedback was obtained, $F(1, 161) = 24.95$, $p < .0001$. Participants in the failure condition estimated an average percentile rank of 54.67 ($SD = 20.93$), whereas those in the success condition estimated an average of 67.50 ($SD = 11.09$). It is likely that the main reason that the failure condition yielded a mean greater than 50 was because some participants confused "percentile rank" with their score on the expansive thinking task (72%). Indeed, 22 participants chose 72% as their response, presumably thinking that they should report the score they received earlier. There were no other significant main effects or interactions on this item.

Performance Climate Induction. One item was included to assess the effectiveness of the performance climate induction. It was, "A major goal of this study is to test people's levels of expansive thinking ability." The mean for this item was 6.26 ($SD = 1.20$), on the 1 to 7 scale, confirming that participants perceived the situation as one that focused on testing and ability.

Tests of Hypotheses

Acceptance of Feedback

Hypotheses 2.1, 2.2, and 2.3. The main hypotheses of Study 2 suggested that an entity belief (but not an incremental belief) about expansive thinking would lead to less acceptance of failure feedback when it came from a less credible source than when it came from a more credible one. The implicit theory and credibility manipulations were not expected to have any effect on acceptability in the success condition, where all participants were expected to show high acceptance of the feedback. To test these hypotheses, an implicit theory × test credibility × feedback score × order ANOVA was performed on the acceptance of feedback measure. There were no significant main effects or interactions involving order. The analysis revealed a significant main effect of feedback, such that participants were more accepting of the feedback in the success condition ($M = 5.29$, $SD = 0.83$) than in the failure condition ($M = 3.37$, $SD = 0.91$), $F(1, 161) = 216.45$, $p < .0001$. As expected, the implicit theory × test credibility × feedback score three-way interaction was significant, $F(1, 161) = 6.40$, $p = .01$. Means are shown in **Table 2.1**.

Simple effects analyses were performed to examine this interaction more closely. First, the simple interaction between implicit theory and test credibility within the failure condition was tested and found to be significant, $F(1, 169) = 5.88$, $p < .05$. Also as predicted, the interaction was not significant in the success condition, $F(1, 169) = 1.29$, $p = .26$. As seen in the table, the pattern of means was as hypothesized. Entity theorists appeared to be less accepting of the failure feedback in the low credibility condition than in the high credibility condition, but this mean difference did not reach significance at a two-tailed level, $F(1, 169) = 2.49$, $p = .12$. This was not true for incremental theorists, who tended to show the reverse pattern. The only significant finding from the simple effects

Table 2.1

The Effects of Implicit Theory, Test Credibility, and Feedback Score on Acceptance of Feedback

	Implicit Theory	
Test Credibility	Entity	Incremental
	Failure Feedback	
Low	3.26_{ab} (0.77, 24)	3.53_{ab}* (1.01, 20)
High	3.67_{a} (0.82, 20)	3.03_{b}* (0.96, 20)
	Success Feedback	
Low	5.53_{a} (0.77, 24)	5.17_{a} (0.90, 24)
High	5.21_{a} (0.93, 21)	5.26_{a} (0.71, 24)

Note. Higher scores on acceptance indicate more acceptance of the feedback, with a possible range from 1 to 7. Within each feedback condition, means that do not share subscripts differ significantly at $p < .05$. Means with * differ from each other at a marginally significant level ($p = .07$).

tests was greater acceptance of the failure feedback in the high credibility condition by entity theorists than by incremental theorists. As predicted by Hypothesis 2.3, acceptance was high in all of the conditions where participants received success feedback and there were no effects of implicit theory or test credibility on acceptance in the success condition.

Feedback believability was significantly correlated with acceptance of feedback, $r(177) = .43, p < .0001$, whereas self-efficacy, mastery goals, performance avoidance goals, and performance approach goals were not. A series of ANCOVAs were performed to examine the effects of taking into account the variance due each of these supplemental

variables. In none of the analyses did the feedback main effect or the implicit theory × test credibility × feedback score become nonsignificant. Also, no previously nonsignificant findings became significant after having included any of these potential covariates. Only feedback believability was a significant covariate, which is not surprising given its similarity to the acceptance of feedback dependent measure.

Task Effort

Hypotheses 2.4 and 2.5. It was predicted that entity theorists would display a more adaptive effort response to failure when the test was high rather than low in credibility. It was also hypothesized that this effect would be mediated by acceptance of feedback. As in Study 1, task effort scores were standardized within each object (paper or rope). Following this, a measurement time (Task 1 versus Task 2) × implicit theory × test credibility × feedback score × order Repeated Measures ANOVA was performed on the effort scores. The expected measurement time × implicit theory × test credibility × feedback score interaction was not significant, $F(1, 160) = 1.23$, $p = .27$ (see **Table 2.2** for change in effort means). Because the predicted pattern of effort was not obtained, there was no way that acceptance of feedback could have mediated the effect. Thus, neither Hypothesis 2.4 nor 2.5 was supported.

There were, however, some other findings from the ANOVA. As in Study 1 there was a significant main effect of measurement time, such that participants increased their effort from the first task ($M = -0.30$, $SD = 0.63$) to the second ($M = 0.26$, $SD = 1.24$), $F(1, 160) = 91.66$, $p < .0001$. There was also a significant main effect of feedback score, $F(1, 160) = 10.24$, $p < .05$, which was qualified by a measurement time × feedback interaction, $F(1, 160) = 13.56$, $p < .0001$. To examine this, change in effort was computed by subtracting effort on Task 1 from effort on Task 2. Participants were shown to increase

Table 2.2

The Effects of Implicit Theory, Test Credibility, and Feedback Score on Change in Effort

	Implicit Theory			
Test Credibility	Entity		Incremental	
	Failure Feedback			
Low	0.88	(0.92, 24)	0.57	(0.65, 20)
High	0.68	(0.65, 19)	1.06	(1.62, 20)
	Success Feedback			
Low	0.35	(0.58, 24)	0.27	(0.32, 24)
High	0.43	(0.61, 21)	0.38	(0.40, 24)

Note. Change in effort was measured as the number of uses generated on Task 2 minus the number of uses generated on Task 1, after scores were standardized within each object (paper or rope). Standard deviations and sample sizes are in parentheses.

their effort more after failure ($M = 0.80$, $SD = 1.04$) than after success feedback ($M = 0.36$, $SD = 0.48$).

There was also a significant implicit theory × test credibility interaction, $F(1, 160) = 5.33$, $p < .05$. Because this interaction did not involve measurement time, it became necessary to examine its effects on each task separately. Implicit theory × test credibility × feedback × order ANOVAs were performed on each measure of task effort. The implicit theory × credibility interaction was significant in both analyses. Because the effects on Task 1 effort must have been entirely due to chance, this interaction is not discussed further.

