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IMPLICIT THEORIES GO APPLIED: CONCEPTION OF ABILITY AT WORK

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science

By

Charles N. Thompson
B.A., Wittenberg University, 2004

2006
Wright State University

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Abstract

Thompson, Charles N., Industrial and Organizational Psychology; Department of Psychology, Wright State University, 2006. Implicit Theories Go Applied: Conception of Ability at Work.

Implicit theories have been extensively studied in educational psychology (e.g. Dweck, 1999; Dweck & Leggett, 1988). Implicit theories have been related to goal orientation, response to failure, attributional style and perception of effort. With a few exceptions (e.g. Heslin, Latham, & VandeWalle, 2005; Martocchio, 1994) the potential applicability of this research to industrial/organizational psychology has been largely ignored. The current study proposed a measure specifically designed to measure implicit theories about work, assessed its relationship to other implicit theory measures, and explored potential relationships with work domain antecedents. Correlational analyses demonstrated significant relationships between conception of ability at work and perceptions of effort at work, as well as competence demonstration goal focus. A confirmatory factor analysis revealed conception of ability at work as an implicit theory distinct from other measures of implicit theory.

TABLE OF CONTENTS

	Page
I. INTRODUCTION.....	8
Self-Theories: The Construct	8
Historical Influences on Self-Theories.	13
Construct Validity and Measurement of Self-Theories.	14
Self-Theories and Goal Focus.	17
Self-Theories and Perception of Effort	19
Self-Theories and Attributions	21
Self-Theories and Training	24
II. METHOD.....	26
Pilot Study	26
Participants.	26
Measures	26
Procedure	27
Results	30
Experimental Study	31
Participants.	31
Measures	31
Procedure	32
III. RESULTS.....	33

IV. DISCUSSION.....	39
Practical Implications	41
Limitations of the Current Research	43
Future Research	44
Conclusion.....	47
V. REFERENCES.....	48

APPENDICES

A. Pilot Study Items	56
B. Instruction to Participants	59
C. Experimental Study Items	60

TABLES

	Page
1. Pilot Study Descriptives	63
2. Conception of Ability at Work Scale Item Statistics	64
3. Competence Demonstration Scale Item Statistics	65
4. Competence Development Scale Item Statistics	66
5. Perception of Effort Scale Item Statistics	67
6. Attribution of Failure to Intelligence Scale Item Statistics	68
7. Attribution of Failure to Effort/Strategy Scale Item Statistics	69
8. Utility of Training Scale Item Statistics	70
9. Means, Standard Deviations, and Correlation Matrix for Experimental Study.	71
10. Independent Samples T-Tests for Sex, Race, and Position	72

FIGURES

1. Model 1	73
2. Model 2	74

Introduction

The study of implicit theories has a long history in psychology. Carol Dweck and her associates have studied the influence of implicit theories in educational settings (e.g. Dweck, 1999; Dweck, Chiu, & Hong, 1995; Dweck & Leggett, 1988). Specifically, they have examined implicit theories regarding the relative fixedness or malleability of human attributes, such as intelligence, morality and character or “kind of person” (Dweck et al., 1995). Research has found meaningful relationships with goal orientation (Dweck & Leggett, 1988; Erdley, Cain, Loomis, Dumas-Hines, & Dweck, 1997), attributional tendencies (Chiu, Hong, & Dweck, 1997; Spray et al., 2006) voluntary enrollment in elective courses (Hong, Chiu, Dweck, Lin, & Wan, 1999), and perceptions of effort (Dweck, 1999). All of these studies have been conducted in academic settings and have utilized schoolchildren or undergraduates as subjects. More recently, the potential application of Dweck’s formulation of implicit theories has been examined in industrial/organizational (I/O) psychology (e.g., Heslin, Latham, & VandeWalle, 2005; Martocchio, 1994). Past implicit theory research in the I/O literature has utilized measures designed to assess implicit theories in domains that are not specific to the work context. The current study proposes a measure specifically designed to measure implicit theories about work, assesses its relationship to other implicit theory measures, and explores potential relationship with work domain antecedents.

Implicit Theories: The Construct

Implicit theories are essentially fundamental assumptions people make that have an impact on how they view the world (Furnham, 1988; Sarbin, Taft, & Bailey, 1960). Furnham (1988) differentiates between lay, or “implicit” theories and scientific theories. Lay theories are generally considered to be non-scientific explanations for a certain set of behaviors, and concern

individual's beliefs about these behaviors. Scientific theories, on the other hand, examine the actual causes. The current study is concerned with the implicit theories possessed by individuals regarding their performance at work.

Dweck and her associates (e.g. Dweck, 1999; Dweck & Leggett, 1988; Dweck et al., 1995) have proposed that a specific type of implicit theories, termed "self-theories," provide a conceptual framework and influence an individuals' goal focus, perception of effort, attributions, and response patterns. They have also suggested that within a particular domain, individuals possess one of two self-theories about the relative fixedness or malleability of one's attributes. These two opposing views, termed entity and incremental, are thought to exist on a single continuum. Individuals possessing an entity theory believe their attributes are of an unchangeable, *fixed* magnitude. They also tend to adopt performance goals, which lead them to seek situations where they can increase favorable judgments and avoid unfavorable ones. Because of their belief that their ability is fixed, entity theorists often show a helpless response pattern when reacting to a setback or negative information and attribute negative performance to a lack of ability on their part. They are concerned with demonstrating competence rather than developing it and try to avoid situations where they may fail. In addition, entity theorists also view behavior as a function of stable traits.

Individuals ascribing to an incremental theory view their attributes quite differently than do entity theorists. To them, attributes are *malleable* and can be increased through effort. They often have learning goals, which lead them to engage in a mastery response pattern when confronted with negative performance feedback. Incremental theorists are much more likely to consider situational moderators when making behavioral attributions. Whereas entity theorists

find effort to be an indicator of low ability, incremental theorists believe effort to be essential in the creation, development, and application of ability.

Investigations into self-theories have found significant relationships with a variety of antecedents in samples of schoolchildren (e.g. Dweck & Leggett, 1988; Heyman & Dweck, 1998) and college students (e.g. Chiu, Hong, & Dweck, 1997; Hong et al., 1999). It is clear that this construct is important in academic and social settings. Traditional areas of I/O psychology have recently seen an increase in cognitive emphasis (Murphy & Cleveland, 1995). Research has examined both Dweck's conception of self-theories (e.g. Heslin et al., 2005; Martocchio, 1994) and other implicit theories, such as implicit theory of leadership (Engle & Lord, 1997; Lord & Emrich, 2000) and manager motivation (Dickson & Wendorf, 1999). The current paper examined Dweck's self-theories (also called "conception of ability") as they relate specifically to work situations.

Martocchio (1994) induced conception of ability through the presentation of computing as either an acquirable skill or a fixed entity. Those participants in the incremental condition had a significant increase in self-efficacy from pre- to post-training, as well as a significant decrease in anxiety. Individuals in the entity condition experienced a significant decrease in self-efficacy. Martocchio (1994) concluded that conceptions of ability should be considered in the formulation and execution of training. The present study departs somewhat from Martocchio (1994), in that relationships between a work-specific conception of ability and self-reported attitudes regarding the utility of training.

Researchers have suggested that managers use schemas or prototypes in performance appraisals (Murphy & Cleveland, 1995) and that self-theories may be one of these schemas. Self-theories, applied in the context of work, have been demonstrated to be important in the area of

supervisor ratings (Heslin et al., 2005). The research by Heslin and his colleagues demonstrated that individuals who scored in the entity direction on Levy and Dweck's (1997) kind-of-person self-theory measure were more highly influenced by the first instance of subordinate performance they witnessed. Participants were shown two instances of good performance and two then two instances of poor performance from a video. An additional study reversed the order of the stimuli. In both cases, managers with an incremental theory were less likely to use the first instances of performance as anchors when rating performance later. That is, entity managers who first witnessed poor performance rated subsequent performance lower than incremental managers who saw the same poor prior performance. The results of this study indicate that the self-theory held by a manager may influence the way in which they rate their subordinates in performance appraisals.

Researchers have examined the broader idea of implicit theories in other areas of I/O. For example, Dickson and Wendorf (1999) explored the role of implicit theory of motivation in the context of managers. Specifically, six manager implicit theories of motivation based upon established theories of motivation were identified: Goal-Setting Theory (Locke & Latham, 1990), Job Characteristics theory (Hackman & Oldham, 1980), Positive reinforcement theory (e.g., Welsh, Luthans & Sommer, 1993), Equity theory (Adams, 1965), Self-direction theory (McGregor, 1961), and Theory X (McGregor, 1960). Research also demonstrated that manager implicit theory of motivation varied across organizations. Although performance differences were not examined in this study, it does demonstrate that implicit theories are receiving increased attention in the I/O literature.

