

Implicit Theories, Attributions, and Coping: A Meaning System Approach

Ying-yi Hong

The Hong Kong University of Science and Technology

Chi-yue Chiu

University of Hong Kong

Carol S. Dweck
Columbia University

Derrick M.-S. Lin and Wendy Wan
University of Hong Kong

This research sought to integrate C. S. Dweck and E. L. Leggett's (1988) model with attribution theory. Three studies tested the hypothesis that theories of intelligence—the belief that intelligence is malleable (incremental theory) versus fixed (entity theory)—would predict (and create) effort versus ability attributions, which would then mediate mastery-oriented coping. Study 1 revealed that, when given negative feedback, incremental theorists were more likely than entity theorists to attribute to effort. Studies 2 and 3 showed that incremental theorists were more likely than entity theorists to take remedial action if performance was unsatisfactory. Study 3, in which an entity or incremental theory was induced, showed that incremental theorists' remedial action was mediated by their effort attributions. These results suggest that implicit theories create the meaning framework in which attributions occur and are important for understanding motivation.

Attributions have been widely recognized as mediators of adaptive and maladaptive behavior patterns in the face of setbacks. Weiner, for example has argued that attributions are the basis of achievement-motivation patterns, such as persistence versus non-persistence following failure (Weiner, 1979, 1985; Weiner & Kukla, 1970); Seligman and his colleagues have argued that an optimistic versus pessimistic attributional style forms the basis of adaptive versus maladaptive patterns, including vulnerability to depression (Abramson, Seligman, & Teasdale, 1978; Peterson, Maier, & Seligman, 1993; Seligman, 1975; Seligman, Reivich, Jaycox, & Gillham, 1995). Dweck has shown that attributions mediate helpless and mastery-oriented responses to setbacks, predicting cognitions, affect, and performance as people encounter obstacles (Diener & Dweck, 1978, 1980; Dweck, 1975; Dweck & Reppucci, 1973). In particular, all of these research programs have shown that attributing setbacks to global, stable factors (such as a lack of global, stable ability) mediates maladaptive reactions,

whereas attributing setbacks to unstable or controllable factors (such as a lack of effort) mediates the adaptive reactions. They have done this by showing both that attributions are predictive of these different reactions and that manipulating people's attributions can create or alter these reactions.

The evidence, then, is very clear that attributions are central to motivation and play a pivotal role in how people cope. However, the attributional approach is incomplete in two ways. One is that implicit in these formulations is the notion that motivational processes (and important individual differences in motivational processes) begin only when the individual has encountered an outcome, such as a failure. Issues of why people are in a particular situation in the first place and what they hope to achieve there (aside from "success") are not dealt with.

The second way in which attribution-based formulations are incomplete is that they do not address the theories, belief systems, or conceptual frameworks people bring with them to a situation that can foster particular attributions. According to the attributional formulations, outcomes occur and attributions (whether previously learned or formulated at that time) are made. Little else about the person's belief systems or goals is seen as relevant.

To address these issues, Dweck and her associates (Dweck, Chiu, & Hong, 1995a; Dweck & Leggett, 1988) proposed a model in which people's implicit theories and goals create a motivational framework that (a) guides the individual's strivings prior to an outcome and (b) creates a meaning system within which attributions occur. The model identifies two implicit self-theories (such as theories of intelligence) that people can hold: an *entity* theory that portrays a personal attribute as relatively fixed or an *incremental* theory that portrays the attribute as relatively malleable.

According to this model, an entity versus an incremental theory of intelligence orients an individual to focus on different goals and on different internal factors in explaining performance. When individuals hold an entity theory of their intelligence, they tend to orient more toward performance goals, the goal of gaining favorable judgments of their attributes and avoiding negative ones. That

Ying-yi Hong, Division of Social Science, The Hong Kong University of Science and Technology, Hong Kong; Chi-yue Chiu, Derrick M.-S. Lin, and Wendy Wan, Department of Psychology, University of Hong Kong; Carol S. Dweck, Department of Psychology, Columbia University.

This research was supported by Grant HKUST6246/97H from the Research Grants Council, Hong Kong, and Grant 342/014/0001 from the University Grants Council, Hong Kong.

We thank Frederick Rhodewalt and Claudia Mueller for their insightful comments on the article and Alexis Andrews, Suzi Arden, Jessica Auth, Edi Cooke, Heidi Duncan, Sigrid Embersits, Vivian Eng, Sonya Kim, Lawrence Maayan, Alan Rebenstock, and Penny Schneider for their assistance in data collection.

Correspondence concerning this article should be addressed to Ying-yi Hong, Division of Social Science, The Hong Kong University of Science and Technology, Clear Water Bay Road, Kowloon, Hong Kong, or to Carol S. Dweck, Department of Psychology, Columbia University, New York, New York 10027. Electronic mail may be sent to sohong@ust.hk or to dweck@psych.columbia.edu.

is, when a valuable personal attribute is seen as fixed, people become very concerned with demonstrating that they have a sufficient amount of it and with avoiding a demonstration of deficiencies. Attributions as well as goals may be organized around fixed ability. That is, in understanding performance outcomes, entity theorists may be more focused on their fixed ability than on the malleable aspects of themselves. Thus, people holding an entity theory (entity theorists) may explain negative performance more in terms of their lack of ability than effort, which would render them vulnerable to helpless responses in the face of failure.

In contrast, when individuals hold an incremental theory of their intelligence, they tend to orient more toward learning goals, the goal of increasing their ability. That is, when an important personal attribute is seen as a potential that can be cultivated, there is less emphasis on showing it off (or protecting it) and more emphasis on cultivating it through effort. As such, people holding an incremental theory (incremental theorists) may focus on effort, which they can invest to increase their ability. When faced with failures, these individuals may be more mastery-oriented, looking for ways to improve their ability and performance, such as exerting more effort or engaging in remedial actions.

Although both entity and incremental theorists may see ability and effort as relevant causes of performance, the implicit theory they hold may orient them to assign unequal weights to these causes. Whereas entity theorists would weight ability relatively more heavily, incremental theorists would view effort as relatively more important. In the face of failure, incremental theorists would then be more likely than entity theorists to exert effort to remedy the skills they lack.

Three studies were conducted in the present research to examine implicit theories as predictors of the relative weights assigned to ability and effort attributions and, hence, of coping with academic challenges. In Studies 1 and 3 we tested the hypothesis that entity and incremental theorists would differ in their relative focus on ability versus effort attributions. As noted, relative to entity theorists, incremental theorists were predicted to assign greater weight to effort and less weight to ability when they explain a negative performance (Hypothesis 1). In Studies 2 and 3 we examined the association between implicit theories and likelihood of taking remedial action in the face of failure, testing the hypothesis that incremental theorists would be more likely to engage in remedial action (Hypothesis 2). In Study 3 we also tested the hypothesis that effort attribution would mediate the link between implicit theories and likelihood of taking remedial action in the face of failure (Hypothesis 3).

Relations to Previous Models

In the present investigation, we assume that a person's implicit theory of intelligence has some direct effects on the relative weight assigned to fixed versus malleable factors in explaining negative outcomes, which in turn affects how the person copes with intellectual challenges. The focus is on how implicit theories arouse different motivational concerns, which in turn set up different attributional frameworks for interpreting achievement outcomes.

In this research we focus on implicit theories rather than performance versus learning goals as predictors of attributions for and reaction to failure. The reason is that although in the original Dweck and Leggett (1988) formulation implicit theories set up goals and goals then set up subsequent attributions and responses, more recent work has modified this view somewhat. This work has suggested that

implicit theories are more consistently predictive of attributions and responses than are achievement goals (at least as they were originally defined, as discussed below). For instance, MacGyvers (1992) showed that students' implicit theories of their intelligence were stronger predictors of their achievement patterns than were their goals. In the same vein, Stipek and Gralinski (1996) showed that students' beliefs in fixed versus malleable intelligence predicted their academic achievement, but there was only modest support for the idea that students' goals mediated this effect.