The only other significant finding from the overall ANOVA was a nonpredicted measurement time × implicit theory × feedback score × order interaction, $F(1, 160) = 3.67$, $p < .03$. Refer to **Table 2.3** for change in effort means as a function of implicit theory, feedback score, and order. As seen in the table, the interaction seemed to be due to a particularly large increase in effort by entity theorists experiencing failure in the second

Table 2.3

The Effects of Implicit Theory, Feedback Score, and Order on Change in Effort

	Implicit Theory			
Feedback Score	Entity		Incremental	
		Order 1		
Failure	0.43	(0.47, 21)	0.93	(1.54, 22)
Success	0.52	(0.72, 23)	0.42	(0.30, 26)
		Order 2		
Failure	1.14_{a}*	(0.92, 22)	0.67_{ab}*†◇	(0.77, 18)
Success	0.24_{b}◇	(0.37, 22)	0.22_{b}†	(0.41, 22)

Note. In the order 1 condition, participants generated task uses for a "piece of paper" before generating task uses for a "piece of rope." The reverse was true for the order 2 condition. Change in effort was measured as the number of uses generated on Task 2 minus the number of uses generated on Task 1, after scores were standardized within each object (paper or rope). Standard deviations and sample sizes are in parentheses. The simple interactions within each of the order conditions were not significant. Within the second order condition, means that do not share subscripts differ significantly at $p < .05$. Means marked with a * are marginally different from one another, $p = .06$. The same is true for means marked with a † ($p = .07$) and those marked with a ◇ ($p = .09$).

order condition. These participants demonstrated significantly higher effort than either entity theorists or incremental theorists experiencing success in the same order condition, $Fs(1, 160) = 13.66$ and 14.60, respectively, $ps < .0001$. Although incremental theorists in the second order condition also tended to show a greater increase in effort after failure than after success, this difference was only marginally significant, $F(1, 160) = 3.22$, $p = .08$. Thus, the pattern of means was consistent with the congruence model in the second order condition, but not the first. Interestingly, the change in effort means in Study 1 were also in the direction of congruence promoting the most increase in effort after failure only in the second order condition. However, in neither study was the interaction statistically significant within that order condition. Nevertheless, it may be important to consider whether participants begin with the easier task (paper object) or the harder one (rope object).

As before, ANCOVAs were performed to examine the effects of partialing out the variance due to feedback believability, self-efficacy, mastery goals, performance avoidance goals, and performance approach goals, none of which were significantly correlated with change in effort. In none of these analyses did the measurement time × feedback interaction become nonsignificant. The measurement time main effect became marginally significant or nonsignificant when feedback believability or self-efficacy was entered into the model.

Individual Difference Effects

Acceptance of Feedback

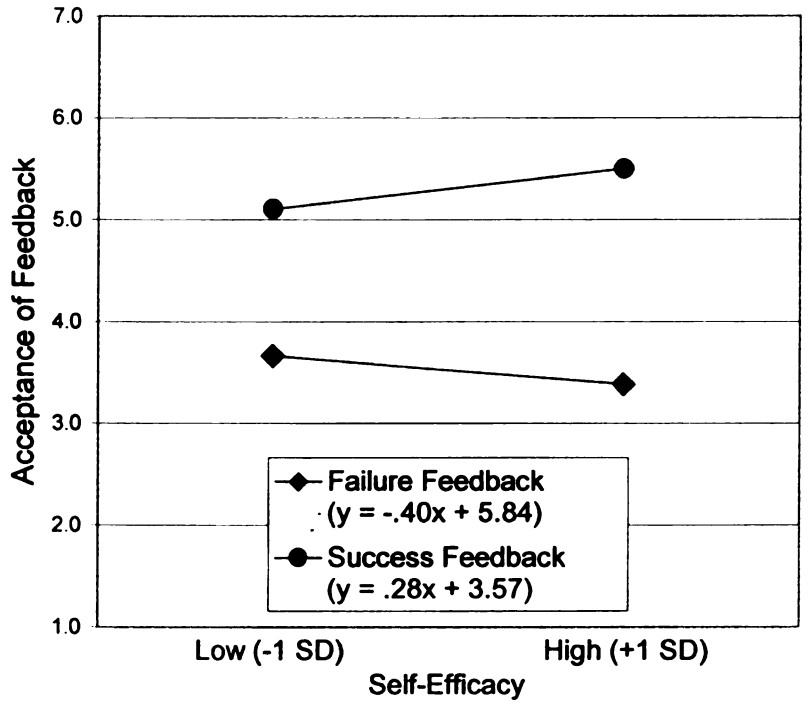
Participant Sex. A participant sex × implicit theory × test credibility × feedback score ANOVA was performed on the acceptance measure to examine possible gender effects. Results indicated a main effect of participant sex, such that females were more

accepting of the feedback ($M = 4.55$, $SD = 1.25$), than were males ($M = 4.16$, $SD = 1.33$), $F(1, 161) = 19.33$, $p < .0001$. There were no significant interactions involving gender.

Self-Efficacy. Self-efficacy was entered as a continuous predictor in an implicit theory × test credibility × feedback score General Linear Model performed on acceptance of feedback. The analysis revealed a significant feedback × self-efficacy interaction, $F(1, 162) = 9.01$, $p < .005$. This interaction can be seen in **Figure 2.1**. As shown, higher self-efficacy led to increased acceptance of the feedback in the success condition, but decreased acceptance in the failure condition. The only other significant finding involving self-efficacy was a four-way implicit theory × test credibility × feedback score × self-

Figure 2.1

Effects of Feedback Score and Self-Efficacy on Acceptance of Feedback



Note. Mean self-efficacy was 6.22 on the 1 to 7 scale ($SD = 0.71$).

efficacy interaction, $F(1, 162) = 5.98$, $p = .01$. **Table 2.4** presents the mean correlations between self-efficacy and feedback acceptance for each of the implicit theory × test credibility × feedback score conditions. As seen in the table, self-efficacy did not affect the acceptance of either failure or success feedback in the entity theory, high test credibility condition. However, the pattern of correlations suggest that self-efficacy was negatively related to failure feedback acceptance and positively related to success feedback acceptance in all of the other conditions.

Table 2.4

The Effects of Implicit Theory, Test Credibility, and Feedback Score on the Relationship Between Self-Efficacy and Acceptance of Feedback

	Implicit Theory			
Test Credibility	Entity		Incremental	
	Failure Feedback			
Low	-.44*	(24)	-.27	(20)
High	.00	(20)	-.38	(20)
	Success Feedback			
Low	.28	(24)	.46*	(24)
High	-.01	(21)	.15	(24)

Note. The numbers in the cells represent the correlations between self-efficacy and acceptance of the feedback. Cell sizes are indicated in parentheses. Correlations marked with a * were significant.

Goal Orientation. Each of the standardized goal orientation composites was entered into a separate General Linear Model analysis examining the direct and interactive effects of implicit theory, test credibility, feedback score, and goal orientation on acceptance of feedback. There were numerous marginally significant interactions involving goal orientation, but no interactions were significant.

Task Effort

Participant Sex. A measurement time × implicit theory × test credibility × feedback score × participant sex Repeated Measures ANOVA performed on task effort found no significant findings involving participant sex.

Self-Efficacy. A measurement time × implicit theory × test credibility × feedback score General Linear Model analysis was also performed on task effort with self-efficacy entered as a continuous predictor. The only significant finding involving self-efficacy was a main effect, $F(1, 160) = 4.18$, $p < .05$. Task 1 and Task 2 effort scores were averaged to form an overall measure of effort. Higher self-efficacy was associated with more overall effort, $r(177) = .14$. In other words, people who thought they could do well on the expansive thinking tasks tended to work harder.