Leadership research is an area where cognitive factors have received a considerable amount of interest (Lord & Emrich, 2000). Lord and Maher (1993) suggested that the way in

which subordinates classify and interpret their leaders is based in part on the behavioral and trait expectations they possess. Empirical evidence has suggested that individuals with implicit theories of leadership are better able to recognize leadership behavior that is consistent with their implicit theory (Kenney, Schwartz-Kenney, & Blascovich, 1996). Implicit theories of leadership are generally thought to arise from previous experience with people in leadership positions. They are essentially subordinate expectations of what leaders look like and how they act. By studying the expectations subordinates have of their leaders, organizations are able to better anticipate potential conflicts between leaders and subordinates. Research has demonstrated that similarity in implicit theory of leadership is related to increased liking and ratings of leader-member exchange (Engle & Lord, 1997). In a similar manner, the present study seeks to understand how individuals perceive their ability to perform at work, with the goal of eventually increasing performance in the workplace.

The current study contributes to the I/O psychology literature in the area by reaffirming the relevancy of implicit theories in the work domain, but goes a step further by formulating and testing a measure of implicit theories specific to the workplace. The rationale behind creating a new scale is that when attempting to predict work-related outcomes, a work domain-specific implicit theory may be more related to domain-specific outcomes. This framework for understanding performance at work is termed “conception of ability at work.” Conception of ability at work is defined as the extent to which an individual believes their ability to perform in a work setting is fixed or malleable. Drawing upon research on implicit theories in educational and social psychology, predictions are made regarding relationships between conception of ability at work and outcomes such as goal focus, perceptions of effort, attribution of failure and

the utility of training. The construct validity of conception of ability at work and potential antecedents are examined.

Historical Influences on Implicit Theory

Implicit theory can be traced to the historical works of Kelly (1955) and Heider (1958). Both posited that implicit theories have an important impact on the way in which individuals perceives the environment and other people existing within it (Dweck et al., 1995; Levy, Stroessner, & Dweck, 1998). Kelly's influence can be seen in his "fundamental postulate of personal construct" which states that "a person's processes are psychologically channelized by the ways in which he anticipates events" (Kelly, 1955, p. 46). That is, two individuals observing the same phenomena will evaluate it differently to the extent that their behavioral expectations differ. Implicit theories about intelligence, morality, and character shape our perception and interpretation of our environments (Molten & Dweck, 2006). In terms of the current study, individuals holding one conception of ability at work over another are likely to view a similar situation very differently. For instance, where entity theorists view failure as an indictment of their ability, incremental theorists embrace it as an opportunity to apply a new strategy or learn a new skill. Further, Kelly's commonality corollary suggests that to the extent that two people use a similar construction of a situation, their psychological processes are similar as well (Kelly, 1955). This suggests that behavioral predictions made from conception of ability at work are potentially stable and accurate.

Heider (1958) was among the first social psychologists to acknowledge that intelligence and knowledge are potentially two different attributes. Intelligence is generally regarded as a fixed entity and knowledge as less permanent (Heider, 1958). Individuals who hold an incremental theory of intelligence adopt this position as well, believing that true intelligence is a

combination of both ability and knowledge. Entity theorists would likely see little difference between the two. In contrast to attribution theory where intelligence is regarded as fixed, internal attribute (Abramson, Seligman, & Teasdale, 1978), Dweck's formulation of implicit theory of intelligence would suggest that the relative fixedness of intelligence as an attribute varies from person-to-person and that it is likely to have influence the way in which they perceive themselves and others (Dweck et al., 1995).

More recently, Ross and Nisbett's (1991) concept of lay dispositionism related to the entity/incremental distinction. Lay dispositionism is defined as the tendency of lay people to use traits as the basic unit of analysis in social perception (Ross & Nisbett, 1991). That is, people have the expectancy that because traits are stable and responsible for behavior, behavior will be consistent across various situations. Individuals engaging in lay dispositionism generally overestimate the impact of traits in determining behavior. Lay dispositionism is somewhat analogous with the fundamental attribution error (Ross, 1977), which states that individuals tend to underestimate the impact of situational factors when making behavioral attributions of others. Implicit theory would suggest that entity theorists are more likely to engage in lay dispositionism because they make more trait attributions of behavior than incremental theorists. Research conducted by Chiu et al. (1997) has supported that prediction.

Construct Validity and Measurement of Self-Theories

Dweck (1999) specifically identified self-theories regarding intelligence, morality, and "kind of person" as specific self-theories that individuals hold. Three scales were designed by Dweck to assess self-theories in these domains: *Implicit Theory of Intelligence*, *Implicit Theory of Morality* and *Implicit Theory of Kind of Person* (see Appendix A for the items relating to each scale). Implicit theory of intelligence examines the extent to which individuals feel their

intelligence is fixed or malleable. Independent research has concluded that both experts and laypeople have well-formed implicit theories regarding intelligence (Sternberg, Conway, Ketron, & Bernstein, 1981). Dweck's work on implicit theory of intelligence represents "self-theories," a special case of implicit theories (Dweck & Ehrlinger, in press). Self-theories relate especially to an individual's understanding of their own attributes (in this case, intelligence). An examination of the items that make up the *Implicit Theory of Intelligence* scale demonstrates that these items are directed inward, rather than towards people in general. The conception of ability at work items are geared more towards work performance in general.

Implicit theory of morality and implicit theory of kind of person is the extent to which people feel their morals and traits are fixed or malleable, respectively. For the "kind of person" domain, other researchers have used the term "character" (Heslin et al., 2005). Both terms will be used interchangeably in this paper. Dweck et al. (1995) summarized measures designed to assess implicit theory in these three domains and provided a review of their psychometric properties. For the *Implicit Theory of Intelligence* scale, agreement with an item such as "You have a certain amount of intelligence and you really can't do much to change it" is indicative of an entity theory of ability. Conversely, disagreement is construed to represent an incremental theory of ability. Full item sets for all three scales are provided in Appendix A. The three scales also showed acceptable internal consistency estimates. A confirmatory factor analysis (CFA) revealed that the items comprising the intelligence, morality, and kind-of-person scales load on separate factors. Composite scores between the scales were significantly correlated. These findings led Dweck and her associates to conclude that individuals may hold different self-theories across domains. For example, an individual may consider intelligence to be a fixed

entity and also believe that one's morality is subject to the influence and impact of situational moderators.

Researchers have examined self-theories in the context of other well-known social psychological constructs. Dweck et al. (1995) examined the extent to which these constructs could predict one's self-theory. In a series of logistic regression analyses, non-significant relationships were reported between measures of self-theory and self-monitoring (Snyder, 1974), social desirability (Palhaus, 1984), locus of control (Levenson, 1974), and various social political scales, such as right wing authoritarianism (Altemeyer, 1981) and political attitudes (Kerlinger, 1984). These results demonstrated divergent validity and suggested that self-theories in these domains are not simply another incarnation of a previously studied construct. Conceptions of ability and their impact on behavioral outcomes are unique and potentially illuminating, even in the context of other constructs.

Research has also demonstrated that self-theory and cognitive ability are not related. Independence has been established in academic settings by examining the relationship between implicit theory of intelligence and SAT scores (Dweck et al., 1995) and teacher ratings of ability (Heyman & Dweck, 1998). A significant relationship between cognitive ability and self-theory would indicate that students who hold one theory or another are smarter or perform better on tests. It can be concluded from the literature that entity and incremental theorists are equally likely to be intelligent.

Both incremental and entity theorists would suggest that ability is an important component of success in various domains. What differs between entity and incremental theorists is how they understand their ability. Researchers have long examined how intelligence may be more than just general cognitive ability or "g" (Gardener, 1985; Sternberg, 1985, 1989). The

theories suggested by Gardener and Sternberg are in line with an incremental theory of intelligence, suggesting that one's mental abilities are not fixed and are subject to the effects of effort and learning. An entity conception of ability at work may best be stated in Ree, Earles, and Teachout's (1994) position that success at work is due to not much more than "g".

A goal of the current study is to place conception of ability at work in the nomological net with other self-theory measures. Consistent with the findings of Dweck et al. (1995), conception of ability at work is expected to be significantly correlated with other self-theories.

Hypothesis 1: Scores on the Conception of Ability at Work Scale, Implicit Theory of Intelligence Scale, Implicit Theory of Morality Scale, and Implicit Theory of Kind of Person Scale will be significantly and positively correlated.

Self-Theories and Goal Focus

Goal orientation has been a well-researched area in I/O psychology, but researchers have disagreed about how goals are structured. Most early theorists promoted a unidimensional structure, where goals could be placed on a continuum ranging from learning to performance (Dweck, 1986; Dweck & Elliott, 1983; Nicholls, 1984). Performance goals were related to demonstrating capability in a particular domain, whereas learning goals were posited to be related to development of ability. In the unidimensional structure, an individual could not simultaneously be high in both types of goals. It was under this model of goal orientation that Dweck and her colleagues examined self-theories as a potential cause of goal orientation. The two concepts are easily synthesized when goal orientation is considered as a one-dimensional construct. In a summary of research in the area, Dweck and Leggett (1988) concluded that self-theories have an impact on the types of goals individuals choose, such that entity theorists are

interested in proving the adequacy of their ability while incremental theorists are concerned with developing new abilities.