Our most recent work has also shown that students' implicit theories seem to modify the meaning that a particular goal has for the student. For example, in a just-completed study by Stone and Dweck (1998), students were presented with clear *performance-goal tasks* (tasks that were said to assess their ability, but not teach them anything new) and clear *learning-goal tasks* (tasks that would give them the opportunity to practice and improve important skills). As in past research, entity theorists preferred performance goal tasks over learning goal tasks far more than did incremental theorists, but the difference did not end there. Students were then questioned systematically about each of the tasks. Entity and incremental theorists differed in the way in which they perceived both tasks. First, they differed on how broad an ability they saw the performance-goal task as diagnosing. Entity theorists tended to think it measured their underlying and future intelligence significantly more than did incremental theorists, who tended to see it more as measuring their present skills. Second, they differed in whether they brought performance concerns (along with their desire to learn) to the learning task. Entity theorists, significantly more than incremental theorists, expressed the concern that they would not feel or look smart on the learning task. Thus within the different frameworks of the two implicit theories, the "same" achievement goals seem to be quite different (e.g., a performance goal that tests a global, stable intelligence vs. a performance goal that tests a specific set of skills). Indeed, in our ongoing research we are continuing to examine the issue of different goal meanings within the two theory frameworks (Grant & Dweck, 1999).

A study by Erdley, Cain, Loomis, Dumas-Hines, and Dweck (1997) yielded similar findings. In this study, students (with both implicit theories) were given either strong learning goals or strong performance goals. They then experienced a setback and made attributions for the setback. Students with an entity theory made significantly stronger low-ability attributions than did those with an incremental theory, regardless of goal condition. These findings should not be taken to mean that goal effects are unimportant, because several of these studies also showed meaningful goal effects; however, taken together, they suggest that implicit theories provide a context within which goals and attributions occur and, as such, can color the meaning that goals and outcomes have for an individual.

In short, the aim of the present study was to test a model that links implicit theories to effort versus ability attributions, which in turn relate to a higher versus lower likelihood of taking remedial actions in the face of failure.

Study 1

This study was designed to examine the relation between implicit theories and effort versus ability attributions. Participants in this study were provided with negative feedback on a task that allegedly assessed their level of intelligence. They were then asked

to explain their poor performance. We were interested in how much they attributed their performance to effort versus ability. When people believe that intelligence is a fixed, nonmalleable "entity" (entity theorists), they may be oriented to interpret performance outcomes as diagnosing the fixed amount of their intellectual abilities rather than some malleable aspects of performance (e.g., effort). In comparison, believing that intelligence is a malleable construct that can be added to might orient individuals to focus on the changeable aspects of the performance, such as effort. Thus, incremental theorists might attribute their performance more to effort than would entity theorists, even when the task is described as one that measures intelligence.

A secondary aim of the present study was to examine the role of self-confidence in the context of implicit theories. The Dweck and Leggett (1988) model predicted that students' confidence level would interact with their theory/goal to produce a helpless or mastery-oriented response. This prediction was based on findings by Elliott and Dweck (1988) showing that when students had a performance goal and high perceived ability they exhibited a mastery-oriented response to failure and that only when a performance goal was combined with low perceived ability did helplessness result. Students with learning goals were mastery-oriented whether they had high or low perceived ability. Subsequent findings, however, have called into question the hardness of students with an entity theory/performance goal and high confidence. For example, Henderson and Dweck (1991), in a study of students making the transition to junior high school, found that entity theorists with high confidence showed clear declines in their achievement standing, along with a tendency to attribute their difficulties to a lack of ability. Similarly, in the study cited above by Erdley et al. (1997), entity theorists' tendency to make low-ability attributions for their setbacks was not affected by their level of confidence. These findings may suggest that confidence is fragile within an entity-theory/performance-goal framework and that salient failures can in fact evoke low-ability attributions and their sequelae (Hong, Chiu, & Dweck, 1995). In other words, as we proposed, an entity theory sets up a meaning for failure—that it measures ability—and although high confidence may sometimes bolster an individual, it may not always ward off that meaning and its consequences. A secondary objective of this study, then, was to test whether entity theorists with a high confidence level were as likely as their low-confidence counterparts to blame ability (vs. effort) in the face of setbacks.

Method

Participants

The participants were 97 undergraduate university students (47 men and 50 women) in the United States. About half of them participated in the experiment to fulfill an introductory psychology course requirement. The other half were paid \$6 per session for participation.

Materials

The implicit-theories measure described below was used in all the studies in the present research.

Assessment of implicit theories. A three-item questionnaire developed by Dweck and Henderson (1988) was used to measure participants' implicit theory of intelligence. This measure is similar in format to the one

used in Chiu, Hong, and Dweck (1997); Chiu, Dweck, Tong, and Fu (1997); and Levy, Stroessner, and Dweck (1998; Studies 1–4). The items are "You have a certain amount of intelligence and you really can't do much to change it"; "Your intelligence is something about you that you can't change very much"; and "You can learn new things, but you can't really change your basic intelligence." Participants were asked to show their degree of agreement with each item on a 6-point Likert scale ranging from 1 (*strongly agree*) to 6 (*strongly disagree*). Thus, the higher the participants' scores, the less they believe that intelligence is a fixed entity.

Items depicting an incremental theory were not included in this measure because several studies (Boyum, 1988; Leggett, 1985) and our own pilot studies have shown that, even for respondents who endorse items depicting entity theories, there is a strong tendency to endorse items depicting the opposite, incremental theory, as well as a tendency to drift toward incremental choices over items. This indicates to us that the incremental items are highly compelling and, perhaps, are more socially desirable as well.

Because, in the current format, endorsement of an entity theory entails agreement with the items, it was important to demonstrate that agreement with these statements did not just represent an acquiescence set. Dweck, Chiu, and Hong (1995a, 1995b) examined individuals' implicit theory of intelligence together with their implicit theories in other domains (such as people's morality). Their findings reveal that even though implicit-theory measures for different domains have the same format, they form clearly independent factors in a factor analysis, suggesting that responses to the implicit theory of intelligence measure are not due to an acquiescence set or any response set.

Another issue requiring attention is the issue of whether disagreement with the entity-theory statements can be taken to represent agreement with the incremental theory. In two studies with college students (see Dweck et al., 1995a, 1995b), participants were given the implicit theory of intelligence measure and asked to explain their responses. Virtually all those who disagreed with the entity statements gave clear incremental-theory justifications for their responses.

Only three items are included because the items are intended to have the same meaning, and continued repetition of the same idea becomes somewhat bizarre and tedious to the respondents. The high internal reliability of the measure (alpha ranged from .94 to .98 for sample sizes ranging from 32 to 184) suggests that this has not been a problem. Test-retest reliability has also been found to be high ($r = .80$, $N = 62$, over a 2-week period).

Data from six validation studies (detailed in Dweck et al., 1995a) have shown that the implicit-theory measure is independent of the respondents' sex and age (β ranged from -0.26 to 0.12 , *ns*). Also the theory measure is not confounded with self-presentation concerns as measured by the Snyder (1974) Self-Monitoring Scale ($\beta = 0.04$, *ns*) and the Paulhus (1984) Social Desirability Scale ($\beta = 0.024$, *ns*). As far as discriminant validity is concerned, the theory measure is unrelated to measures of cognitive ability (SAT scores; $\beta = -11.03$, *ns*) and self-esteem (Coopersmith, 1967; $\beta = 0.39$, *ns*). In addition, in a pilot study, we found that entity theorists perceived academic achievement to be as important as did incremental theorists.¹ Thus, any relation between implicit theory and other variables is unlikely to be mediated by differential value placed on academic achievement.