Goal Orientation. Separate General Linear Model analyses were performed to examine each of the goal orientation measures. A measurement time × implicit theory × test credibility × feedback score × mastery goals General Linear Model resulted in no significant findings involving mastery goal orientation. The same was true for analyses examining performance avoidance and performance approach goal orientations.

Supplemental Dependent Measures

Task Interest

To examine the condition effects on task interest, an implicit theory × test credibility × feedback score ANOVA was performed on the interest measure. Only a main effect of feedback was obtained, $F(1, 169) = 11.70$, $p = .001$. Specifically, participants expressed more interest in expansive thinking and the object use generation tasks in the success condition ($M = 5.61$, $SD = 0.91$) than in the failure condition ($M = 5.11$, $SD = 1.02$). Thus, although failure caused participants to work harder, it also made them less interested in the tasks.

Theories of Effort and Performance

As in Study 1, participants responded to six items that measured beliefs regarding task effort and its potential consequences. Means for items 1 to 6 (presented in Appendix B) were 4.73 ($SD = 1.30$), 5.35 ($SD = 1.36$), 4.68 ($SD = 1.65$), 4.31 ($SD = 1.55$), 3.67 ($SD = 1.62$), 3.65 ($SD = 1.34$), respectively. Implicit theory × test credibility × feedback score ANOVAs were performed on each item. For the first item, "I think that scores on the object use generation task are a good reflection of someone's level of expansive thinking skills," there was a significant main effect of feedback, $F(1, 169) = 22.68$, $p < .0001$. Consistent with the acceptance of feedback results, participants showed more agreement with this item when they believed they scored well on the first expansive thinking task ($M = 5.15$, $SD = 1.14$) than when they thought they scored poorly ($M = 4.26$, $SD = 1.31$).

With regard to the second item, "When performing the last object use generation task, I thought that working hard would lead to a higher expansive thinking score," the only significant finding was an implicit theory × test credibility × feedback score

interaction, $F(1, 169) = 3.88, p = .05$. This finding was due to entity theorists in the success, high credibility condition showing less agreement with the item than incremental theorists in that condition, $F(1, 169) = 5.99, p < .05$.

For the third item, "When performing the last object use generation task, I thought that working hard would help me increase my expansive thinking skills," there was only a main effect of implicit theory, $F(1, 169) = 8.13, p < .005$. Specifically, those induced to hold an incremental theory showed more agreement with the item ($M = 5.03$, $SD = 1.39$) than those in the entity theory condition ($M = 4.33$, $SD = 1.81$).

There were no significant effects on the fourth item, "When performing the last object use generation task, I thought that if I worked hard, I would get a more favorable evaluation from the experimenter and the other participants." However, there was a significant main effect of test credibility on the fifth item, $F(1, 169) = 4.14, p < .05$, which was, "When performing the last object use generation task, I tried to put down mostly good or creative object uses rather than jot down everything that came to mind." Participants in the low credibility condition agreed with the item ($M = 3.91$, $SD = 1.68$) more than those in the high credibility condition ($M = 3.41$, $SD = 1.53$). Perhaps this was because participants were not as motivated to receive a high score when the test was low in credibility, so they decided instead to make the task more interesting. Alternatively, participants might not have been as concerned with following the instructions when the test was low in credibility.

For the final item, "When performing the last object use generation task, I focused on speed and quantity more than on the quality of my responses," there was a significant implicit theory × feedback interaction, $F(1, 169) = 3.85, p = .05$. This seemed to be due to participants showing less agreement with the item when they held an entity belief as

opposed to an incremental belief in the success feedback condition, $F(1, 169) = 6.13$, $p = .01$. Implicit theory did not affect responses in the failure feedback condition.

Perceived Effort and Performance

As in Study 1, there was a significant correlation between the two measures of perceived Task 1 effort, $r(177) = .80$, $p < .0001$, and between the two measures of perceived Task 2 effort, $r(177) = .79$, $p < .0001$. Thus, both pairs of measures were averaged ($M = 2.79$, $SD = .97$, and $M = 3.48$, $SD = 0.85$, respectively). Then perceived change in effort was computed as perceived Task 2 effort minus perceived Task 1 effort ($M = 0.69$, $SD = 0.83$). An implicit theory × test credibility × feedback score ANOVA was performed on this measure and a significant main effect of feedback emerged, $F(1, 169) = 21.91$, $p < .0001$. Specifically, participants perceived a higher increase in effort if they had apparently failed the first task ($M = 0.99$, $SD = 0.88$), then if they thought they succeeded ($M = 0.43$, $SD = 0.69$). These perceptions matched actual changes in effort as a function of feedback score. Also similar to the findings regarding actual change, there were no participant sex effects on perceived change in task effort.

An index of change in perceived performance was again calculated as the percentile rank estimate for Task 2 performance minus the percentile rank estimate for Task 1 performance ($M = 8.25$, $SD = 12.56$). An implicit theory × test credibility × feedback ANOVA performed on this measure found only a significant main effect of feedback, $F(1, 161) = 19.70$, $p < .0001$. Participants perceived a greater increase in performance after failure ($M = 12.33$, $SD = 13.42$) than after success ($M = 4.57$, $SD = 10.51$). This pattern is consistent with findings pertaining to perceived and actual changes in effort.

Summary of Study 2 Findings

The main purpose of Study 2 was to examine whether entity theorists might be more threatened by negative feedback than incremental theorists. Hypothesis 2.1 predicted that when entity theorists had a justifiable reason for discounting negative feedback, then they would perceive the feedback as less valid. Specifically, it was predicted that entity beliefs would lead to less acceptance of failure feedback if the feedback was based on a test that was low, rather than high, in credibility. Hypothesis 2.2 predicted that this would not be true for incremental theorists, who should not be as threatened by failure feedback, given that they believe that failure stems mainly from a lack of effort, and that they can improve their personal attributes. Hypothesis 2.3 predicted that participants in all conditions would be quite accepting of the feedback when it was favorable.

The data provided some support for these hypotheses. With regard to Hypothesis 2.1, entity theorists did seem to be more accepting of negative feedback when it was presented by a source high in credibility as opposed to one low in credibility, but this difference did not reach significance (although it was marginally significant on a one-tailed level). Hypothesis 2.2 received some support, given that incremental theorists did not show the same pattern. In fact, there was a marginally significant pattern in the opposite direction, such that incremental theorists tended to be more accepting of the failure feedback when it was presented by a source low in credibility. Hypothesis 2.3 was strongly supported. Participants in all success feedback conditions were very accepting of the feedback, regardless of implicit theory or test credibility information.

Hypothesis 2.4 predicted that participants induced to hold an entity theory about expansive thinking would show a more adaptive effort response to failure when the test credibility was high, rather than low. This effect was not observed. Thus, Hypothesis 2.5,

which suggested that the effect would be mediated by acceptance of feedback, was also not supported. All of these findings are discussed in the general discussion section below.

GENERAL DISCUSSION

The focus of this research was on behavioral, affective, and cognitive reactions to failure. Three main sets of predictions were advanced. The first was that congruence between implicit theories and motivational climate would produce the most adaptive effort response to failure. The second was that incremental theorists would experience more task interest and more favorable affect than entity theorists after failure. The third was that entity beliefs would cause individuals to discount negative feedback when a discounting cue was available. These predictions and their relevant findings are discussed below. Following are discussions of some of the more interesting individual difference findings obtained in the two studies. The section concludes with some directions for future research and a discussion of the implications of the present findings and this area of research.