Theory regarding goal structure soon shifted away from the unidimensional model. Nicholls, Cheung, Lauer, and Patashnick (1989) were among the first to contend that individuals could simultaneously be high in both learning and performance goals. Button, Mathieu, and Zajac (1996) agreed with Nicholls et al. (1989), contending that learning and performance goals are “neither mutually exclusive nor contradictory” (p. 28). Empirical analyses supported this claim. Operating under this model, researchers examined situations in which it was possible for an individual to be pursuing both types of goals at the same time.

More recently, VandeWalle (1997) proposed and tested a three-dimensional view of goal orientation in which goals could be classified as learning, approach, or avoid. Learning goals are analogous to those examined by earlier researchers (Button et al., 1996; Dweck, 1986; Nicholls, 1984). VandeWalle (1997) advocated separating the performance goal scale into approach and avoid dimensions. Approach goals are pursued by individuals concerned with demonstrating ability and obtaining favorable judgments from others. These goals are contrasted with avoid goals, where an individual tries to avoid unfavorable judgments at all costs. Although VandeWalle (1997) found significant correlations between an *Implicit Theory of Intelligence Scale* and the three goal orientations, the magnitudes were relatively weak for the learning goal scale ($r = -.14$) and performance-prove scale ($r = .18$). VandeWalle concluded that a more complete framework on the outcomes of goal orientation may help to illuminate potential relationships with self-theories.

Acceptance of a multi-dimensional model of goal structure makes placing self-theories and goal orientation into the same nomological net difficult. However, given the exploratory

nature of this research, potential relationships between conception of ability at work and goal focus will be explored. Organizations often set goals for both the organization and individual employees. Examining the relationship between conception of ability at work and goal focus allows organizations to understand better how employees interpret and react to both self-set goals and goals set by the organization. For this study, a two dimensional structure of goal focus was utilized. Two non-mutually exclusive goal focuses, competence development and competence demonstration were examined in terms of their relationship to conception of ability at work. Operationally defined individuals who are high in competence development goals are focused on improving their current skills and learning new ones. For individuals high in competence demonstration goal focus, their main concern is demonstrating their skills. Individuals with an entity conception of ability at work are expected to be more focused on competence-demonstration goals and that individuals with an incremental conception of ability at work will be more focused on competence-development goals.

Hypothesis 2A: Scores on the Conception of Ability at Work Scale and scores on the Competence Demonstration Scale will be significantly and positively correlated.

Hypothesis 2B: Scores on the Conception of Ability at Work Scale and scores on the Competence Development Scale will be significantly and negatively correlated.

Self-Theories and Perception of Effort

Perception of effort is one area in particular where entity and incremental theorists have a high level of disagreement. For this discussion and study, effort is operationally defined as the extent to which one has to apply energy and resources in order to complete a particular task. From the self-theory construct, it can be understood how entity theorists may come to see effort as an indication of low ability. Entity theorists consider effort and ability to be negatively related,

such that high levels of effort are interpreted as a way to make up for a lack of ability. Entity theorists' opinion of effort interacts with their performance goals, in that a performance goal orientation dictates that they try to avoid situations where their ability may be judged as inadequate. Thus, because they see effort as an indicator of low ability, they are likely to put forth a less than maximum amount of effort to avoid being seen as having little ability (Dweck, 1999; 2002a).

Incremental theorists consider effort as an essential component of ability and a valuable means to mastering a task. Because of their tendency to believe that there isn't much that is unachievable with the correct strategy and effort, incremental theorists are likely to embrace effort and perceive it as an indicator of intelligence or ability. This is in sharp contrast to an entity theorist, who views effort as an indicator of low ability (Dweck, 1999; 2002a). Perceptions of effort are also tied in with their learning goal orientation. Because effort is required to develop competence in a subject area, incremental theorists are likely to view effort as meeting the demands of their goal orientation.

A great deal of research has focused on attributions regarding effort, but the relationship to how an individual perceives effort has been lacking. Dweck (2002b) reported that by the age of ten years old, children who have an entity intelligence self-theory begin to perceive a high amount of individual effort as indicative of low ability. Although the concept makes theoretical sense, a systematic examination has not yet occurred. It is expected that theoretical predictions to hold when employees are asked about their perception of effort at work, in that entity theorists will endorse items that suggest effort is indicative of low ability and that incremental theorists will endorse items that suggest effort is indicative of high ability.

Hypothesis 3: Scores on the Conception of Ability at Work scale and scores on the Perception of Effort measure will be significantly and positively correlated.

Self-theories and Attributions

On the surface, self-theories may appear to be analogous to attribution theory (Abramson et al., 1978). Attribution theory is an important aspect of self-theories, but attribution theory is seen as existing within self-theories (Dweck, 1999). In attribution theory, people make attributions that can be placed on three continuums; stable to unstable, global to specific, and internal to external. Learned helplessness occurs when individuals are induced to make stable, global and internal attributions when evaluating a situation (Seligman & Maier, 1967). For instance, if a student receives a failing grade on a test and attributes the failure to a lack of intelligence (which is considered a stable and internal attribute), the student would be unlikely to attempt to relearn the material. Self-theory differs from attribution theory in two important ways (Dweck, 1999). First, attribution theory suggests that all people are essentially the same prior to the attributional situation. Conversely, self-theory suggests that individuals differ on conceptions of ability before the situation takes place. The self-theory an individual brings with them into the situation has a large impact on the kinds of attributions they make. Second and perhaps most importantly, attribution theory assumes that certain attributes lie on a specific place on the three continuums mentioned earlier. Intelligence, for example, is assumed to be stable and internal while luck is unstable and external. Entity and incremental theorists make different judgments as to the stability of intelligence. It is precisely this difference in judgment that is of interest to self-theory researchers.

The relationship between self-theory and attributions has been extensively studied by researchers in the educational and social psychology literature. The line of research started by

Dweck that eventually ended in the formulation of self-theories started as a search for an explanation regarding resiliency at school (Diener & Dweck, 1978; 1980). Entity and incremental theorists behave differently when attributing the actions of themselves and others. Dweck and Leggett (1988) posited that entity theorists will tend to attribute success and failure to intelligence, which they believe to be a stable and fixed trait. Incremental theorists will attribute success and failure to factors other than ability, such as effort and strategy. The following section reviews research on athletes, school children and college students.

Ability attributions have also been examined in youth sports (Spray et al., 2006). Their results are consistent with what would be predicted from self-theory. Entity theorists, who believe their athletic abilities are fixed, made more ability attributions than did incremental theorists. That is, entity theorists tended to place more weight on their own ability when explaining success or failure in an athletic setting. In contrast, incremental theorists attributed their successes to practice and effort.

Heyman and Dweck (1998) examined how second grade students attributed success and failure at school. Students were told they were going to be involved in a pen pal program, and that they were tasked with writing a letter introducing themselves to their potential pen pal. Students were then placed randomly into acceptance or failure conditions. They were then interviewed and asked why they thought they were either accepted into or rejected from the program. In accordance with self-theory, entity theorists attributed success and failure to intelligence whereas incremental theorists attributed success to choosing the correct strategy or trying hard enough to solve the problems. Perhaps most importantly, the students' behavior fit with the predictions made by self-theories. When given the chance to resubmit letters to potential pen pals, incremental and entity theorists used different strategies. Incremental theorists tended

to revamp their strategy, and submitted letters that greatly differed from their originals. This is contrasted with the entity theorists, many of whom simply resubmitted their original letter.

Self-theories also have an effect on the attributions college students made regarding their school performance. Hong et al. (1999) presented students with one of two *Psychology Today*-like articles. One was written to suggest that intelligence was largely determined by genetics and was unlikely to change (entity condition). The other article was written to suggest that a large percentage of intelligence is determined by genetic factors and it is highly changeable (incremental condition). The results of this additional study demonstrated that entity-induced students were less likely to make effort attributions than were incremental-induced students.

In this study, we are careful to avoid using the terms stable and unstable to refer to attributes such as intelligence and effort. Where attribution theory assumes individuals agree that intelligence is stable, self-theory suggests that individuals actually differ on what personal attributes they consider as stable. This study will focus on attributions of failure. Of particular interest is if entity and incremental theorists attribute failure differently. Attributions of failure to intelligence and attributions of failure to effort or strategy are two different attributional tendencies examined in this study. They are examined on two separate continuums, such that it would be possible to be high on both.

In organizational settings, employees are likely to encounter challenging situations where they may fail. Organizations may be interested in the relationship between conception of ability at work and attribution of failure. It is expected that conception of ability at work will be related to attributions of success and failure at work in a pattern similar to the results found in athletes (Spray et al., 2006), school children (Heyman & Dweck, 1998) and college students (Chiu et al., 1997; Hong et al., 1999).

Hypothesis 4A: Scores on the Conception of Ability at Work measure and scores on the Attribution of Failure to Intelligence measure will be significantly and positively correlated.