Recently, Levy and Dweck (1997) constructed a new implicit-theories measure, which is composed of four items that depict intelligence as a fixed entity (including the three used in the current scale) and four items that depict intelligence as malleable. The incremental items present extreme

¹ Forty-nine entity theorists and 63 incremental theorists were asked to rate the importance of academic achievement to them on a scale ranging from 1 (*extremely important*) to 6 (*not at all important*). Entity theorists rated academic achievement to be as important to them ($M = 1.74$, $SD = 0.91$) as incremental theorists did ($M = 1.81$, $SD = 0.82$), $F(1, 110) = 0.21$, *ns*.

forms of the incremental theory and thus avoid the social desirability problem (e.g., "You can substantially change how intelligent you are" and "No matter who you are, you can significantly change your intelligence level"). In a validation study, 96 college students were asked to fill out the original three-item implicit-theories measure and, a week later, the new eight-item measure. The classification of participants as entity, incremental, and unclassified on both measures was highly similar. Of those who were classified as incremental theorists on the original measure, 87.8% were classified as incremental theorists on the new measure, and only 2.4% were classified as entity theorists. Of those who were classified as entity theorists on the original measure, 92.9% were classified as entity theorists on the new measure, and none were classified as incremental theorists. In addition, in three validation studies, the correlation between responses to the entity items and to the incremental items was found to be between $-.81$ and $-.85$, showing that disagreement with the entity items does in fact represent agreement with the incremental items. In short, the implicit-theory measure appears to be a reliable and valid measure.

Recall that participants' implicit theories were measured on a scale that ranges from 1 to 6, with higher scores indicating stronger disagreement with an entity theory. Those participants who believe that intelligence is fixed (entity theorists) should consistently endorse responses at the lower (*agree*) end of the scale (yielding a mean score of 3.0 or lower), whereas participants who believe that intelligence is malleable (incremental theorists) should consistently endorse responses at the upper (*disagree*) end of the scale (yielding a mean score of 4.0 or above). Those whose average score falls between 3.0 and 4.0 have given mixed answers across items and are indeterminate (or mixed) in their beliefs about intelligence. In the present research, to select participants with unambiguous beliefs about intelligence, we eliminated from the analysis those participants who scored in the middle (i.e., who had an average score higher than 3.0 and lower than 4.0). Participants with average scores lower than or equal to 3.0 were classified as entity theorists, whereas those with average scores higher than or equal to 4.0 were classified as incremental theorists.

Assessment of self-confidence in intelligence. To assess the participants' perceived ability or confidence in their own intelligence, we used the measure constructed by Dweck and Henderson (1988). For each of the three items, a statement depicting high confidence is pitted against a statement depicting low confidence. The items are "I usually think I'm intelligent" versus "I wonder if I'm intelligent"; "When I get new material, I'm usually sure I will be able to learn it" versus "When I get new material, I often think I may not be able to learn it"; and "I feel pretty confident about my intellectual ability" versus "I'm not very confident about my intellectual ability." Respondents are asked to choose the alternative that is more true for them and then to indicate how true it is for them on a scale ranging from 1 (*very true*) to 3 (*sort of true*). Responses to this measure were recorded as a 6-point scale, ranging from low to high confidence.

Previous research (see Hong et al., 1995) has shown high internal reliability for the measure ($\alpha = .81$, $N = 69$), and test-retest reliability over a 1-week period has also been found to be high ($r = .83$, $N = 50$). Other studies of ours have established the validity of this confidence measure by comparing it with various established measures. Specifically, in one study (see Hong et al., 1995), 33 participants were asked to respond to our confidence measure, and an hour later to the intellectual competence subscale of the Self-Perception Profile for College Students (Neemann & Harter, 1986). Both questionnaires were embedded in other unrelated questionnaire measures. The intellectual competence subscale was tested by Neemann and Harter on 300 college students and was found to be a reliable measure of students' perceptions of their general intellectual competence. Results from our study revealed a high correlation between the responses on our confidence measure and those on the intellectual competence subscale ($r = .77$, $p = .0001$). Results from another study revealed a significant correlation ($r = .43$, $N = 55$, $p = .001$) between responses on our measure and those on the Rosenberg Self-Esteem Scale

(Rosenberg, 1965), which is theoretically less similar than the Neemann and Harter measure but provides an interesting comparison.

To provide further validation of the measures, we asked 184 Hong Kong Grade 7 students (65 boys and 119 girls), with an average age of 13.09 years, to fill out the implicit-theory measure, the self-confidence measure, and the Rosenberg (1965) Self-Esteem Scale. As in previous validation studies, we expected the self-confidence measure to correlate with the self-esteem measure, and it did ($r = .32$, $p < .05$). Ninety-two and 85 participants were classified as entity theorists and incremental theorists, respectively. The two theory groups did not differ on self-confidence, $t(175) = -0.03$, or self-esteem, $t(175) = 0.35$.

In sum, results from these studies show that our confidence measure is a reliable and valid measure of individuals' confidence in their intellectual abilities. In the present research, self-confidence was treated as a continuous variable, with higher scores indicating higher levels of self-confidence.

Conceptual ability test. A conceptual ability test was used as the performance task on which the negative feedback was later given. This test was made up of 90 problems selected from the Abstract Reasoning section of the Academic Promise Tests (Bennett et al., 1965). The participants were told that the task was a measure of conceptual ability, which is an important component of intelligence. It was then explained that the aim of the experiment was to establish test norms for college undergraduates. They were instructed to solve these problems in six blocks of 15 problems each. To make the participants feel unsure of their performance and hence find the negative feedback credible, they were required to finish each block in 4 min. Pilot testing showed that 4 min for each trial would be optimal in that the participants could possibly finish all the problems at a hasty pace. Furthermore, to discourage participants from dwelling on some problems for too long and not finishing all the problems in time, a penalty was introduced for every unanswered problem. This method was effective as no participants left more than 1 problem unanswered.

Attribution measure. To measure their attributions for the poor performance, participants were asked "What factors do you believe most influenced your performance on the test?" They were instructed to indicate the importance of effort, conceptual ability, luck, and skill by assigning each factor a weight, such that the more important factor would be assigned a larger weight. Although the primary interest in this measure was in the weights assigned to effort and ability, the two other factors were also presented to make the focal attributions less obvious. Participants were asked to distribute the weights among the four factors such that the total weights assigned would equal 100.

Procedures

The participants were committed to participate in two allegedly unrelated experiments. In the first experiment (the first phase), they were asked to fill out the implicit-theories measure and the confidence-in-intelligence measure in small groups of about 10 people. In the second experiment (the second phase), 2 participants (of the same sex as the experimenter) came to each session. This was intended to create a realistic social comparison situation.

After introducing the task, the experimenter explained that in order to save time and to create a real test-taking situation, which usually involves a group, 2 students were being asked to take the test at the same time in different booths of the same room. The 2 participants were also asked to maintain silence throughout the experiment. Participants were requested to hand in their answers for scoring on each trial. After they handed in the answers for the last problem set, the experimenter typed all their scores into a computer and activated the printer in the control booth (obscured from the participants). Shortly after the printing sound stopped, each participant was presented with a bar chart. The experimenter apologized to the participants for showing both of their scores on the bar chart and explained that it was the fault of the computer program. In this way, each participant knew his or her scores and those of the other participant.

All participants were presented with the same bar charts. On each, the score of the self was plotted against that of the other participant for each of the six trials. The participants could easily identify which scores were theirs. Across all six trials, their scores were lower than the other participant's. Their scores as shown on the bar chart were 11, 9, 11, 8, 10, and 9 (correct out of 15), whereas those of the other participant were 15, 13, 15, 14, 15, and 15. The average scores of the self (9.67) and the other participant (14.50) were also printed on the top of the graph. Thus, all participants were presented with negative feedback.

After giving participants an opportunity to examine the bar chart for about 3 min, the experimenter asked them to fill out the test-evaluation questionnaire. They were told that their evaluation was important for the refinement of the test for a future experiment. Actually, items that measured their attributions were embedded in the questionnaire.

As a manipulation check, the participants were asked to recall both their own and the other participant's average score on the conceptual ability test at the end of the session. Then, a short interview was conducted to check for any suspicion or knowledge of the purpose of the experiment. Only 4.1% (4 out of 97) of the participants expressed knowledge of or suspicion concerning the true purpose of the experiment, and their data were excluded from further analysis. In addition, because the feedback manipulation compared the performance of the 2 participants in the same session, a participant's prior knowledge about the other person's ability might affect responses. To avoid this, we discarded the data of three pairs of friends (6.2% of the participants) who participated in the same sessions.