Task Effort: The Congruence Model

Hypotheses 1.1 predicted that entity beliefs would lead to the most effort after failure when combined with a motivational climate that emphasized performance, as compared to learning, goals. Hypotheses 1.2 predicted that an incremental theory would lead to the most adaptive effort response to failure when the climate emphasized learning and self-improvement. In other words, a match between implicit theory and motivational climate was expected to be most advantageous when it came to increasing effort following a setback. Interestingly, most participants in both Studies 1 and 2 showed an increase in effort after failure. Moreover, this increase was not affected by implicit theory, motivational climate, or test credibility manipulations.

These findings are not consistent with past work. For example, Dweck and her colleagues have shown through numerous investigations over years of research that entity beliefs lead to decrements in effort and performance following failure (see Dweck, 1999,

for a review). In addition, El-Alayli and Baumgardner (in press) found that entity beliefs resulted in increased effort and incremental beliefs resulted in decreased effort after failure in a performance climate. In fact, it was that study that led to the development of the congruence model and the predictions made for Study 1.

There are a number of questions that need to be addressed. For example, why is it that incremental beliefs about expansive thinking did not lead to more effort after failure than entity beliefs when the climate focused on learning? Also, why is it that entity theorists did not work harder than incremental theorists after failing in the performance climates of Studies 1 and 2? One possible answer to both of these questions is that the task used in the present investigations was not challenging enough. Imagine that you just failed a very simple task. It is likely that you would work harder on the task when given another chance, because you would know exactly how to improve your score. Regardless of whether you think the ability needed for the task can be improved or not and regardless of whether you are more interested in learning or showing off, you would probably work harder on this very simple task until you achieved the high score that you would expect of yourself.

If the task used in the present studies was more challenging, such as working on difficult analytical problems or a very tough object use generation task, then there would have been greater variability in effort after failure and participants would have been more affected by implicit theories and motivational climates. Perhaps individuals who could not pursue their particular goals, i.e., those in incongruent climates, would not have pushed themselves on the second task. And, perhaps entity theorists would have been especially driven to score well, thus motivating them to work harder than incremental theorists in a performance climate. Similarly, incremental theorists might have been particularly

motivated to improve themselves and would have thus worked harder than entity theorists when in a learning climate.

In fact, when incremental theorists work harder than entity theorists after failure, it is often because they are thrilled by the challenge (Dweck, 1999). Having ample time to generate uses for an object that do not need to be good or creative is not a very challenging situation. Failure would merely cause someone to think that they must have been a little too lazy when performing the task. Also, entity theorists would probably not be very concerned with demonstrating their ability to generate object uses if they think it is a very easy thing for anyone to do. They would have little reason to prove their competence to themselves or others. Note that Dweck and her colleagues tended to use more difficult intellectual tasks than the one employed in the current experiments (see Dweck, 1999, for a review). Also note that the change in effort means in both of the present studies were in the predicted direction (congruence promoting the most effort after failure) when the more difficult rope task was completed first.

Another issue that should be addressed is that participants were not aware that the first task would be scored until after they had completed it. Regardless of whether one holds any entity or incremental belief about a trait, their first concern would likely be to get a good understanding of how they stand on that attribute. Because they did not think that they would learn their score from the first task, they had little reason to exert much effort at it. Upon having completed it, then, they might have thought they received very little indication of their true ability level. When given the chance to do the task again, they worked hard so they could get a clearer estimate of their true level of ability, particularly when they learned that they failed the task.

However, this explanation does not account for why participants worked hard on the second task when in the learning climate, where they did not think the second task would be scored. Perhaps participants in this climate thought their second task would be scored in spite of what they were told. They were surprised by the fact that the first test had been scored, so they might have expected the second (nearly identical) task to be scored as well. It is also possible that they might have put more effort into the second task in order to gain a good *subjective* gauge of their true ability level, by keeping track of the number of object uses that they listed. Had participants already had a good indication of their true ability level after the first task, the manipulations might have had differential effects on subsequent effort. Individuals with a clearer understanding of their current ability level may be more concerned with improving their ability or with demonstrating high competence. As such, incremental theorists in a learning climate may work hard to improve their skills, and entity theorists in a performance climate may work hard to prove their skills under such conditions.

These two possible explanations are bolstered by the findings in Study 2 that participants were less accepting of failure feedback than success feedback, but worked harder after receiving the failure feedback. Given that the task was easy and that participants did not know ahead of time that the first one would be scored, getting failure feedback probably caused them to feel that they did not work to their full potential or did not get the score they deserved. In fact, there was a small but significant negative correlation between acceptance of feedback and change in task effort in Study 2. Participants who rejected the validity of the feedback the most worked the hardest on the second task, presumably because they saw more of a need to get a better indication of their true level of expansive thinking. El-Alayli and Baumgardner's (in press) study employed

much more difficult and ambiguous tasks and participants knew ahead of time that each would be scored.

Task Interest and Affect: The Possible Benefits of Holding an Incremental Theory

Based on years of research by Dweck and her colleagues (see Dweck, 1999), Hypothesis 1.3 predicted that incremental theorists would be more interested in expansive thinking and would feel better than entity theorists after the experience of failure. This finding did not emerge in either study. It was also predicted that incremental theorists might experience particularly more affective benefits when in a climate that best suited their goals, a learning climate. Instead, however, Study 1 found that mean interest in that condition was the lowest. Incremental theorists were less interested when in a learning climate than a performance climate. Perhaps that was because they wanted to know their true expansive thinking score and were more interested in the trait when they would have a second chance to determine their ability level. Knowing that they could improve their level of expansive thinking, they might have been particularly interested in learning how they fall on the dimension.

Another possible explanation is that incremental theorists in the learning climate may have expected to perceive substantial improvement in their ability to generate task uses in the second trial. While performing the task, though, they might have felt that they were not improving. They could have also thought that improvement could not take place so quickly, in spite of what they were told. As such, they might have expressed low task interest because they felt that they had tried hard and not apparently improved and that they might never have the opportunity to work on their expansive thinking skills sufficiently.

Unlike incremental theorists, entity theorists did not show lower interest in the learning climate than in the performance climate. Instead, the reverse tended to be true. This finding that entity theorists in the performance climate in Study 1 tended to show low task interest is consistent with the notion that entity theorists might suffer emotionally from failure when in a climate that matches their goals. Perhaps one reason for this is that entity theorists who just failed at a task would be more worried about failing the task again when that task would be scored. Although the tasks were simple, the exact nature of the second task was still ambiguous when participants reported their interest in expansive thinking because they did not know what object they would be generating uses for. Perhaps they were worried that the second task might be more difficult than the first, and this led to less interest when they thought it would be scored. Failing twice and thinking that they could never improve their level of expansive thinking might have been too threatening of a thought. This threat could cause entity theorists to sometimes give up after failure (Dweck, 1999) or to try extra hard to prove their competence (El-Alayli & Baumgardner, 1999), but in either case, they might feel more carefree and interested in the task at hand when in a situation where they would not have to face another evaluation.

Study 1 found no condition effects on temporary affect, and thus no support at all for Hypothesis 1.3. Perhaps the affect measure was not sufficiently sensitive to detect any differences as a function of implicit theory or motivational climate. It is also possible that the failure feedback was so strong that it dominated any other potential influences on affect.