Hypothesis 4B: Scores on the Conception of Ability at Work measure and scores on the Attribution of Failure to Effort/Strategy measure will be significantly and negatively correlated.

Self-Theories and the Utility of Training

The final goal of this paper is to examine how self-theories may influence an employee's beliefs regarding the utility of training. Training is an important aspect of employment, and companies spend tremendous amounts of money in an attempt to keep their employees' skill current and up to date. One can assume that organizations are interested in having employees who are likely to find the training process worthwhile and useful.

In the educational literature, Hong et al. (1999) examined how a student's self-theory impacted their willingness to voluntarily enroll in a remedial language course. When students performed highly on a test of English capability, entity and incremental-induced theorists were equally unlikely to enroll in a remedial course. When the students performed poorly, incremental theorists were much more willing to participate in a remedial course than were induced entity theorists. Because entity theorists view their abilities as fixed, they don't see value in remedial class work as a means to improve their ability. Incremental theorists, on the other hand, see the remedial class work as a way to meet their learning goal orientation and as consistent with a mastery response pattern.

The results from Martocchio (1994) and Hong et al. (1999) supported the theoretical relationship between self-theories and training. Because entity theorists see their abilities as fixed and not subject to change, they are likely to view training as a not worthwhile. Further, because training may introduce uncertainty about performance, an entity theorist may be hesitant

to participate (fulfilling their performance-avoidance goal orientation). Self-theory would suggest that incremental theorists are likely to view training as an opportunity to improve upon their skills or learn new skills entirely. Training is more compatible with their learning goal orientation in part because they do not view training as a threat. It is expected that conception of ability at work will be related to how employees perceive training such that incremental theorists will be concerned with developing skills at training, and entity theorists will be concerned with demonstrating their skills to supervisors.

Hypothesis 5: Scores on the conception of ability at work measure and scores on the Utility of Training measure will be significantly and positively correlated.

Method

Pilot Study

A pilot study was conducted in order to assess the psychometric properties of the items and scales created specifically for the current study. This study was wholly separate from the experimental study, from which an evaluation of the hypotheses were made.

Participants. Undergraduate students (N = 192) enrolled in an introductory-level psychology course at a public, Midwestern institution completed the study measures to provide data for reliability analyses and exploratory factor analyses (EFA). Participants received class extra credit for completing the study measures. The sample was 62.2% female, 67.7% Caucasian, 23.3% African-American, 2.1% Hispanic, 2.1% Asian, and 4.7% classified themselves as “Other.” The average age of the participants was 20.1 years old.

Measures. Pilot study participants were given a questionnaire, containing the Dweck et al. (1995) *Implicit Theory of Intelligence*, *Implicit Theory of Morality*, and *Implicit Theory of Kind of Person* scales. The intelligence and kind of person scales both have four items, and the morality scale has three items. Participants indicate their level of agreement on a six-point Likert scale. Possible responses are strongly disagree, disagree, somewhat disagree, somewhat agree, agree, and strongly agree. Because all of the items on these scales are written so that agreement indicates an entity orientation, individuals scoring three or below are considered to have an incremental orientation, whereas those scoring four or higher are considered as having an entity orientation (Dweck et al., 1995). Dweck et al. (1995) discards individuals scoring between three and four, reasoning that they don’t have a well-defined self-theory. These scores typically represent around fifteen percent of the sample. In this study, participants were not separated into two groups. Rather, each of these scales were considered as continuous variables.

In addition to the measures from Dweck et al. (1995), the participants were given additional items designed to measure perceptions about conception of ability at work, perception of effort at work, goal focus at work, attributions of failure at work, and willingness to participate in training. In total, 64 items were administered to the sample and the items administered during the pilot study are displayed in Appendix A. These items are responded to on the same scale as the Dweck et al. (1995) measures. In addition, participants completed a questionnaire asking demographic questions such as age, sex, and race. The main goal of this pilot study was determine the best items to comprise these separate scales, which will then be administered to actual job applicants in the experimental study.

Procedure. A reliability analysis for each scale was conducted, and items with a corrected item-total correlation of less than .25 were reworded and modeled after the items with the highest corrected item-total correlation. Corrected item-total correlations were used because the correction removes common variance associated with both the item and the total, providing a better estimate of the relationship between the item and the rest of the scale. An exploratory factor analysis (EFA) was also conducted. Factor loadings were examined, and the results of the EFA were the same as those for the reliability analysis, in that both procedures identified the same weak items that were re-written for use in the experimental study. One exception is an item on the *Utility of Training Scale*, which had an acceptable item-total correlation (.27), but did not load on the same factor as the rest of the training items. This item was re-written (see below).

The scales were finalized before the experimental portion of the study was conducted. Composite scores of each sub-scale were generated summing the scores on the items that comprise a particular scale, and then dividing the summed total by the number of the items on

the scale. The distribution of scores on each scale was examined for the bimodal pattern found by Dweck et al. (1995).

The *Conception of Ability at Work Scale* contains seven items that tap how individuals perceive their ability to perform in a work role. Consistent with the scoring of the Dweck et al. (1995) measures, higher scores on the scale are consistent with an entity self-theory. Also, all of the items are written so that agreement with the item is indicative of an entity self-theory. Again, this practice is consistent with how self-theory measures have been used in other studies (Dweck et al., 1995; Heslin et al., 2005). A reliability analysis showed that no items had a corrected item-total correlation below .25. Thus, no items were removed or amended from this scale.

The *Perception of Effort at Work Scale* contains five items written to assess how employees perceive effort at work. A high score on this scale is indicative of an attitude that high levels of effort reflect low ability. A low score is indicative of an attitude that high levels of effort do not reflect low ability. Again, a reliability analysis showed no items with corrected item-total correlations below .25. As a result, no items were removed.

The *Competence Demonstration Scale* contains nine items that are designed to assess the extent to which an individual's goals are focused on demonstrating their competence. A high score on this scale would suggest that competence demonstration goals are frequently adopted by the individual. A reliability analysis showed that two items, "My goals at work are generally related to performance rather than learning" and "I'd rather have a task where I have to perform a skill I already have than a task where I have to learn something new" had corrected item-total correlations of .22 and .24, respectively. As a result, the items were re-written as "My goals at work involve showing my skills to supervisors" and "I like to show off my skills at work."

The *Competence Development Scale* contains eight items written to assess the extent to which the individual has goal focused on developing competence at work. Structured similarly to the *Competence Demonstration Scale*, high scores indicate endorsement of competence development goals. A reliability analysis showed no items had corrected item-total correlations below .25, so the scale was kept intact with no changes.

The *Attribution of Failure to Intelligence Scale* has seven items designed to assess the extent to which the individual attributes failure at work to their own intelligence. High scores on the scale reflect a tendency to attribute failure to intelligence. The reliability analysis showed no corrected item-total correlations below .25.

The *Attribution of Failure to Effort/Strategy Scale* has six items that assess the extent to which failure is attributed to effort or strategy. Higher scores are conceived to represent a tendency to attribute failure to effort or strategy. According to the reliability analysis, the item “When I experience failure at work, it is usually because I didn’t put forth enough effort,” had a corrected item-total correlation of .12 and was re-written as “Applying an incorrect strategy leads to failure at work.”

Finally, the *Utility of Training Scale* has eleven items designed to assess the extent to which individuals believe training is most useful to learning new skills or improving performance. High scores on this scale represent an emphasis on improving performance, while low scales indicate a focus on learning new skills. A reliability analysis showed that the item “Training is a place to develop skills rather than demonstrate them” had a corrected item-total correlation of .10, so it was re-written as “Learning new work skills is an important outcome of training.” Also, the item “Training is a way to show others the skills I already have” had an item-total correlation of .11, and was re-written as “I enjoy training because I like to learn new work

skills.” The item “Training is a place to develop skills rather than demonstrate them” had an acceptable item-total correlation (.27), but the EFA showed clear cross-loadings on unrelated factors, so the item was re-written as “Learning new work skills is an important outcome of training.”

Results. Table 1 displays the means, standard deviations, and internal consistency estimates for the scales in the pilot study. Of the scales where no weak items were found, acceptable distributions and reliabilities were obtained. The bimodal pattern of distribution found by Dweck et al. (1995) was not replicated in the pilot study. As a result, scores on the *Conception of Ability at Work Scale* will be treated as a continuous variable.