The participants were carefully debriefed before they left the experiment. They were told that the scores presented to them were constructed for experimental purposes and were not their actual scores. The experimenter also explained that we had intentionally given them insufficient time for the test. Afterward, the participants were invited to discuss their experiences in situations that involved social comparison so that they might learn from the experiment. Also, articles were recommended if participants wanted to learn more about the area.

Results

Manipulation Check

Results from the manipulation check showed that the manipulation was successful. The participants recalled the scores presented to them on the graph fairly accurately. The mean recalled average scores were 9.21 ($SD = 0.64$) for self (score presented = 9.67) and 14.18 ($SD = 0.60$) for other (score presented = 14.50).

Actual Performance on the Conceptual Ability Test

Before testing their attributional style, we needed to test whether the four Theory \times Confidence groups were similar in their actual performance on the ability test. Thirty participants scored 3.0 or below on the implicit-theory measure and were classified as entity theorists, and 50 participants scored 4.0 or above on the implicit-theory measure and were classified as incremental theorists. A Theory \times Confidence general linear model analysis (with theory as a dichotomous variable and confidence as a continuous variable) was performed on the participants' actual performance. No significant main effects or interaction effects were found, suggesting that those who held different implicit theories or had different levels of confidence did not differ in their ability at the task. The mean score was 12.13 for entity theorists and 11.95 for incremental theorists, $F(1, 76) = 0.17$, *ns*. The correlation between confidence and performance was .28 (*ns*) for entity theorists, -.22

(*ns*) for incremental theorists, and .18 (*ns*) for both groups combined.

Attributions

A Theory \times Confidence general linear model was constructed for the arcsine percentages assigned to the ability and effort attributions. As predicted, participants' effort attribution was significantly predicted by their theory. The theory main effect was significant, $F(1, 76) = 5.02$, $p < .05$, with incremental theorists attributing more weight to effort ($M = 27.3\%$) than did their entity counterparts ($M = 17.8\%$). The confidence main effect and the Theory \times Confidence interaction were nonsignificant, $F_s(1, 76) = 0.68$ and 0.58 , respectively.

Both groups, however, assigned similar weight to ability ($M = 33.9\%$ vs. 30.4%), $F(1, 76) = 0.46$, *ns*. The confidence main effect, $F(1, 76) = 0.79$, and the Theory \times Confidence interaction, $F(1, 76) = 0.14$, were not significant.

When both attributions are taken together, this pattern of results is consistent with Hypothesis 1 regarding the relative primacy of ability attributions versus effort attributions for entity and incremental theorists. Incremental theorists made stronger effort attributions than did entity theorists even when the task was described as an assessment of intelligence. In fact, they assigned about the same weight to effort ($M = 27.3\%$) as to ability ($M = 30.4\%$) in explaining their poor performance, $t(49) = 0.65$, *ns*, whereas entity theorists assigned significantly more weight to ability ($M = 33.9\%$) than to effort ($M = 17.8\%$), $t(29) = 3.39$, $p < .01$.

Discussion

The present study provided support for the greater focus on effort (a malleable determinant of performance) among incremental theorists than among entity theorists. It is noteworthy that, in the present study, participants were asked to determine how much their performance was due to a lack of ability. It is possible that entity and incremental theorists define *ability* differently. Whereas entity theorists define *ability* in terms of fixed intellectual qualities, incremental theorists may see it as an indicator of their current level of expertise on the task, which could be improved through effort. Thus, although both entity and incremental theorists made strong ability attributions, these attributions might have different meanings for the two groups (cf. Stone & Dweck, 1998).

Our findings also do not support the idea that having high confidence within an entity-theory framework wards off low-ability attributions or promotes effort attributions. Indeed, high-confidence entity theorists were no more likely than low-confidence ones to think that their failure on an intelligence test was a function of their effort (vs. ability). These findings, together with those of Henderson and Dweck (1991) and Erdley et al. (1997), provide a body of evidence that consistently suggests that implicit theories set up a meaning system in which attributions occur and that having high confidence within an entity framework does not ward off vulnerable attributions.

How then would we explain the positive relation between self-confidence and academic achievement frequently found in past studies (e.g., Brookover & Passalacqua, 1981; Jones & Grieneeks, 1970; Marsh, 1984; see also Hansford & Hattie, 1982; Skaalvik & Hagtvet, 1990)? Confidence may often serve as an index of past

and current achievement outcomes. To the extent that one's achievement environment remains relatively stable, those achievement outcomes should continue, creating a strong positive relation between confidence and achievement. However, when the achievement environment changes to become more challenging, the relation between confidence and subsequent achievement outcomes should decline. Indeed, research by MacGyvers (1992) and by Henderson and Dweck (1991) supports this prediction. When MacGyvers examined the relation between confidence and achievement outcomes (grades, achievement test scores) in fifth and eighth grades, she found high, significant correlations. These students were in a "steady state" situation, having been in the same school in previous years. However, when Henderson and Dweck examined this relation in students making the transition to a challenging junior high school (seventh grade), they found no positive correlation between the students' confidence in their intelligence at the beginning of the semester and their subsequent grades (even though students' confidence was correlated with their past, sixth grade, grades). Only students' theories of intelligence predicted their achievement outcomes in this situation. In short, having high confidence is no guarantee of high achievement because the theory seems to affect the meaning of achievement situations and outcomes, particularly in the face of challenge.

In short, the present study has shown a link between incremental (vs. entity) theory and effort (vs. ability) attributions. The next question is what the effort attributions lead to. In the next two studies, we focus on how implicit theories might be linked to remedial actions and how this link might be mediated by effort attributions.

Study 2

If incremental theorists focus more on the malleable aspects of performance than do entity theorists, they may be more ready to take remedial action in the face of unsatisfactory performance. Specifically, we predicted that entity theorists would be less likely than incremental theorists to take remedial action (a) because within an entity theory framework, intellectual ability is believed to be unalterable, so that continuing to try may not be seen as fruitful, and (b) because if entity theorists persisted and took remedial action but still performed poorly, this would only confirm their low ability. Thus, entity theorists may be reluctant to take remedial action even when the skill in question is critical to future success and their present skill level is inadequate. In contrast, because incremental theorists believe that intellectual ability is malleable and are more likely than entity theorists to make effort attributions for poor past performance, as shown in Study 1, they should also be more likely to believe that their skills can be improved with greater effort. Thus, relative to entity theorists, incremental theorists should be more motivated to take remedial action when they have poor skills in an important area. The present study tested this prediction.

Method

Participants

The participants were 168 entering university freshmen from the division of social sciences at a university in Hong Kong.

Design and Procedures

On course registration day, the participants were approached by one of the researchers, who identified himself as a final-year psychology major working on his honor's thesis. He told them that he was conducting a study of freshmen's course selection preferences and asked them to fill out a questionnaire. On the questionnaire, the participants were told that English proficiency was very important for academic success in the social science disciplines at the university. Then, they were asked how likely they would be to take a remedial course that had been shown to be effective in improving university students' English proficiency. They were asked to indicate their response on an 11-point scale ranging from 0 (*certainly no*) to 10 (*certainly yes*).

The participants were also asked to list all subjects in which they had received a grade of A or B on their recent School Certificate Examination, a public proficiency examination taken by all high school graduates. Because English is a required subject for every School Certificate Examination candidate, if students did not have English on their list, it implies that they had received a grade of C or below in English. On the basis of their response to this question, we classified the participants into the high-previous-performance group (those who had received an A or B in English) or the low-previous-performance group (those who had received a C or below). It should be noted that because all lectures, readings, and examinations are in English at the university, English proficiency is essential to academic success.

Finally, the participants were asked to fill out the implicit-theory measure, presented to them as a questionnaire designed for another psychology student's honor thesis. Everyone was fully debriefed at the end of the study.