Being Threatened by Negative Feedback:

The Possible Costs of Holding an Entity Theory

The primary objective of the second study was to examine whether entity theorists are more threatened by failure feedback than incremental theorists, even when in a motivational climate that emphasized the goals that they value most. Hypothesis 2.1 predicted that entity theorists would reject negative feedback when it came from a source low in credibility because doing so would allow them to avoid feeling bad about themselves. They were expected to be more accepting of poor feedback from a source high in credibility simply because they would have no basis for rejecting it. The pattern of means was consistent with this prediction, but the difference did not reach statistical significance at a two-tailed level. Perhaps the test credibility manipulation was not strong enough. Manipulation check analyses showed, in fact, that the difference between the two conditions was only one point on a 7-point scale. Had the manipulation been stronger, perhaps the mean difference would have been significant.

Hypothesis 2.2 predicted that incremental theorists would not attempt to discount the negative feedback when it came from a source low in credibility. Results indicated, in fact, a marginally significant trend in the opposite direction. Incremental theorists may have actually accepted the failure feedback more when they had an available discounting cue. This supports the prediction that incremental theorists are not as threatened by negative feedback. Hypotheses 2.1 and 2.2 were also supported by the fact that the interaction between implicit theory and test credibility in the failure feedback condition was significant.

Hypothesis 2.3 predicted that participants receiving success feedback would be very accepting of the feedback as valid. Implicit theory and motivational climate were not

expected to have any impact on acceptance of feedback when participants believed that they succeeded at the expansive thinking task. Findings were consistent with these predictions. Regardless of whether participants thought expansive thinking was changeable or not and regardless of the credibility of the test, they all wanted to believe that the favorable feedback was valid.

Hypotheses 2.4 and 2.5 predicted that entity theorists would work harder after failure when the test was high in credibility than when it was low in credibility because they could discount the feedback in the latter condition. These hypotheses were not supported. The only meaningful condition effect on effort was that participants worked harder after failure than after success. Perhaps the feedback manipulation was so strong that participants focused mostly on that information and paid little attention to the implicit theory and test credibility information with which they were provided. Participants could have been so threatened by the failure feedback that they were driven to work hard to improve, regardless of what they were told about expansive thinking or the expansive thinking tests.

Also, perhaps the test credibility manipulation would have had a stronger impact on task effort and task acceptance if it was placed *after* the feedback manipulation. After receiving threatening negative feedback, it might have been easier to discount that information if participants received the discounting cue soon after. Participants would probably have processed the test credibility information more, and in a motivated manner, if they already had a reason to do so when they came upon that information. This, in turn, might have caused entity theorists to show less effort after failure when the test was low in credibility than when it was high in credibility and could thus not be discounted.

Individual Differences

The present pair of investigations found some interesting gender effects. Perhaps most interesting was the finding in Study 1 that males worked harder after failure in a performance climate than in a learning climate, whereas females did the opposite. This pattern is consistent with some past work that has shown a performance climate to bring about more benefits for boys than for girls (Bouffard et al.,1995). Also noteworthy was the finding that only male participants seemed to show higher task interest in the incongruent conditions. If the explanations for the interest findings provided earlier are correct, then perhaps males have a stronger need to evaluate their current ability level and a stronger fear of failure than females. If so, then either of these reactions might have also been responsible for males working harder than females after failure in a performance climate.

The other finding that involved participant sex was obtained in Study 2. Specifically, females tended to be more accepting of the feedback they received than were males. Perhaps females are less reactive and more trusting than males upon learning something new about themselves. It is also possible that females are more easily persuaded, thus making them less suspicious, although research examining gender effects on persuasability is both mixed and controversial (see Eagly & Chaiken, 1983).

There were also a few effects involving self-efficacy. For example, Study 2 found that higher self-efficacy led to more task effort. In addition, Study 1 found that self-efficacy promoted higher task interest. It is not surprising that individuals who believe they can handle a task well would put more effort into performing it and would enjoy it more. Another interesting finding was that higher self-efficacy was associated with greater acceptance of the success feedback but lower acceptance of the failure feedback in Study

2. Participants with higher self-efficacy were probably more likely to think that they would score high on the expansive thinking task. Thus, when they scored high on the task, they assumed it to be a valid measure, but when they unexpectedly failed, they assumed that there must have been a problem with the way expansive thinking was assessed.

General academic goal orientation also proved to be an important individual difference measure. The most interesting of these findings involved mastery goal orientation. For example, mastery goals were related to more task interest in Study 1. Participants who were most motivated to increase their knowledge and skills showed greater interest in expansive thinking. Study 1 also found that a stronger mastery goal orientation was associated with a greater increase in task effort in the incremental condition, but not the entity condition. This finding is consistent with the congruence model proposed in the current research. Recall that mastery goals are the same as learning goals, which are best matched with an incremental theory. Participants who were most concerned with learning and self-improvement tried harder after failure when they were told that expansive thinking was a changeable characteristic. When told it was a fixed trait, high mastery goals did not lead to more effort following failure.

There was, however, another finding involving mastery goals that contradicted the congruence model. Specifically, a stronger mastery orientation led to more effort after failure in a performance climate, but not a learning climate. Again, perhaps individuals concerned with improving themselves were more interested in getting a clear estimate of their current ability level, which they might have thought they would get in the performance context.

Directions for Future Research

The most important direction for future research is to further examine the possible validity of the congruence model. As I noted at the beginning of this dissertation, it is likely that certain conditions have to be in place for entity and incremental theorists to try harder after failure in a congruent climate. Some of these conditions depend largely on the nature of the task. For example, the possible moderators regarding the ease of the task, beliefs about whether the tasks would be scored, and beliefs regarding the ability of the task to provide reliable information about one's level of skills should all be considered in future research. As mentioned earlier, it may be helpful to employ more challenging or ambiguous tasks so that some participants would be particularly concerned with scoring high or improving their skills. In addition, future research examining the congruence model should make sure that participants know ahead of time that their first task would be scored. Thus, it might be best if the motivational climate manipulation came early on. In the learning climate condition, participants could be told that the first task would be scored but the second would not. It would probably be best to use two different types of tasks so that participants would avoid construing the second one as another "test." The first task could be presented as a test while the second is presented as a training task.

Or, alternatively, participants in a learning climate could receive three tasks, as done by El-Alayli and Baumgardner (in press). In their study, the first and last tasks were identical and were used as the pre- and post- manipulation measures of effort. The middle task was different in format and was used to provide a feedback score. Motivational climate could be manipulated by telling some participants that only the second task was a test that would be scored and telling others that all three were tests that would be scored.

This three-tasks paradigm might also be more conducive to convincing entity and incremental theorists that working hard can lead to an improved score or an improved ability level, respectively. Although Study 1 manipulated the motivational climate by emphasizing performance or learning goals, it may not have provided situations that differentially *facilitated* the pursuit of those goals, as was planned. Had participants in the performance climate instead expected to receive scores on two different *types* of tasks, they might have seen more potential for effort to bring about higher scores. Likewise, had participants in the learning climate received a score on one type of task and expected to have the opportunity to improve their skills on another type of task, they might have been more likely to construe the second task as a training task, rather than another test (one that would not be scored). If so, then they would have been more likely to believe that hard work would result in skill improvement. Recall that I noted that such beliefs about the possible consequences of effort might be a necessary prerequisite for the congruence model.