The *Implicit Theory of Intelligence*, *Implicit Theory of Morality*, *Implicit Theory of Kind of Person*, and the *Conception of Ability at Work* scales were examined to assess the extent of minority group differences in composite score. To accomplish this, independent sample t-tests were conducted, comparing males versus females and Caucasians versus African-Americans. T-tests were not conducted between Caucasians and other minority groups due to lack of sample size. For the *Implicit Theory of Intelligence* scale, non-significant results were found for race ($t_{(173)} = 0.05, p = .87$), and sex ($t_{(190)} = 0.81, p = .29$). For the *Implicit Theory of Morality* scale, non-significant results were obtained for race ($t_{(173)} = -0.37, p = .46$) and sex ($t_{(190)} = 0.65, p = .22$). For the *Implicit Theory of Kind of Person* scale, non-significant results were obtained for race ($t_{(173)} = 0.06, p = .95$) and sex ($t_{(190)} = 0.28, p = .78$). Finally, for the *Conception of Ability at Work* scale, non-significant results were found for race ($t_{(173)} = -0.52, p = .87$) and race ($t_{(190)} = 1.46, p = .34$). From these results, it appears that there are no group differences on composite scores of the predictors examined in the pilot study. The negative values for three of the t-tests comparing Caucasians and African-Americans demonstrate that African-Americans have a

slightly higher tendency to hold an entity theory than do Caucasians. This difference, however, was not statistically different than chance.

Experimental Study

A main goal of the experimental study was to cross-validate the measures developed in the pilot study. Analyses on a completely different sample allowed for better generalization of results.

Participants. Participants in this study ($n = 569$) were applicants from organizations throughout the United States. The study measures were taken in conjunction with an assessment that potential employers asked them to complete as part of a selection procedure. The answers given on the study measures had no impact on the recommendation given from the assessment company to the employer. The instructions received at the beginning of the research section reiterated this and are located in Appendix B. The individuals participating in this study were applying for either sales or managerial positions. All participants took the assessment in English.

The racial mix of the participants was 77.7% Caucasian, 7.7% African-American, and 6.9% Hispanic. Another 5.6% indicated they were of “other” descent, and 2.1% did not respond to the item. In regards to sex, 58.2% of the participants were male, 41.3% were female, and 0.5% did not respond to the item. The average age of participants was 34.6.

Measures. The *Implicit Theory of Intelligence*, *Implicit Theory of Morality*, and *Implicit Theory of Kind of Person* scales were administered to the applicant sample. For psychometric data on these scales, see the measures section for the pilot study. The measures generated from the Pilot Study (*Conception of Ability at Work*, *Competence Development*, *Competence Demonstration*, *Perception of Effort at Work*, *Attribution of Failure to Intelligence*, *Attribution*

of Failure to Effort/Strategy and *Utility of Training*) were also be administered. The items administered in this study are located in Appendix C.

Procedure. Applicants took the study measures in an online format. A potential employer sent them a link via email to complete an assessment from a medium-sized Midwestern consulting firm. The assessment from the consulting firm generally takes between sixty and ninety minutes to complete. Following completion of the assessment, participants were directed to a web page containing the study measures as described above. In an attempt to reduce the chance that responses were colored by social desirability, they observed a message stating that the next items were for research purposes only and would not affect their scores on the assessment. See Appendix B for the full text of this message. Following completion of the entire assessment, participants were thanked for their cooperation.

Results

Tables 2-8 present corrected item-total correlations, item means, and item standard deviations for all of the items administered in the experimental study. Means, standard deviations, and inter-correlations for the study variables are presented in Table 9. The *Conception of Ability at Work* scale was significantly correlated with the *Implicit Theory of Intelligence* measure ($r = .11, p < .05$), the *Implicit Theory of Morality* measure ($r = .14, p < .01$), and the *Implicit Theory of Kind of Person* measure ($r = .18, p < .01$). These results suggest that conception of ability at work is related to other measures of self-theory. Although the magnitude of the correlations is relatively low, Hypothesis 1 is fully supported.

In support of Hypothesis 2A, the *Conception of Ability at Work* scale was significantly and positively correlated with the *Competence Demonstration* scale ($r = .30, p < .01$). The positive correlation means that individuals who have a competence-demonstration goal focus also tend to have an entity conception of ability at work. Scores on the *Implicit Theory of Morality* and *Implicit Theory of Kind of Person* measures were also correlated with scores on the *Competence Development* scale. Because conception of ability at work is a new application of the self-theory construct, a hierarchical linear regression analysis was conducted to determine the extent to which conception of ability at work contributes unique variance in competence development goal focus above and beyond that which is contributed by the other two self-theory measures. At Step 1, scores on the *Implicit Theory of Morality* and *Implicit Theory of Kind of Person* measures were entered. For the morality measure, a non-significant beta ($\beta = .02$) was found while a significant beta ($\beta = .08, p < .01$) was found for the kind of person measure. Thus, when scores on the kind of person measure are controlled, the morality measure does not have a significant relationship with competence development. At Step 2, scores on the *Conception of*

Ability at Work measure were entered. A significant beta ($\beta = .28, p < .01$) was found. When scores on the other self-theory measures are controlled for, the conception of ability at work measure has a significant and positive relationship with competence development. Hypothesis 2B predicted a significant and negative correlation between the *Conception of Ability at Work* scale and the *Competence Development* measure. A significant correlation was found, but it was not in the predicted direction ($r = .17, p < .01$). As a result, Hypothesis 2B was not supported by the data.

A significant correlation was found between *Conception of Ability at Work* and *Perception of Effort at Work* ($r = .21, p < .01$). Thus, Hypothesis 3 was supported. Interestingly, the *Implicit Theory of Intelligence* measure was also significantly correlated with the *Perception of Effort at Work* measure ($r = .23, p < .01$). A hierarchical regression analysis was conducted to determine if conception of ability at work contributed unique variance in perception of effort, above and beyond that contributed by implicit theory of intelligence. At Step 1, implicit theory of intelligence was entered. A significant beta ($\beta = .13, p < .01$) was found. At Step 2, conception of ability at work was entered. Again, a significant beta ($\beta = .17, p < .01$). From this, we can conclude that conception of ability at work contributes significant and unique variance above and beyond implicit theory of intelligence.

A non-significant correlation was found between *Conception of Ability at Work* and *Attribution of Failure to Intelligence* ($r = .05, n/s$). Therefore, Hypothesis 4A was not supported. However, the other three measures of self-theory did have significant relationships. This finding may suggest that other self-theories have an impact on attribution of failure to intelligence. A negative correlation between *Conception of Ability at Work* and *Attribution of Failure to Effort/Strategy* was predicted in Hypothesis 4B. This would have suggested that incremental

theorists were more likely to attribute work failure to effort or strategy. Again, a significant relationship was found, but not in the predicted direction ($r = .21, p < .01$). Hypothesis 4B was not supported.

Finally, Hypothesis 5 predicted a positive and significant relationship between *Conception of Ability at Work* and the *Utility of Training* measure. However, a non-significant relationship was found ($r = -.06, n/s$). As such, Hypothesis 5 was not supported. A small but significant relationship was found between *Implicit Theory of Intelligence* and the *Utility of Training* measure ($r = .12, p < .01$).

Exploratory Analyses

Exploratory analyses were also conducted as part of the experimental study. Relationships with demographic variables such as gender, race, and age were examined. Similarly, the attraction-selection-attrition model (ASA; Schneider, 1987) may suggest that employees and organizations may select each other based upon a congruence of values and goals. It is possible that different classes of occupations, such as sales or management, may inherently be attractive to individuals with one kind of self-theory or another. To test for this possibility, the participants were classified as either sales or management applicants by records kept by the consulting firm. An independent sample t-test was conducted, with composite scores on the *Conception of Ability at Work* scale acting as the dependent variable.

One could reasonably suggest that a more experienced employee may be more likely demonstrate an entity self-theory, as they have more experience in a particular domain. Having more experience may be related to having a better understanding of their ability, and they may also be currently performing closer to their peak levels, in which case they may realistically see little room for improvement. Conversely, one might also suggest that experts in a particular

domain are able to see higher level connections between parts of the job and thus see more room for performance improvement. To test these possibilities, a series of hierarchical regression analyses were conducted where number of years of experience was entered at step one and composite scores on the *Conception of Ability at Work Scale* at step 2. Composite scores on the *Perception of Effort Scale*, *Competence Development Scale*, *Competence Demonstration Scale*, *Attribution of Failure to Intelligence Scale*, *Attribution of Failure to Effort/Strategy Scale*, and *Utility of Training Scale* served as the dependent variable in six separate regression analyses.

Previous research has demonstrated that self-theory and cognitive ability are not related (Dweck et al., 1995; Heyman & Dweck, 1998). To assess this relationship in a sample of applicants, a correlation between conception of ability at work scores and scores on a proprietary cognitive ability measure will be computed.

To better place conception of ability at work in a nomological net with the existing self-theory measures, a confirmatory factor analysis was conducted. Two models were tested and evaluated for fit. Model 1 had the items for each self-theory measure load on a separate latent factor. This model was found to be supported in previous research (Dweck et al., 1995). Also in accordance with previous research and the results of the current study, the latent factors were allowed to correlate. For a representation of this model, see Figure 1. Model 2 had the measures from Dweck et al. (1995) load on a single factor, while the conception of ability at work measures loaded on separate factor (see Figure 2). Again, the latent factors were allowed to correlate. This is essentially the same as fixing the correlations between the implicit theory measures to one.