Results and Discussion

Sixty-four participants scored 3.0 or below on the implicit-theory measure and were classified as entity theorists, and 56 participants scored 4.0 or above on the implicit-theory measure and were classified as incremental theorists. A 2×2 (Implicit Theory \times Previous Performance) analysis of variance (ANOVA) performed on the participants' intention to take the remedial English course revealed a significant previous performance main effect, $F(1, 116) = 7.92, p < .01$. Participants who had received a C or below on the School Certificate Examination were more inclined to take the remedial course than were those who had received an A or B ($M = 6.27$ vs. 4.89). However, this difference should be interpreted in light of the significant Implicit Theory \times Previous Performance interaction, $F(1, 116) = 4.33, p < .05$. As shown in Figure 1, the two theory groups did not differ in their intention to take the remedial course if they did well in the English examination ($M_s = 5.00$ for entity theorists and 4.77 for incremental theorists). Having done well and presumably not needing remedial work, both groups were uncertain about whether they would pursue remedial work. However, when their previous English examination result was unsatisfactory and remedial work was called for, incremental theorists were more inclined to take the remedial course than were entity theorists ($M = 7.00$ vs. $5.62, p < .05$). Another way to interpret the interaction is that among incremental theorists, those whose English examination result was not satisfactory were more inclined to take the remedial course than those whose examination result was good ($p < .05$). However, entity theorists who did not do well were not more inclined to take the remedial course than entity theorists who did well.

In short, consistent with Hypothesis 2, the findings indicated that incremental theorists were more inclined to take remedial

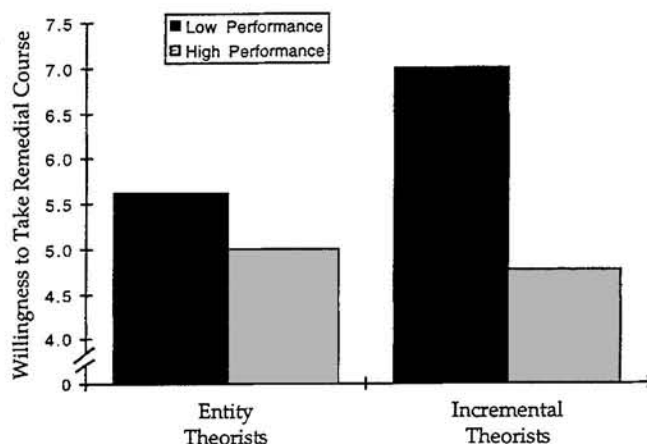


Figure 1. The intention to take a remedial English course as a function of implicit theories and previous performance (Study 2).

action to improve their performance when they realized that their skills in an important subject were unsatisfactory. However, entity theorists whose skills were unsatisfactory were not as inclined to take the remedial course to improve their language skills even when they knew that these skills were essential for their future success and that the remedial course had been found to be effective in improving language proficiency. These findings again show that believing in an entity theory creates vulnerability to a helpless pattern.

Study 3

The aim of Study 3 was to test the causal relationship between implicit theories and responses to setbacks by manipulating participants' implicit theories. Specifically, this study examined whether implicit theories affect the likelihood of taking remedial actions in the face of setbacks and whether the link between implicit theories and remedial actions is mediated by effort attributions.

In addition, an interesting question concerns how the relation between effort and ability is viewed within the entity versus incremental meaning system. Research (e.g., Dweck & Leggett, 1988; Surber, 1984) has shown that some people view effort and ability as inversely related, meaning that if one needs effort, one does not have high ability, and if one is indeed good at a subject, one does not need to exert much effort to achieve a high performance. Other people, in contrast, are found to believe that effort and ability are positively related. That is, effort allows one to activate and make use of one's ability. To flesh out the entity versus incremental meaning systems, this study examined whether the two implicit theory frameworks might foster the inverse versus the positive inference rule: In one meaning system, is ability a static thing that is measured by one's effort? In the other meaning system, is ability a dynamic thing that is powered by one's effort? In other words, would a belief in fixed ability lead people to view effort as a measure of (lack of) ability? Would a belief in malleable ability lead people, instead, to view effort as a means of increasing ability?

Method

Overview

The participants were told that the objective of the research was to investigate various psychological aspects of university students' performance in English comprehension and conceptual problem solving. Then, they were presented with an English comprehension task, in which their implicit theories were manipulated by means of reading passages (described below). When they had completed the comprehension task, they were told that the second, unrelated task was an intelligence test and that in order to familiarize them with the test, they would be given 12 practice problems sampled from the test. They were provided with feedback on the practice trials, which indicated that their performance was either satisfactory or unsatisfactory. At this point, the experimenter offered them a tutorial exercise and told them that it had been shown to be effective in improving performance on the intelligence test. They were told that they could either take the tutorial or work on an unrelated ability test. After the participants had indicated their choice, they were given a questionnaire that assessed their attributions, preference for challenging tasks, and inference rules. Finally, they were thanked for their participation and fully debriefed.

Participants

The participants were 60 undergraduates at a university in Hong Kong, who participated in the study in exchange for course credit.

Implicit-Theory Manipulation

In a past study, Bergen (1991) successfully manipulated theories of intelligence using reading passages. In his manipulation, which was used in the present study, participants were provided with a *Psychology Today*-type article that compellingly presented either the entity or the incremental theory. The articles were illustrated with "extensive research" purporting to document the theory. For example, one paragraph in the entity article said,

Knowles spent the last decade tracing identical twins who were raised apart. . . . According to Knowles' results, up to eighty-eight percent of a person's intelligence is due to genetic factors. About ten percent of intelligence seems to be determined during the first three years of life. This means that intelligence may be increased or decreased by only about two percent during most of a person's life.

The same paragraph in the incremental article read

Knowles spent the last decade tracing identical twins who were raised apart. . . . According to his results, up to 88 percent of a person's intelligence is due to environmental factors. In an extreme case, a young girl adopted by a college professor and his wife had an IQ of 138. The genetically identical twin was raised by the real mother, who was a prostitute. This girl had an IQ of 85.

The rationale behind this manipulation was that although people might have chronic preferences for one theory or the other, both theories may represent basic modes of thought that are at some level familiar to most individuals (see Dweck et al., 1995b). Thus, after reading persuasive arguments professing an entity or incremental theory, participants may be led to adopt that particular mode of thought. Consistent with this idea, in the Bergen study, the implicit-theory manipulation produced significant effects on measures of helplessness that were in no way touched on in the passages.

In the present study, to manipulate their theories of intelligence, participants were randomly assigned to read either the entity- or the incremental-theory article taken from Bergen's (1991) study. They were told that the task was an "English reading comprehension task." To check their understanding, we asked the participants to (a) summarize the theme of the

article in one sentence and (b) state the evidence they thought was the most convincing.

Feedback Manipulation

When the participants had completed the comprehension task, they were given 5 min to work on 12 practice problems sampled from an intelligence test. They were told that the purpose of the practice problems was to familiarize them with the test format. The problems were taken from some of the most difficult problems in Cattell's Culture Fair Intelligence Scales (Cattell & Cattell, 1960) and from the conceptual ability test used in Study 1. The problems involved multi-attribute matching of geometric figures. Our pilot studies showed that college students normally could not finish these problems in time and were generally not sure about the accuracy of their answers. The credibility of the feedback manipulation was protected by asking the participants not to leave any question unanswered, even if they were not sure about the accuracy of their answers.

At the end of the 5 min, the experimenter collected the answer sheet from the participants, entered another cubicle hidden from the sight of the participants, and returned 2 min later with a feedback form. To create the satisfactory performance feedback, the experimenter told half of the participants that they got seven answers correct and were at the 66th percentile among the 800 Hong Kong university undergraduate students who had taken the test. They were told that their performance, although not outstanding, was satisfactory. The feedback was not set at a higher percentile in order to leave room for improvement. Thus taking remedial action would still be meaningful to participants in the satisfactory-performance condition. To create the unsatisfactory-performance feedback, the experimenter told the remaining participants that they got three answers correct and were at the 20th percentile of university undergraduates.