Clearly, then, there are a number of important methodological issues that need to be addressed before any conclusions can be made regarding the congruence model. If the congruence model receives support, then subsequent research should be dedicated to understanding when it applies and when it does not. An exploration of both situational and individual difference variables could prove useful at that point.

Conclusions and Implications

There were two main purposes of the present research. The first was to examine the congruence model with regard to task effort. The congruence model received no support from either study. Because there are numerous methodological factors that could

have interfered with the predicted patterns of task effort, no conclusions can be made about the congruence model until those factors are investigated.

The second purpose was to examine effects of implicit theories on the possible emotional and cognitive reactions to failure. Of particular interest was the possibility that entity theorists might be more threatened by negative performance feedback than are incremental theorists. Although somewhat weak, the findings from Study 2 were consistent with this prediction. However, this possible reaction needs to be tested further in order for any conclusions to be made. After research has employed a stronger test credibility manipulation and/or operationalized feedback threat in various other ways, we can gain a clearer understanding of whether entity theorists are, in fact, more threatened upon receiving unfavorable information about themselves.

This type of research has implications for many achievement domains. For example, decades of research have yielded data indicating that both implicit theories (Dweck, 1999) and motivational climate (e.g., Ames & Archer, 1988; Ames, 1992) have an important impact on children's motivation in academic settings. Moreover, numerous investigations have found motivational climate and goal orientations to have a substantial impact on motivation in sports-related contexts (e.g., Kavussanu & Roberts, 1996; Newton & Duda, 1999; Papaioannou; 1995; Solomon, 1996; Treasure, 1997; Treasure & Roberts, 1998). Also, the degree of congruence between goals and motivational climate has been shown to be related to academic performance (Harackiewicz et al., 1997; Harackiewicz et al., 2000; McKeachie, 1961; Sanford, 1962) and even to whether or not students drop out of medical school (Funkenstein, 1962). Although the present investigation did not find support for the congruence model, future research should continue to investigate the validity of the model.

Because perceived ability, implicit theories, and motivational climate can be manipulated quite readily, this type of research could potentially provide some direction for how effort can be maximized at school, at work, in sports, and in other achievement domains. For example, mentors, teachers, employers, or coaches could learn how to employ strategies that foster hard work and prevent withdrawal. In addition, people can learn to improve their own motivation and effort in these settings by striving to maintain certain perceptions of their personality, their ability level, and the motivational climate. As we continue to explore these issues, we can learn more and more about how to promote hard work, intrinsic interest, and positive feelings in achievement situations.

APPENDICES

APPENDIX A: Verbatim Instructions and Manipulations

Note: In most cases, each paragraph was presented on a separate screen.

Introduction of Expansive Thinking

"Expansive thinking" is a desirable personality characteristic that has recently gained popularity among psychologists. This characteristic involves the ability to brainstorm. People who are high in expansive thinking are able to think in more diverse, elaborate, and creative ways. They are also good at applying abstract concepts and theories to their understanding of the real world.

One important characteristic of people high in expansive thinking is that their mind does not fatigue easily. They can focus and persist at tasks for a longer period of time than most other people before they start to feel intellectually drained. All of these qualities make expansive thinkers great idea-generators. They can think of lots of ideas quickly and efficiently.

Some current research on expansive thinking has shown that it is an important characteristic that is associated with favorable life outcomes. For example, researchers at Yale (e.g., Morton and Bliss, 1999) found that people who are higher in expansive thinking tend to exhibit more interest and productivity at work, higher relationship success, more optimism, and even greater overall well-being. Thus, the research has concluded that expansive thinking is a favorable attribute. As such, it is getting more and more research attention from psychologists.

Today you will be performing two expansive thinking tasks. Although the tasks are nearly identical, previous research has shown that it is important to administer both of them in order to gain a thorough understanding of expansive thinking.

Expansive Thinking Task Instructions

You will now be asked to perform the first expansive thinking task. As mentioned earlier, you are to list as many uses as possible for an everyday object. For example, if presented with the object "pencil," you might come up with such things as: writing, erasing, marking a box, filling out a scantron, poking holes in paper, chewing on it, using it as a pointer, pretending it is a microphone, stabbing someone, using it as a stirrer, using it as firewood, and so on.

These uses can be as obvious or as silly and unusual as you like. Use your judgment to avoid listing uses that are extremely impractical (e.g., using a pencil to shovel snow or to wear as jewelry). But do not inhibit yourself too much because your goal should be to come up with as many uses as possible.

While performing the task, do not worry about spelling, grammar, clarity, specificity, or length of responses. Try to keep your responses simple in order to save time. For example, instead of "using a pencil to write with," you can put down "to write" or "writing."

Don't be concerned with the quality of your responses. Note that greater expansive thinking is related to the *number* of feasible uses people can come up with on these types of tasks. It is not related to the quality of the uses selected, just the quantity.

There is an ample amount of time allotted for this task. When you are done listing object uses, you will have to wait until the computer advances to next screen. Please continue when you are ready to start the task.

List as many uses as you can for a "piece of paper" / "piece of rope" Each use should be listed on a separate line. Do not waste time numbering your responses. Simply hit <Enter> after each one. When you are finished, please wait until the computer advances to the next screen. You may begin.

Implicit Theory Manipulation

Entity Condition:

Although many personality characteristics are controllable, a host of research (e.g., Rostoff et al., 1999) has shown that expansive thinking is an uncontrollable and unchangeable attribute.

Researchers at Stanford have determined that there is a large genetic component to expansive thinking, making it very difficult to change. Environmental influences on this characteristic only play a role during a "critical period" in early childhood. As such, expansive thinking is almost fully formed by the end of childhood, remaining stable throughout the lifespan.

A few longitudinal studies have examined level of expansive thinking at various ages and found it to be very consistent over time. For example, Miller and Schmitt (2000) found that people's level of expansive thinking at age 8 corresponded very closely to their expansive thinking at ages 18, 28, and 38.

Thus, your level of expansive thinking has already been established and will remain stable for most of your lifetime. In other words, if you are high in expansive thinking now, you always will be. If you are not very high, you will not have high skills in the future.

Incremental Condition:

Although many personality characteristics are uncontrollable, a host of research (e.g., Rostoff et al., 1999) has shown that expansive thinking is a controllable and changeable attribute.

Researchers at Stanford University have determined there is no genetic component to expansive thinking, making it very easy to change. We are born with the potential to develop any level of expansive thinking, depending on how much we work at it and what experiences we choose. Consistent with this idea, level of expansive thinking is believed to vary quite a bit throughout the lifespan.

A few longitudinal studies examined expansive thinking level at various ages and found it to be quite inconsistent over time. For example, Miller and Schmitt (2000) found that level of expansive thinking at ages 8, 18, 28, and 38 often varied considerably within each person.

These researchers have also found strong evidence that expansive thinking can be readily improved with practice and hard work. Thus, if you are not a very expansive thinker now, you can work at it to become higher in expansive thinking. And if you are

currently high in expansive thinking, you may not always be that way if you do not nurture your skills

Motivational Climate

Performance Climate:

The expansive thinking task you completed earlier has been shown by Dr. Robert Morton and his colleagues at Yale to be a very reliable test of expansive thinking ability. Years of research have shown that taking this test provides an accurate estimate of one's level of expansive thinking.