Results. To assess potential differences between demographic groups on the self-theory measures, independent sample t-tests were conducted. A summary of these results is presented in

Table 10. Male – female and Caucasian – African-American comparisons elicited no significant differences between the groups. When comparing Caucasians and Hispanics, no differences were found either, except on the *Conception of Ability at Work* scale. In this comparison, a significant difference was found ($t_{(476)} = -3.38, p < .01$). The negative value indicates that Hispanics had slightly higher (more entity) scores than Caucasians. In regards to age, non-significant correlations were found for all of the self-theory measures, except for the *Conception of Ability at Work* scale ($r = -.11, p < .05$).

Potential score differences between participants applying for management positions or sales positions were evaluated in a similar manner. Independent sample t-tests were conducted, with each of the four self-theory measures serving as the dependent variable. Again, a summary of these results is presented in Table 10. No significant score differences were observed between potential managers and salespeople on any of the self-theory measures.

Potential relationships between years of sales experience and scores on the *Conception of Ability at Work* measure were also investigated. A non-significant correlation ($r = -.08$) was observed between self-reported years of sales experience and composite scores on the *Conception of Ability at Work* scale.

To examine the extent to which self-theory is related to cognitive ability, correlations were computed between composite scores on the *Implicit Theory of Intelligence* measure, the *Implicit Theory of Morality* measure, the *Implicit Theory of Kind of Person* measure, and the *Conception of Ability at Work Measure*. Non-significant correlations were found for all pairings ($r = .01, r = -.14, r = -.11, r = -.01$, respectively).

The results of the confirmatory factor analysis suggest that conception of ability at work is distinct from the other measures of self-theory. Model 1 ($\chi^2_{(129)} = 561.24, p < .01, CFI = .90$,

RMSEA = .08, SRMR = .08) had moderate fit, but it was better than a competing model, Model 2 ($\chi^2_{(134)} = 2240.62, p < .01, CFI = .53, RMSEA = .17, SRMR = .15$). Because these are nested models, a chi-square difference test was conducted to determine if Model 1 had significantly better fit than Model 2. A chi-square difference test shows that Model 1 had significantly better fit than Model 2 ($\chi^2_{(5)} = 1679.38, p < .01$).

Discussion

The results from this study affirm the notion that self-theories are indeed applicable to the work domain and are consistent with other research in the area (Heslin et al., 2005; Martocchio, 1994). A scale constructed for this study and measuring conception of ability at work had significant relationships with perception of effort at work and competence demonstration goal focus. Specifically, possessing an entity conception of ability at work was related to perceiving effort at work as indicative of low ability. This relationship was consistent with academic research conducted by Dweck (1999; 2002b). Understanding differences in how people perceive effort in the workplace has direct implications to performance appraisals. If managers with an entity conception of ability at work are likely to perceive high levels of effort by their subordinates to be indicative of low ability, one may reasonably expect this fundamental assumption to influence the way in which they evaluate their subordinates.

Entity theorists also endorsed competence demonstration goals more than incremental theorists did. Again, this finding suggests that research conducted in academic settings (Dweck & Leggett, 1988) may have applications in work settings. A significant and positive relationship was observed between conception of ability at work and competence development goal focus. That is, entity theorists agreed with these items to a greater extent than incremental theorists as well. Linear regression analyses demonstrated that even when significant relationships with other self-theory measures are controlled for, conception of ability at work retains a significant relationship with perception of effort and competence demonstration. A negative relationship was predicted, meaning that incremental theorists would have endorsed competence development goals to a greater extent. A potential explanation for the positive result could be that entity theorists see competence development as part of a type of performance goal. The idea of

goals taken from academic contexts may not be directly relatable to a work context. Learning, in a work setting, may be more closely related to performance than it is in an academic setting. It may be hard for individuals to imagine goals in a work context that are not related to performance. Such goals may be more differentiated in academic settings. Even development goals, such as broadening a set of skills or job enrichment may take on a performance aspect in a work setting.

A significant relationship between conception of ability at work and attribution of failure to intelligence was not found in this study. However, significant effects were found between attribution of failure to intelligence and the other three measures of self-theory. These significant findings are consistent with research in other domain, such as academics and athletics. Thus, it appears that attribution of failure in a work context may be partially contingent upon the self-theory held by an employee. The results for the relationship between conception of ability at work and attribution of failure to effort/strategy were similar to those for competence development, in that a significant positive relationship was found when a negative relationship was expected.

A major contribution of this research is assessing the construct validity of conception of ability at work. One way in which to accomplish this goal is to perform a confirmatory factor analysis, where competing models are assessed. The model that would be predicted from a review of past confirmatory factor analyses (e.g., Dweck et al., 1995) would be one where items from each of the self-theory measures load on separate latent factors. When compared to other theoretically feasible models, the predicted model showed the best fit. This fit, however, did not meet the recommended standards of Hu and Bentler (1999) for good fit. Revising or adding

items in the *Conception of Ability at Work* scale may increase model fit. The anticipated model did have significantly better fit than another theoretically possible model.

The results of this study also demonstrate that conception of ability at work is not related to sex or race. While the relationship between conception of ability at work and age is statistically significant, the practicality of a .10 correlation could be questioned. Also, managers and salespeople do not tend to have one conception of ability at work or another. Consistent with prior research (Dweck et al., 1995; Heyman & Dweck, 1998), all four measures of self-theory were not correlated with scores on a cognitive ability measure. To the extent that self-theories are predictive of job performance, employers could use self-theories without fear of adverse impact or sub-group differences in scoring.

The significant relationships between conception of ability at work and perception of effort at work and competence demonstration suggest that self-theories have real applications in a work setting. The results from the confirmatory factor analysis demonstrate that conception of ability at work is an application of the self-theory construct that is distinct from its other applications in the domains of intelligence, morality, and kind of person. From all of these results, it can be concluded that conception of ability at work is an application of the self-theory construct on par with implicit theory of intelligence, implicit theory of morality, and implicit theory of kind of person. Future research into other antecedents relevant to the work setting is warranted.

Practical Implications

Practitioners in training and development may wish to understand how self-theories may influence how a particular employee reacts to training. Because they are unfamiliar and potentially uncomfortable with learning goals, entity theorists may attempt to turn training into

an avenue for fulfilling their competence demonstration goals. As the focus of training is not to perform, but rather to learn, this may be potentially detrimental to training goals. In addition, a parallel may be drawn between Dweck's (2002a) admonishment to avoid praising the intelligence of students and the kind of rewards and incentives given in some training programs. In the context of training, Dweck would likely suggest that trainers should praise and reward the actual process of learning during training rather than the outcome. The guiding theory is that praising the intelligence or outcome of an entity theorist only serves to reinforce their orientation towards performance goals.

The previously discussed research by Heslin et al. (2005) has demonstrated the tendency for entity theorists to adhere to their first impression of performance, regardless of quantitative changes. This pattern of ratings is likely to lead to inaccurate ratings from managers.

Furthermore, Bommer, Johnson, Rich, Podsakoff, and Mackenzie (1996) found that manager ratings and objective ratings are not interchangeable. The current research suggests that one of the reasons for the disparity between objective and subjective ratings may be differences in how effort at work is perceived by entity and incremental theorists.

Organizations may also wish to better understand how training outcomes may be impacted in terms of conception of ability at work. First, managers with an entity conception of ability at work may be less likely to assign subordinates to training. Because of their belief that an individual's attributes are unlikely to change, they may view training as non-effective. Instead, they may be more likely to reassign an employee to a different position, believing that their attributes may be better suited for a different position. Secondly, the mindset with which employees go into the training process may also differ as a function of conception of ability at work. Entity theorists may view the training process as a skeptic, believing that their abilities are

fixed. The aforementioned research by Hong et al. (1999) demonstrated that self-theory influences how remedial courses are viewed. Organizations should be interested in determining if training readiness is related to conception of ability at work.

Limitations of the Current Study

A limitation of the current study is that it examines the responses of applicants only. Research has shown incumbents and applicants respond differently when answering pre-employment questionnaires (Anderson, Warner, & Spencer, 1984). Although Dweck et al. (1995) demonstrated that conception of ability was not related to social desirability, those results were not obtained in an employment setting. Since the measure was taken as part (albeit not scored) of a selection assessment, social desirability may be more of a concern. Future studies may wish to examine the effect of an individual's conception of ability at work on antecedents from a hierarchical linear regression framework, where social desirability could be statistically controlled.

In terms of the study method, correlations could be inflated due to mono-method bias (Cook, Campbell, & Peracchio, 1990). That is, composite scores for all study measures were computed by generating comparing answers on the same questionnaire. Each scale also had the same response options. Therefore, mono-method bias cannot be ruled out as a cause for the significant results of this study. Future research should address this issue by examining behavioral indicators of willingness to participate in training, goal orientation, perception of effort, and attribution of success and failure.