Measure of Remedial Action

Following the feedback manipulation, the experimenter told the participants that he needed some time to prepare the materials for the next task. While he was preparing the materials, the participants were asked to choose between a tutorial exercise that had been shown to be effective in improving performance on the intelligence test or an unrelated ability task to work on. Participants who chose to work on the tutorial exercise, but not those who chose to work on an unrelated ability task, were assumed to prefer remedial action.

Task Choice, Attributions, and Inference Rule Measures

After participants had indicated their choice, the experimenter gave them another questionnaire to fill out. In the questionnaire, participants' preference for challenging tasks was assessed as another measure of mastery orientation on which the two implicit-theory groups were expected to differ. Specifically, participants were asked if they were given a choice of the difficulty level of the items on the conceptual problem-solving task, how much would they prefer the items to be (a) simple and easy and (b) relatively difficult and challenging. They indicated their answer to the items on a 5-point scale ranging from 1 (*extremely not preferable*) to 5 (*extremely preferable*). The two items were highly correlated ($r = -.76$) and were therefore recoded and averaged to form a single measure of the willingness to take on a challenging task.

The participants were also asked the extent to which their performance on the practice problems was due to a number of factors, including effort, task difficulty, mood, interest in the task, luck, concentration, understanding of the task, practice, intellectual ability, and skill. They indicated their answer to each item on a scale that ranged from 0 (*certainly no*) to 10 (*certainly yes*). For the purpose of the present study, we only focused on participants' attributions to effort and intellectual ability.

Finally, as a test of whether an entity theory leads students to see effort as indicating a lack of ability, the participants were presented with the following scenario: "Students A and B ranked the first and the tenth in a class test, respectively. Student A was a diligent student; every week he studied what was taught. Student B only studied before the test." The participants were asked to indicate which student they thought was more intelligent. We reasoned that participants who viewed effort as an indication of lack of intelligence should be more likely to choose Student B than A.

Debriefing

The participants were thanked and fully debriefed about their performance after they had completed the questionnaire. They were also shown both theory articles, and both viewpoints were discussed. They were assured that, actually, both views were widely held, and they were given references for further reading.

Results and Discussion

Likelihood of Taking the Remedial Tutorial

A 2×2 (Implicit Theory \times Feedback) logit model fitted to the likelihood of taking the remedial tutorial revealed a significant Implicit Theory \times Feedback interaction, $\chi^2(1, N = 60) = 4.40$, $p < .05$, which qualified both the significant implicit-theory main effect, $\chi^2(1, N = 60) = 7.55$, $p < .01$, and the significant feedback main effect, $\chi^2(1, N = 60) = 4.49$, $p < .05$. As predicted, when given low-ability feedback, participants who read the entity articles were less likely to take the remedial tutorial than were those who read the incremental article (as shown in Figure 2). In fact, only 2 out of the 15 participants (13.3%) in the entity/unsatisfactory-feedback condition wanted to take the tutorial, whereas 11 of the 15 participants (73.3%) in the incremental/unsatisfactory-feedback condition wanted to take the tutorial. Interestingly, most participants in both theory conditions wanted to take the tutorial when they were given satisfactory feedback (66.7% and 73.3% for the entity- and the incremental-theory condition, respectively). This result indicated that participants in

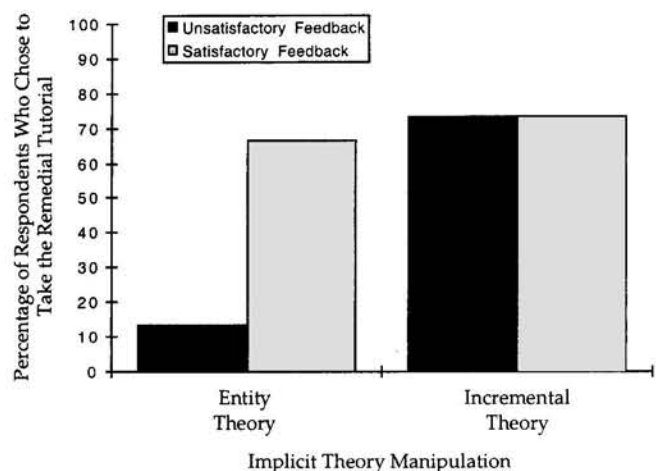


Figure 2. The intention to take a remedial tutorial as a function of the implicit-theory and performance-feedback manipulations (Study 3).

the entity condition did not have a general tendency to avoid the tutorial; they did so only in the face of unsatisfactory-performance feedback. When the performance was satisfactory (but left room for improvement), participants in the entity-theory condition were as likely to choose to take the tutorial, perhaps because there was no reason for them to avoid the task given that they had performed quite satisfactorily on it already.

Effort and Ability Attributions

A Theory \times Feedback \times Attribution (effort vs. ability) multivariate analysis of variance showed a reliable three-way interaction, $F(1, 56) = 4.42, p < .05$. Further analysis revealed that for effort attribution, the implicit-theory main effect was significant, $F(1, 56) = 4.06, p < .05$, which was qualified by the significant Implicit Theory \times Feedback interaction, $F(1, 56) = 4.04, p < .05, MSE = 5.65$. The feedback main effect was nonsignificant, $F(1, 56) = 0.85$. As in Study 1, when given unsatisfactory feedback, participants in the incremental-theory condition made significantly stronger effort attributions than did those in the entity-theory condition ($M = 4.47$ vs. $2.00, p < .05$). There was no difference in effort attribution between the two implicit-theory conditions when satisfactory feedback was given ($M_s = 3.80$ for both entity- and incremental-theory conditions).

Although participants in the two implicit-theory conditions did not differ in their attribution of poor performance to intellectual ability, as in Study 1, participants in the entity-theory condition, after receiving negative feedback, attributed their performance far more to ability ($M = 6.27$) than to effort ($M = 2.00$), $t(14) = 7.55, p < .001$. Indeed, their rating of effort is clearly toward the low end of the scale (i.e., *certainly not a factor*). In contrast, participants in the incremental-theory condition attributed their performance only slightly more to ability ($M = 5.47$) than to effort ($M = 4.47$), $t(14) = 0.93, ns$. This pattern of findings is again very similar to that found in Study 1. After receiving satisfactory feedback, participants in both the entity and the incremental conditions attributed their performance more to ability ($M = 5.80$ for entity theorists and $M = 5.87$ for incremental theorists) than to effort ($M = 3.80$ for both entity and incremental theorists), $t(14) = 3.28$ for entity and $t(14) = 2.56$ for incremental ($p_s < .01$).

The attribution results are consistent with the hypothesis that incremental theorists assign greater weight to effort in understanding negative outcomes than do entity theorists. Again, the lack of implicit-theory difference in ability attribution might be due to the different readings of *ability* in the two implicit-theory conditions. Participants in the entity-theory condition might define *ability* in terms of fixed intellectual qualities, whereas participants in the incremental-theory condition might define it in terms of current expertise on the task, which is relatively malleable.

Effort Attribution as a Mediator of Remedial Action

Is incremental theorists' greater willingness to take remedial action in the unsatisfactory-performance-feedback condition mediated by their greater tendency to make effort attributions? To test this prediction, we performed a logit regression on the likelihood

of taking the remedial tutorial. Effort attribution was found to be a significant predictor $\beta = 0.54, t(58) = 3.62, p < .001$. A 2×2 (Implicit Theory \times Feedback) ANOVA was then performed on the residuals of the logit regression model. The results revealed that after the effects of effort attribution were partialled out, the Implicit Theory \times Feedback interaction was no longer significant, $F(1, 56) = 0.07$. This result suggests that the effects of implicit theories on remedial action in the unsatisfactory-feedback conditions were mediated by effort attributions.