The purpose of this study is to compare your expansive thinking ability with that of others. You will be informed of your scores on the expansive thinking tests during the session. At the end of the session, you will get an opportunity to discuss your scores with the other participants, so you can get an idea of how your performance compares to that of others.

You have already taken one expansive thinking test. After you receive your score, you will complete some questionnaires and then take your final expansive thinking test, which is similar to the first one. Later you will be informed of your score on the second test as well. Scores are calculated in terms of how your level of expansive thinking compares to that of other college students who took the same tests.

Although these tests can provide an accurate assessment of your level of ability, they cannot provide any opportunity for improving your expansive thinking. If you want to score as high as you can, you should try to generate as many object uses as possible on the next expansive thinking test.

Learning Climate:

The expansive thinking task you completed earlier has been shown by Dr. Robert Morton and his colleagues at Yale to be a very reliable training task for practicing expansive thinking. Years of research have shown that merely completing this training task allows people to practice using their expansive thinking skills.

The purpose of this study is to examine the effects of performing the expansive thinking training tasks. You will not be given any specific feedback regarding your level of expansive thinking. At the end of the session, you will get an opportunity to ask the other participants what methods, if any, they used to help them come up with as many object uses as possible.

You have already completed one expansive thinking training task. After you get some general feedback from that task, you will complete some questionnaires and then work on your final expansive thinking training task, which is similar to the first one. You will not be given any feedback regarding your performance on the second training task.

Although completing the second expansive thinking task will not help you assess your ability level, it will provide an opportunity for you to practice thinking expansively. If you want to learn the most from the next expansive thinking task, you should try to generate as many object uses as possible.

Test Credibility Manipulation

Low Credibility Condition:

The purpose of the expansive thinking test you just completed is to provide an accurate estimate of one's level of expansive thinking ability. The test was developed by Melanie Clark, a graduate student at Wisconsin State University. She developed the test to assist her advisor with his work on expansive thinking. Melanie has little experience in developing personality tests and some of her professors think her work is questionable. Although some researchers have used this expansive thinking test, there has not yet been enough research to validate the test.

High Credibility Condition:

The purpose of the expansive thinking test you just completed is to provide an accurate estimate of one's level of expansive thinking ability. The test was developed by Dr. Robert Morton and his colleagues at Yale. Dr. Morton has a great deal of experience in constructing personality tests and his work is very well-respected in the personality psychology community. In addition, the expansive thinking test has been well-tested and validated through years of research.

APPENDIX B: Measures

Study 1

Self-Efficacy Measure
Please use the scale below to indicate your agreement with the following items:

7 = Strongly Agree
6 = Agree Somewhat
5 = Agree Slightly
4 = Neither Agree Nor Disagree
3 = Disagree Slightly
2 = Disagree Somewhat
1 = Strongly Disagree

1. I know how to handle this task.
2. I am confident that I can do this task well.
3. I can meet the challenges of this task.
4. I am certain that I can manage the requirements of this task.

Manipulation Check Measures
We would now like to ask you some questions regarding your perceptions of expansive thinking and of this experiment. Please indicate your agreement with the following statements.

7 = Strongly Agree
6 = Agree Somewhat
5 = Agree Slightly
4 = Neither Agree Nor Disagree
3 = Disagree Slightly
2 = Disagree Somewhat
1 = Strongly Disagree

Implicit Theory Manipulation Check Items:
1. With hard work, people can improve their expansive thinking skills.
2. It would be possible for me to somehow change my level of expansive thinking.
3. I think expansive thinking is a stable and fixed personality characteristic.
4. I will probably always have the same level of expansive thinking ability.
5. I think one's level of expansive thinking varies a lot throughout his or her life.
6. I don't think people have much control over how well they can think expansively.

Motivational Climate Manipulation Check Items:
7. One goal of this study is to test people's level of expansive thinking ability.
8. One purpose of this study is to examine expansive thinking practice and training.

9. The expansive thinking tasks used in this study are well-established tests of expansive thinking ability level.
10. The expansive thinking tasks used in this study cannot provide me with any opportunity to increase my expansive thinking skills.
11. By the time this study is over, I will have a good idea of how my expansive thinking ability compares to that of others.
12. The expansive thinking tasks used in this study are exercises for practicing expansive thinking.

Temporary Affect

Now please indicate how much you are currently feeling each of the following emotions:

5 = Extremely
4 = Very Much
3 = Somewhat
2 = Slightly
1 = Not At All

1. happy
2. joyful
3. depressed
4. frustrated
5. pleased
6. worried/anxious
7. enjoyment/fun
8. angry/hostile
9. unhappy

Measure of Interest

Please take the time now to indicate your interest in expansive thinking by responding to the following items:

7 = Strongly Agree
6 = Agree Somewhat
5 = Agree Slightly
4 = Neither Agree Nor Disagree
3 = Disagree Slightly
2 = Disagree Somewhat
1 = Strongly Disagree

1. I enjoyed working on the expansive thinking tasks.
2. I would be interested in learning more about expansive thinking.
3. I don't care about the topic of expansive thinking.
4. I would be interested in performing more expansive thinking tasks in the future.
5. I'm glad I participated in this study.
6. I did not pay much attention to what was going on in this study.
7. I wish I signed up for a different study instead of this one.

8. I think expansive thinking is an important personality characteristic.
9. I think expansive thinking is an interesting personality characteristic.

Measures of Perceived Effort and Performance

Now please answer the following questions about your effort and performance during this study.

5 = I worked extremely hard
4 = very hard
3 = somewhat hard
2 = slightly hard
1 = I did not work hard at all

1. How hard did you work on the FIRST expansive thinking task?
2. How hard did you work on the SECOND expansive thinking task?

5 = Very Much Effort
4 = Much Effort
3 = Moderate Effort
2 = Some Effort
1 = Minimal Effort

3. How much effort did you put into generating as many object uses as possible during the FIRST expansive thinking task?
4. How much effort did you put into generating as many object uses as possible during the SECOND expansive thinking task?

5 = Very Well
4 = Somewhat Well
3 = Average
2 = Somewhat Poorly
1 = Very Poorly

5. How do you feel you performed on the FIRST expansive thinking task?
6. How do you feel you performed on the SECOND expansive thinking task?

7. On a scale from 1 to 100 (50 being average and 100 being higher than everyone else), what do you think was your percentile rank for the FIRST expansive thinking task?
8. On the same 1 to 100 scale, what do you think was your percentile rank for the SECOND expansive thinking task?

Theories of Effort and Performance

We would now like to ask you a few questions about your perceptions of the study. Please indicate your agreement with each item using the scale below:

7 = Strongly Agree
6 = Agree Somewhat
5 = Agree Slightly
4 = Neither Agree Nor Disagree
3 = Disagree Slightly
2 = Disagree Somewhat
1 = Strongly Disagree

1. I think that scores on the object use generation task are a good reflection of someone's level of expansive thinking skills.
2. When performing the last object use generation task, I thought that working hard would lead to a higher expansive thinking score.
3. When performing the last object use generation task, I thought that working hard would help me increase my expansive thinking skills.
4. When performing the last object use generation task, I thought that if I worked hard, I would get a more favorable evaluation from the experimenter and the other participants.
5. When performing the last object use generation task, I tried to put down mostly good or creative object uses rather than jot down everything that came to mind.
6. When performing the last object use generation task, I focused on speed and quantity more than on the quality of my responses.