In addition, response bias may also be a limitation of the current study. By keying nearly all of the items in the entity direction, it may be possible that an acquiescence response set caused observed correlations to be higher than they actually are. This could also be a reason for

the significant relationships found in the opposite direction than was predicted. Although such keying is used by Dweck et al. (1995) in their measures of self-theory, future studies may wish to employ items that are keyed so that agreement indicates an incremental self-theory.

The final limitation of this study is the internal consistency estimate of the *Conception of Ability at Work* scale. The constructed scale had only moderate reliability ($\alpha = .65$). However, because internal consistency is based in part upon the number of items in a scale, adding five to ten new items would likely improve reliability in to the acceptable range, generally thought to be .70 or higher (Cortina, 1993).

Future Research

Perhaps the most obvious area for future research would be to take the findings of the current study and examine them in a field setting. Where this study only assessed outcome variables through a questionnaire, future research may examine a variable such as goal focus in a field experiment. Evaluating actual successes and failure as work, as opposed to just asking employees about them, may illuminate interesting relationships.

An important area of construct validity that was not examined in the current study is the extent to which conception of ability at work is related to personality traits, such as those included in the Big Five (Costa & McCrae, 1992). The most relevant Big Five construct to self-theories may be Openness to Experience. Individuals high in Openness to Experience are considered to be tolerant and imaginative. Such a disposition may be seen as related to an incremental theory, in that incremental theorists are more open to the possibility of learning new information and developing their skills.

Another area of future research might be an exploration into how self-theories influence the job satisfaction-job performance relationship. Causal directions of the relationship has long

been studied in the literature (Judge, Thoresen, Bono, & Patton, 2001; Schneider, Hanges, Smith, & Salvaggio, 2003). Reviews have concluded that the literature does not support causal inferences (Judge et al., 2001). Perhaps conception of ability at work may explain the relatively modest observed correlations between satisfaction and performance. One could reasonably suggest that for employees who hold an entity conception of ability at work, job performance may precede job satisfaction. Because entity theorists strive to demonstrate their ability, they may derive satisfaction from having their ability validated by successful performance.

Conversely, when they fail to perform a task, they are likely to engage in a helpless response, which may cause a loss in job satisfaction. Theory would suggest that the opposite would be true for employees who hold an incremental conception of ability at work. Because these individuals have a learning goal orientation, they may derive satisfaction merely from doing their job and learning a new skill. In this case, satisfaction may precede job performance.

Further research examining how manager ratings could be impacted by the concept of ability at work is warranted. Entity managers may attend only to information that confirms their stereotypes. Plaks, Stroessner, Dweck, and Sherman (2001) found that incremental theorists were more likely to pay attention to counterstereotypic information than were entity managers. If halo is considered a type of stereotyping, where managers generalize the performance of an employee in one domain to other domains, research examining the relationship between self-theories and stereotyping (e.g. Levy et al., 1998) suggest that entity managers may be more likely to engage in halo. Future studies may wish to focus on the processes involved in halo as a function of self-theories.

The relationship between language and self-theory may be an avenue for future research as well. Dweck (2002b) reported that schoolchildren with an entity theory of intelligence used

“outcome” language when asked why a classmate was smart. For example, an entity theorist might say “I know Tommy is smart because he gets good grades.” Incremental theorists, on the other hand, were much more likely to use “action” language, such as “Tommy is smart because he does all of his homework.” Research has been successful in temporarily inducing one self-theory or another by using direct framing (for examples of inducement procedures, see Hong et al., 1999; Martocchio, 1994). What is less clear is the potential impact of unintentional, indirect framing. One could reasonably suggest that use of outcome-focused language on performance appraisals may induce managers into endorsing entity theories when evaluating employees. For example, a performance appraisal form that emphasizes outcomes, such as an increase in market share or sales volume rather than the process by which those outcomes occur, may induce an entity conception of ability at work. Previous researchers have suggested that part of the unreliability found in most performance appraisal systems may be related to a lack of understanding how manager schemas influence ratings (Murphy & Cleveland, 1995). Self-theories do have an impact on supervisor ratings (Heslin et al., 1995) and could potentially be a cause of unreliability in performance appraisals.

Dweck and her colleagues have extensively studied the relationship between self-theories and response to failure in an education setting (Diener & Dweck, 1978, 1980). They have found that entity theorists, in addition to having a performance goal orientation, seem to respond to failure or setbacks with helpless response. This response is an educational analogue to the learned helplessness response reported by Seligman and Maier (1967) in their experiments with canines. When entity theorists are presented with poor performance or a failure, they tend to give up and not work on the task any further. In their minds, their abilities to solve the problem are fixed, so further effort on their part would be meaningless. Incremental theorists, on the other

hand, tend to see failure as an opportunity for learning a new strategy or to apply more effort, and thus demonstrate a mastery response pattern. In a selection context, an area for future research in industrial/organizational psychology would be to examine how self-theory relates to reaction to setbacks in business and employment settings. Research has shown that people with entity and incremental theories differ greatly on how they respond to failure or setbacks (Henderson & Dweck, 1990). In jobs where an employee experiences multiple setbacks on a daily basis, organizations may be interested in selecting individuals who are likely to be more resilient. Sales roles that require cold calling or lead generating may provide opportunities for this kind of research.

Conclusion

The present research has demonstrated that self-theories have important impacts in the work domain. Specifically, a scale measuring a work-specific self-theory, termed conception of ability at work, appears to be a valid instrument for assessing self-theories as they relate to work performance. Additionally, significant relationships were found between conception of ability at work and both competence demonstration goal focus and perception of effort at work, suggesting that this new construct also has important antecedents in the workplace. A systematic empirical investigation of other antecedents is warranted as a result of this research.

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Appendix A Pilot Study Items

Implicit Theory of Intelligence – Dweck (1999)

1. You have a certain amount of intelligence and you really can't do much to change it.
2. Your intelligence is something about you that you can't change very much.
3. To be honest, you can't really change how intelligent you are.
4. You can learn new things, but you can't really change your basic intelligence.

Implicit Theory of Morality – Dweck (1999)

5. A person's moral character is something very basic about them and it can't be changed very much.
6. Whether a person is responsible and sincere or not is deeply ingrained in their personality. It cannot be changed very much.
7. There is not much that can be done to change a person's moral traits (e.g. conscientiousness, uprightness and honesty).

Implicit Theory of Kind of Person – Dweck (1999)

8. The kind of person someone is something very basic about them and it can't be changed much
9. People can do things differently, but the important parts of who they are can't really be changed
10. As much as I hate to admit it, you can't teach an old dog new tricks. People can't really change their deepest attributes.
11. Everyone is a certain kind of person, and there is not much than can be done to really change that.

Conception of Ability at Work

12. Performance at work is determined by your fixed intelligence
13. People who perform highly at work now are likely to be high performers in the future.
14. People who perform highly in one role at work are likely to perform highly in a different role.
15. Success at work is largely due to a person's intelligence and not much else
16. First impressions of performance at work usually are correct in the long-term
17. People who are good at sports are probably successful in the workplace as well
18. Success in school translates to success on the job

Competence Demonstration

19. At work, my goal focus is on demonstrating my skills rather than learning new ones
20. I like to prove my work skills
21. I prefer goals that involve proving my skills at work
22. Hitting performance goals at work are important
23. I prefer to demonstrate my skills rather than to learn new ones
24. *My goals at work are generally related to performance rather than learning
25. *I'd rather have a task where I have to perform a skill I already have than a task where I have to learn something new

- 26. Making sure supervisors see my skills is important to me
- 27. My main focus is on performing a work task successfully

Competence Development

- 28. My goals at work involve developing new skills rather than demonstrating the goals I already have
- 29. I like to learn new work skills
- 30. I prefer goals that involve developing my skills at work
- 31. Achieving professional development goals at work are important
- 32. Continuing education goals are worthwhile and important
- 33. I'd rather learn a new skill than perfect one I already have
- 34. I like to do work tasks where I can learn a new skill
- 35. I would be excited about potentially learning a new skill at work

Perception of Effort

- 36. If you have to stay late at work to get your assigned task completed, you must not be very smart
- 37. People who are smarter get their work done faster
- 38. Intelligence matters more than effort in performing tasks at work
- 39. The more effort you have to put into your work assignments, the less intelligent you probably are.
- 40. If you are really good at your job you probably can work less hours

Attribution of Failure to Intelligence

- 41. When I have a set-back at work, most of the time it is because I've been asked to do a task I simply am incapable of completing.
- 42. When I perform poorly at work, it is usually because I just don't have the intelligence necessary to succeed.
- 43. Performing poorly at work makes me feel dumb.
- 44. If I fail at a work task, I'll fail if asked to perform that same task again
- 45. When I fail at work, it's because I'm not smart enough to perform the task
- 46. Failure on a work task is caused more by lack of intelligence than by lack of effort
- 47. If I fail to complete a task, I'd rather not be asked to do the task again