Task Choice

An Implicit Theory \times Feedback Condition ANOVA revealed that the theory main effect was significant, $F(1, 56) = 32.61, p < .001, MSE = 0.997$. When asked whether they preferred an easy task or a relatively difficult and challenging task, participants in the entity conditions in general preferred an easy task more than did those in the incremental-theory conditions ($M = 2.61$ vs. 4.09). The feedback main effect was also significant, $F(1, 56) = 11.14, p < .01$, but this effect should be interpreted in the context of the significant Implicit Theory \times Feedback Condition interaction, $F(1, 56) = 12.02, p = .001$. The implicit-theory effect was particularly pronounced when the participants were given unsatisfactory feedback. In the unsatisfactory-feedback conditions, participants in the entity-theory condition expressed a clear preference for an easy task ($M = 1.73$ on a 5-point scale), whereas those in the incremental-theory condition preferred the relatively difficult task ($M = 4.10$).

Beliefs About Effort-Ability Relations

An Implicit Theory \times Feedback logit model was fitted to the probability of naming Student B (the student who did not work hard and did fairly well in the examination) as being smarter than Student A (the student who worked very hard and had outstanding performance). The only significant effect was the implicit-theory main effect, $\chi^2(1, N = 60) = 4.59, p < .05$. Half of the participants in the incremental-theory condition named Student B as the smarter student, whereas the remaining half named Student A as the smarter student. By contrast, only 23.3% of the participants in the entity condition named Student A, the one who worked hard and got excellent results, as the smarter student. Thus, the remaining 76.7% named Student B, the one who got fairly good results without having to work hard, as the smarter student. This result suggests that an entity theory, relative to an incremental theory, fosters an inference that working hard or exerting effort reflects lower ability. Again, this belief, as part of the entity meaning system, could contribute to vulnerability among people who hold an entity theory.

In summary, as predicted, compared with participants who read the incremental article, those who were led to believe in an entity theory were less likely to take the tutorial and less likely to make effort attributions when they received negative feedback. Moreover, consistent with Hypothesis 3, residual analyses indicated that the effect of implicit theories on the likelihood of taking the remedial tutorial in the face of setbacks was mediated by the effort attributions. In addition, those who read the entity article were more likely to choose an easy task and to see effort as indicating low ability than those who read the incremental article. In short, by

manipulating implicit theories, Study 3 showed that implicit theories play a causal role in effort attributions, persistence, and remedial effort after failure.

General Discussion

As suggested at the outset, the attributional approach is somewhat incomplete in that it does not address the theories, belief systems, or conceptual frameworks people bring with them to a situation that can foster particular attributions. Attempting to fill this gap, this research proposes that implicit theories set up frameworks within which attributions occur. Consistent with this view, Study 1 revealed that, in the face of failure, entity theorists, regardless of their level of self-confidence, were less likely to make effort attributions than were incremental theorists. Moreover, the causal link between believing in an entity theory and making effort attributions following failure was established in Study 3. Furthermore, incremental theorists were found to be more likely than entity theorists to take remedial actions in the face of setbacks in Studies 2 and 3. The link between implicit theories and remedial actions was shown to be mediated by effort attributions in Study 3.

Implicit theories, however, did not predict the tendency to make ability attributions in Studies 1 and 3 as we hypothesized. This is possibly because entity and incremental theorists define *ability* differently. Indeed, in a recently completed study, Stone and Dweck (1998) presented entity and incremental theorists with a task said to assess an important intellectual ability. When probed further about what they thought the task measured, entity theorists agreed appreciably and significantly more than incremental theorists that the task measured their overall intelligence and their future intelligence. In contrast, incremental theorists agreed only that the task measured their current skills at this type of task. Thus, for entity theorists, ability may refer to fixed amount of intellectual ability, whereas for incremental theorists, *ability* may be the individual's current level of expertise on the task. Together, the data suggest that both entity and incremental theorists acknowledge the importance of intellectual ability in task performance. However, unlike entity theorists, incremental theorists also stress effort, something they can immediately alter.

Further evidence for this interpretation comes from the data on the different conceptions of the relation between effort and ability within the entity and incremental frameworks. Within an entity theory, if one needs effort, one does not have ability. Hence, to prove that one has the ability, one should invest less effort in the task. By contrast, within an incremental theory, effort and ability are positively related. To promote one's competence, one should try harder to solve challenging problems. Thus, in several ways, entity theorists appear to be focused on immutable ability, whereas incremental theorists are focused on mutable ability and effort.

Taken as a whole, the present research has demonstrated the role of implicit theories in setting up frameworks within which different causes (effort vs. ability) are given differential weights. This process then determines the likelihood of taking remedial action in the face of failure.

Implicit Theories and Coping With Failure

It is noteworthy that most differences between the two groups were found when the feedback was unsatisfactory in Studies 2 and 3. This pattern of findings suggests that the implicit theories may matter most when individuals are faced with clear poor performance or the threat of it. This may be the time when holding an entity theory renders individuals vulnerable to helpless and defensive behavior. Entity theorists were reluctant to take remedial action to make up for the deficiency, probably because (a) they did not see the poor performance as reflecting lack of effort as much as lack of ability, which in their theory cannot be changed by remedial action (promoting a helpless response), and (b) the inverse inference rule they endorse orients them to believe that exerting effort (such as taking remedial action) is a further indication of lack of ability (promoting a defensive response).

Indeed, there is growing evidence that an entity theory of intelligence, with its emphasis on measuring fixed ability, fosters defensive behavior, behavior designed to ward off meaningful failure. Rhodewalt (1994) showed that individuals believing in fixed ability reported engaging in significantly more self-handicapping behavior than did individuals holding a more incremental view of ability. This means that entity theorists are more likely to engage in behaviors, like withdrawing effort or procrastinating, that will jeopardize their chances for success but will give them face-saving excuses for poor performance. At some level, ability judgments may be more important to them than actual success.

The Role of Choice in Achievement

As students go on in school (and as people go on in life), they generally have more and more control over the activities and the courses of action they select. Thus, choice becomes a more and more important determinant of achievement. For example, Eccles (1984, 1988) found that course choice among girls is a factor in their underachievement in mathematics. In the present study, we found that entity theorists were less inclined than incremental theorists to take the remedial course when faced with unsatisfactory performance, even when the skill in question was important for future success and the remedial course was described as effective (in Study 2). The causal relationship between implicit theories and intention to take remedial action in the face of setbacks (as well as the desire for easy vs. challenging tasks) was established in Study 3. Thus, implicit theories might be expected to exert increasing influence as students go on in school and meet increasing challenges combined with increasing choice. Recent research findings have indeed revealed a relatively long-term negative effect of an entity theory on achievement as students advance in school (Henderson & Dweck, 1991; Hong & Chan, 1998; see also Dweck & Sorich, 1999). It would be interesting to know how much of this effect is due to failure to take remedial action when encountering setbacks or skill deficits.

Concluding Remarks

We proposed at the outset that implicit theories create a meaning framework within which attributions occur. The present research supported the critical role of attributions in mediating coping but

demonstrated how implicit theories set up those attributions. Thus, the implicit theory approach might help to broaden the attributional approach by shedding light on the psychological context within which attributions occur.