Goal Orientation

Now please answer the following questions as they pertain to your general goals in your college courses. Each item should be answered on a scale from 1 (not at all true of me) to 7 (very true of me).

1. It is important for me to do better than other students.
2. It is important for me to do well compared to others in my classes.
3. My goal in most classes is to get a better grade than most of the other students.
4. I worry that I may not learn all that I possibly could in my classes.
5. Sometimes I'm afraid that I may not understand the content of my course material as thoroughly as I'd like.
6. I am often concerned that I may not learn all that there is to learn in class.
7. I want to learn as much as possible from my classes.
8. It is important for me to understand the content of my courses as thoroughly as possible.
9. I desire to completely master the material presented in my classes.
10. I just want to avoid doing poorly in class.
11. My goal in most classes is to avoid performing poorly.
12. My fear of performing poorly in this class is often what motivates me.

Suspicion Measure
Now we would like you to describe what you believe was the purpose of this study.

Feedback Believability
As one final question, please indicate how believable your expansive thinking task feedback was. Please try to be as honest and accurate as possible.

6 = Extremely Believable
5 = Very Believable
4 = Believable
5 = Somewhat Believable
4 = Slightly Believable
5 = Not At All Believable

Study 2

Manipulation Checks
We would now like to ask you some questions regarding your perceptions of expansive thinking and of this experiment. Please indicate your agreement with the following statements.

7 = Strongly Agree
6 = Agree Somewhat
5 = Agree Slightly
4 = Neither Agree Nor Disagree
3 = Disagree Slightly
2 = Disagree Somewhat
1 = Strongly Disagree

Implicit Theory Manipulation Check Items:
(Items 1 to 6 from Study 1 above)

Performance Climate Induction Check Item:
7. A major goal of this study is to test people's level of expansive thinking ability.

Test Credibility Manipulation Check Items:
8. The test I took was a well-established measure of expansive thinking ability.
9. The person who developed this expansive thinking test probably does not have much experience in this area.
10. The expansive thinking test I took has been validated by previous research.
11. Scores on this expansive thinking test provide a good indication of someone's true level of expansive thinking ability.
12. More research needs to be done on this expansive thinking test to make sure it is an accurate measure of one's level of ability.

Acceptance of Feedback Measure

At this point, we would like to ask you a few more questions to further examine your views of expansive thinking and this particular experiment. Please use the following scale to indicate how much you agree with the statement below:

7 = Strongly Agree
6 = Agree Somewhat
5 = Agree Slightly
4 = Neither Agree Nor Disagree
3 = Disagree Slightly
2 = Disagree Somewhat
1 = Strongly Disagree

1. I believe that my true level of expansive thinking ability is quite high.
2. I am not very good at thinking expansively.
3. I think the feedback I received regarding my expansive thinking ability is indicative of my true ability level.
4. I do not trust the results of the expansive thinking test I completed.
5. I think that the person who made this expansive thinking test did not really know what they were doing.
6. I think that my performance on the expansive thinking test I took is a good reflection of my everyday expansive thinking ability.

* All of the other measures for Study 2 were the same as those used for Study 1.

APPENDIX C: Preliminary Study

A preliminary study was performed to confirm that participants did not have different perceptions of the attribute of "expansive thinking" depending on whether they received the entity or incremental information about the trait. Twenty seven participants received the same introductory information about expansive thinking that was used in Studies 1 and 2. They then performed the same expansive thinking task, after reading essentially the same instructions described in the methodology section above. Following this, they randomly received the entity (n = 13) or incremental (n = 14) information about expansive thinking. Next, they were asked to indicate how much they believed expansive thinking to be related to (i.e., similar to) 23 attributes, such as creativity, intelligence, and, persistence (see **Table A.1** of this appendix for the entire list). Responses were indicated on a 1 to 5 scale from "not at all related" to "extremely related."

Participants also indicated the extent of their agreement with seven items, listed in **Table A.2** of this appendix, that assessed perceptions of the desirability, usefulness, and importance of expansive thinking. These items were included to assess whether participants with different induced implicit theories might value the attribute of expansive thinking to a different degree. A scale from 1, "strongly disagree," to 7, "strongly agree," was used to respond to each.

T-tests were performed to compare responses to each of the 30 items between the entity and the incremental conditions. The only significant finding for the attribute similarity items, was for the trait "imagination," $t(25) = 2.45$, $p < .05$ (see Table A.1). Participants viewed expansive thinking as being more related to imagination in the incremental condition (M = 4.86) than in the entity condition (M = 4.31). There were no

significant differences for the seven additional items, as seen in Table A.2. Overall, these analyses confirmed that perceptions of the nature of expansive thinking and its importance did not vary as a function of the implicit theory manipulation.

Table A.1

Effects of Implicit Theory Induction on the Relationship Between Expansive Thinking and Various Other Attributes.

Dependent measure	df	t	p
Creativity	25	-0.75	.46
Spatial skills	25	-0.69	.50
Brainstorming ability	25	-0.64	.53
Originality	25	-0.74	.85
Imagination	25	2.44	.02
Inspiration	25	0.72	.48
Ingenuity	25	-0.60	.56
Inventiveness	25	-0.70	.49
Resourcefulness	25	-0.66	.52
Intelligence	25	-0.07	.95
Ability to focus	25	0.48	.64
Persistence	25	0.95	.35
Productivity	25	0.22	.83
Optimism	25	-0.58	.57
Cleverness	25	0.90	.38
Determination	25	1.19	.38
Efficiency	25	0.27	.79
Willpower	25	0.14	.89
Extraversion (outgoingness)	25	0.45	.66
Conscientiousness	25	1.29	.21
Openness to experience	25	-0.11	.92
Neuroticism	25	0.59	.56
Agreeableness	25	0.21	.84

Note. A positive value of t indicates a higher mean in the entity condition than in the incremental condition. The reverse is true for negative t values.

Table A.2

Effects of Implicit Theory Induction on the Seven Items Assessing Expansive Thinking Desirability, Usefulness, and Importance.

Dependent measure	df	t	p
Item 1: It is quite desirable to be an expansive thinker.	25	-1.61	.12
Item 2. I would be upset if I thought I had poor expansive thinking skills.	25	-0.77	.45
Item 3. If I had low expansive thinking, I would be motivated to improve my skills.	25	-0.77	.45
Item 4. I would be embarrassed if others knew I was low on expansive thinking.	25	-0.80	.43
Item 5. Expansive thinking is a favorable attribute.	25	-0.45	.66
Item 6. Expansive thinking is an important characteristic.	25	0.73	.47
Item 7. It would be useful to have high expansive thinking skills.	25	-0.83	.41
Composite 1: Mean of Items 1 to 7 (α = .82)	25	-0.89	.38
Composite 2: Mean of Items 1 to 7, excluding Item 6 (α = .78)	25	-1.23	.23

Note. A positive value of t indicates a higher mean in the entity condition than in the incremental condition. The reverse is true for negative t values. R^2 values for the nine dependent measures ranged from .01 to .09.

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