References

- Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87*, 49–74.
- Bennett, G. K., Bennett, M. G., Clendenen, D. M., Doppelt, J. E., Ricks, J. H., Jr., Seashore, H. G., & Wesman, A. G. (1965). *Academic Promise Tests*. New York: Psychological Corporation.
- Bergen, R. S. (1991). *Beliefs about intelligence and achievement related behaviors*. Unpublished doctoral dissertation, University of Illinois at Urbana-Champaign.
- Boyum, L. A. (1988). *Students' conceptions of their intelligence: Impact on academic course choice*. Unpublished master's thesis, University of Illinois at Urbana-Champaign.
- Brookover, W. B., & Passalacqua, J. (1981). Comparison of aggregate self-concepts for populations with different reference groups. In M. D. Lynch, A. A. Norem-Hebeisen, & K. J. Gergen (Eds.), *Self-concept: Advances in theory and research* (pp. 283–294). Cambridge, MA: Ballinger.
- Cattell, R. B., & Cattell, A. K. S. (1960). *Test of "g": Culture Fair Scale 2, Forms A & B*. Champaign, IL: Institute for Personality and Ability Test.
- Chiu, C., Dweck, C. S., Tong, Y., & Fu, H. (1997). Implicit theories and conceptions of morality. *Journal of Personality and Social Psychology, 73*, 923–940.
- Chiu, C., Hong, Y., & Dweck, C. S. (1997). Lay dispositionism and implicit theories of personality. *Journal of Personality and Social Psychology, 30*, 19–30.
- Coopersmith, S. (1967). *The antecedents of self-esteem*. San Francisco: Freeman.
- Diener, C. I., & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance, strategy and achievement cognitions following failure. *Journal of Personality and Social Psychology, 36*, 451–462.
- Diener, C. I., & Dweck, C. S. (1980). An analysis of learned helplessness: II. The processing of success. *Journal of Personality and Social Psychology, 39*, 940–952.
- Dweck, C. S. (1975). The role of expectations and attributions in the alleviation of learned helplessness. *Journal of Personality and Social Psychology, 31*, 674–685.
- Dweck, C. S., Chiu, C., & Hong, Y. (1995a). Implicit theories and their role in judgments and reactions: A world from two perspectives. *Psychological Inquiry, 6*, 267–285.
- Dweck, C. S., Chiu, C., & Hong, Y. (1995b). Implicit theories: Elaboration and extension of the model. *Psychological Inquiry, 6*, 322–333.
- Dweck, C. S., & Henderson, V. L. (1988). *Theories of intelligence: Background and measures*. Unpublished manuscript.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*, 256–273.
- Dweck, C. S., & Reppucci, N. D. (1973). Learned helplessness and reinforcement responsibility in children. *Journal of Personality and Social Psychology, 25*, 109–116.
- Dweck, C. S., & Sorich, L. (1999). Mastery-oriented thinking. In C. R. Snyder (Ed.), *Coping* (pp. 232–251). New York: Oxford University Press.
- Eccles, J. S. (1984). Sex differences in achievement patterns. In T. B. Sonderegger & R. A. Dienstbier (Eds.), *Nebraska Symposium on Motivation: Vol. 32. Psychology and gender* (pp. 97–132). Lincoln: University of Nebraska Press.
- Eccles, J. S. (1988). Gender roles and women's achievement related decisions. *Psychology of Women Quarterly, 11*, 135–171.
- Elliott, E. S., & Dweck, C. S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology, 54*, 5–12.
- Erdley, C., Cain, K., Loomis, C., Dumas-Hines, F., & Dweck, C. S. (1997). The relations among children's social goals, implicit personality theories and responses to social failure. *Developmental Psychology, 33*, 263–272.
- Grant, H., & Dweck, C. S. (1999). *When goals implicate the self: A new analysis (and measure) of achievement goals*. Unpublished raw data. New York: Columbia University.
- Hansford, B. C., & Hattie, J. A. (1982). The relationship between self and achievement/performance measures. *Review of Educational Research, 52*, 123–142.
- Henderson, V., & Dweck, C. S. (1991). Adolescence and achievement. In S. Feldman & G. Elliott (Eds.), *At the threshold: Adolescent development* (pp. 197–216). Cambridge, MA: Harvard University Press.
- Hong, Y., & Chan, C. (1998). [Achievement motivation and performance of Hong Kong Chinese high school students: The role of implicit theories]. Unpublished raw data, Hong Kong University of Science and Technology, Hong Kong, China.
- Hong, Y., Chiu, C., & Dweck, C. S. (1995). Implicit theories of intelligence: Reconsidering the role of confidence in achievement motivation. In M. Kernis (Ed.), *Efficacy, agency, and self-esteem* (pp. 197–216). New York: Plenum.
- Jones, J. G., & Grieneeks, L. (1970). Measures of self perceptions as predictors of scholastic achievement. *Journal of Educational Research, 63*, 201–203.
- Leggett, E. L. (1985, March). *Children's entity and incremental theories of intelligence: Relationships to achievement behavior*. Paper presented at the meeting of the Eastern Psychological Association, Boston.
- Levy, S., & Dweck, C. S. (1997). [Revised implicit theories measures]. Unpublished raw data, Columbia University, New York.
- Levy, S., Stroessner, S., & Dweck, C. S. (1998). Stereotype formation and endorsement: The role of implicit theories. *Journal of Personality and Social Psychology, 74*, 1421–1436.
- MacGyvers, V. (1992). *Implicit theories and real world outcomes*. Unpublished doctoral thesis, University of Illinois at Urbana-Champaign.
- Marsh, H. W. (1984). Self-concept: The application of a frame of reference model to explain paradoxical results. *The Australian Journal of Education, 28*, 165–181.
- Neemann, J., & Harter, S. (1986). *Manual for the self-perception profile for college students*. Unpublished manuscript, University of Denver, Denver, CO.
- Paulhus, D. L. (1984). Two-component models of socially desirable responding. *Journal of Personality and Social Psychology, 46*, 598–609.
- Peterson, C., Maier, S. F., & Seligman, M. E. P. (1993). *Learned helplessness: A theory for the age of personal control*. New York: Oxford University Press.
- Rhodewalt, F. (1994). Conceptions of ability, achievement goals, and individual differences in self-handicapping behavior: On the application of implicit theories. *Journal of Personality, 62*, 67–85.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Seligman, M. E. P. (1975). *Helplessness: On depression, development and death*. San Francisco: Freeman.
- Seligman, M. E. P., Reivich, K., Jaycox, L., & Gillham, J. (1995). *The optimistic child*. New York: Houghton Mifflin.
- Skaalvik, E. M., & Hagtvet, K. A. (1990). Academic achievement and self-concept: An analysis of causal predominance in a developmental perspective. *Journal of Personality and Social Psychology, 58*, 292–307.
- Snyder, M. (1974). The self-monitoring of expressive behavior. *Journal of Personality and Social Psychology, 30*, 526–537.
- Stipek, D., & Gralinski, J. H. (1996). Children's beliefs about intelligence and school performance. *Journal of Educational Psychology, 88*, 397–407.

- Stone, J., & Dweck, C. S. (1998). [Implicit theories of intelligence and the meaning of achievement goals]. Unpublished raw data, Columbia University, New York.
- Surber, C. F. (1984). The development of achievement-related judgment processes. In J. G. Nicholls (Ed.), *The development of achievement motivation* (pp. 137-184). Greenwich, CT: JAI Press.
- Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology*, 71, 3-25.
- Weiner, B. (1985). *Human motivation*. New York: Springer-Verlag.
- Weiner, B., & Kukla, A. (1970). An attributional analysis of achievement motivation. *Journal of Personality and Social Psychology*, 15, 1-20.

Received August 5, 1997

Revision received February 15, 1999

Accepted February 15, 1999 ■

Call for Nominations

The Publications and Communications Board has opened nominations for the editorships of *Behavioral Neuroscience*, *JEP: Applied*, *JEP: General*, *Psychological Methods*, and *Neuropsychology* for the years 2002-2007. Michela Gallagher, PhD; Raymond S. Nickerson, PhD; Nora S. Newcombe, PhD; Mark I. Appelbaum, PhD; and Laird S. Cermak, PhD, respectively, are the incumbent editors.

Candidates should be members of APA and should be available to start receiving manuscripts in early 2001 to prepare for issues published in 2002. Please note that the P&C Board encourages participation by members of underrepresented groups in the publication process and would particularly welcome such nominees. Self-nominations are also encouraged.

To nominate candidates, prepare a statement of one page or less in support of each candidate. The search chairs are as follows:

- Joe L. Martinez, Jr., PhD, for *Behavioral Neuroscience*
- Lauren B. Resnick, PhD, and Margaret B. Spencer, PhD, for *JEP: Applied*
- Sara B. Kiesler, PhD, for *JEP: General*
- Lyle E. Bourne, Jr., PhD, for *Psychological Methods*
- Lucia A. Gilbert, PhD, for *Neuropsychology*

Address all nominations to the appropriate search committee at the following address:

[Name of journal] Search Committee
c/o Karen Sellman, P&C Board Search Liaison
Room 2004
American Psychological Association
750 First Street, NE
Washington, DC 20002-4242

The first review of nominations will begin December 6, 1999.