Attribution of Failure to Effort/Strategy

- 48. *When I experience failure at work, it is usually because I didn't put forth enough effort
- 49. A mismatch between a person's skills and the task is often what causes poor performance at work.
- 50. If I perform a task incorrectly, it's because I just went about it the wrong way
- 51. When a task at work is performed incorrectly, it's because I just don't know how to do it properly
- 52. I can perform any work task if someone tells me the right way to do it
- 53. Failing a task at work is usually caused by applying an incorrect strategy

Utility of Training

- 54. *I would go to voluntary training as a way to improve my work skills

- 55. I would be excited to go to voluntary training to learn a new skill
- 56. Training is a good way to increase my performance at work
- 57. Even if the training doesn't help my performance at work, I would enjoy learning a new skill or ability
- 58. Training is better for demonstrating skills than for developing them
- 59. *Training is a place to develop skills rather than demonstrate them
- 60. Training provides an opportunity to learn and develop new skills
- 61. *Training is a way to show others the skills I already have
- 62. If I knew I would fail performing a new skill during training, I would still do it as long as I learned something new.
- 63. It's more important to learn a new skill at training than it is to demonstrate the skills I already have
- 64. The purpose of training is to show the trainers the skills I've learned already

*Item amended in experimental study

Appendix B

Instructions

You are about to be asked some questions regarding success in the workplace. These responses are for RESEARCH ONLY, and will not affect the answers on any other sections of the assessment. Chally conducts research in an ongoing effort to refine and improve the assessment. Please answer as openly and honestly as possible. Again, this section is for RESEARCH ONLY and will not affect the report Chally gives to your employer/potential employer.

Please indicate the extent to which you agree or disagree with the following statements using the following scale.

Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6

Appendix C Experimental Study Items

Implicit Theory of Intelligence – Dweck (1999)

1. You have a certain amount of intelligence and you really can't do much to change it.
2. Your intelligence is something about you that you can't change very much.
3. To be honest, you can't really change how intelligent you are.
4. You can learn new things, but you can't really change your basic intelligence.

Implicit Theory of Morality – Dweck (1999)

5. A person's moral character is something very basic about them and it can't be changed very much.
6. Whether a person is responsible and sincere or not is deeply ingrained in their personality. It cannot be changed very much.
7. There is not much that can be done to change a person's moral traits (e.g. conscientiousness, uprightness and honesty).

Implicit Theory of Kind of Person – Dweck (1999)

8. The kind of person someone is something very basic about them and it can't be changed much
9. People can do things differently, but the important parts of who they are can't really be changed
10. As much as I hate to admit it, you can't teach an old dog new tricks. People can't really change their deepest attributes.
11. Everyone is a certain kind of person, and there is not much than can be done to really change that.

Conception of Ability at Work

12. Performance at work is determined by your fixed intelligence
13. People who perform highly at work now are likely to be high performers in the future.
14. People who perform highly in one role at work are likely to perform highly in a different role.
15. Success at work is largely due to a person's intelligence and not much else
16. First impressions of performance at work usually are correct in the long-term
17. People who are good at sports are probably successful in the workplace as well
18. Success in school translates to success on the job

Competence Demonstration

19. At work, my goal focus is on demonstrating my skills rather than learning new ones
20. I like to prove my work skills
21. I prefer goals that involve proving my skills at work
22. Hitting performance goals at work are important
23. I prefer to demonstrate my skills rather than to learn new ones
24. My goals at work involve showing my skills to supervisors
25. I like to show off my skills at work
26. Making sure supervisors see my skills is important to me

27. My main focus is on performing a work task successfully

Competence Development

28. My goals at work involve developing new skills rather than demonstrating the goals I already have

29. I like to learn new work skills

30. I prefer goals that involve developing my skills at work

31. Achieving professional development goals at work are important

32. Continuing education goals are worthwhile and important

33. I'd rather learn a new skill than perfect one I already have

34. I like to do work tasks where I can learn a new skill

35. I would be excited about potentially learning a new skill at work

Perception of Effort

36. If you have to stay late at work to get your assigned task completed, you must not be very smart

37. People who are smarter get their work done faster

38. Intelligence matters more than effort in performing tasks at work

39. The more effort you have to put into your work assignments, the less intelligent you probably are.

40. If you are really good at your job you probably can work less hours

Attribution of Failure to Intelligence

41. When I have a set-back at work, most of the time it is because I've been asked to do a task I simply am incapable of completing.

42. When I perform poorly at work, it is usually because I just don't have the intelligence necessary to succeed.

43. Performing poorly at work makes me feel dumb.

44. If I fail at a work task, I'll fail if asked to perform that same task again

45. When I fail at work, it's because I'm not smart enough to perform the task

46. Failure on a work task is caused more by lack of intelligence than by lack of effort

47. If I fail to complete a task, I'd rather not be asked to do the task again

Attribution of Failure to Effort/Strategy

48. Applying an incorrect strategy leads to failure at work

49. A mismatch between a person's skills and the task is often what causes poor performance at work.

50. If I perform a task incorrectly, it's because I just went about it the wrong way

51. When a task at work is performed incorrectly, it's because I just don't know how to do it properly

52. I can perform any work task if someone tells me the right way to do it

53. Failing a task at work is usually caused by applying an incorrect strategy

Utility of Training

54. Training is valuable because you can learn new work skills

55. I would be excited to go to voluntary training to learn a new skill

56. Training is a good way to increase my performance at work
57. Even if the training doesn't help my performance at work, I would enjoy learning a new skill or ability
58. Training is better for demonstrating skills than for developing them
59. Learning new work skills is an important outcome of training
60. Training provides an opportunity to learn and develop new skills
61. I enjoy training because I like to learn new work skills
62. If I knew I would fail performing a new skill during training, I would still do it as long as I learned something new.
63. It's more important to learn a new skill at training than it is to demonstrate the skills I already have
64. The purpose of training is to show the trainers the skills I've learned already.

Table 1

Pilot Study Descriptives

Scale	Mean	SD	α
Implicit Theory of Intelligence	2.88	1.20	.91
Implicit Theory of Morality	3.27	1.19	.82
Implicit Theory of Kind of Person	3.24	1.16	.90
Conception of Ability at Work	3.39	.76	.74
Perception of Effort at Work	2.32	.89	.83
Competence Demonstration Goal Focus	3.91	.61	.66
Competence Development Goal Focus	4.35	.68	.81
Attribution of Failure to Intelligence	2.59	.80	.81
Attribution of Failure to Effort/Strategy	3.93	.68	.63
Utility of Training	3.06	.47	.47

Note. α = Cronbach's Internal Consistency Estimate

Table 2

Conception of Ability at Work scale item statistics

Item	Corrected Item-Total Correlation	Item Mean	Item SD
1. Performance at work is determined by your fixed intelligence.	.29	2.20	1.14
2. People who perform highly at work now are likely to be high performers in the future.	.42	4.47	1.31
3. People who perform highly in one role at work are likely to perform highly in a different role.	.36	3.83	1.31
4. Success at work is largely due to a person's intelligence and not much else.	.29	2.08	.92
5. First impressions of performance at work usually are correct in the long-term.	.35	3.36	1.27
6. People who are good at sports are probably successful in the workplace as well.	.35	3.16	1.35
7. Success in school translates to success on the job.	.47	3.50	1.35

Table 3

Competence Demonstration scale item statistics

Item	Corrected Item-Total Correlation	Item Mean	Item SD
1. At work, my goal focus is on demonstrating my skills rather than learning new ones.	.17	2.35	1.00
2. I like to prove my work skills.	.38	5.00	1.08
3. I prefer goals that involve proving my skills at work.	.40	4.54	1.22
4. Hitting performance goals at work are important.	.18	5.33	1.20
5. I prefer to demonstrate my skills rather than to learn new ones.	.20	2.41	.99
6. My goals at work involve showing my skills to supervisors.	.47	4.06	1.27
7. I like to show off my skills at work.	.49	3.79	1.38
8. Making sure supervisors see my skills is important to me.	.49	4.12	1.23
9. My main focus is on performing a work task successfully.	.22	5.20	1.07

Table 4

Competence Development scale item statistics

Item	Corrected Item-Total Correlation	Item Mean	Item SD
1. My goals at work involve developing new skills rather than demonstrating the goals I already have.	.30	3.82	1.23
2. I like to learn new work skills.	.46	5.35	.91
3. I prefer goals that involve developing my skills at work.	.50	4.96	.97
4. Achieving professional development goals at work are important.	.51	5.30	.85
5. Continuing education goals are worthwhile and important.	.45	5.30	.92
6. I'd rather learn a new skill than perfect one I already have.	.26	3.30	1.10
7. I like to do work tasks where I can learn a new skill.	.49	5.09	.73
8. I would be excited about potentially learning a new skill at work.	.43	5.31	.71

Table 5

Perception of Effort scale item statistics

Item	Corrected Item-Total Correlation	Item Mean	Item SD
1. If you have to stay late at work to get your assigned task completed, you must not be very smart.	.45	1.53	.75
2. People who are smarter get their work done faster.	.53	2.08	1.07
3. Intelligence matters more than effort in performing tasks at work.	.46	2.04	.89
4. The more effort you have to put into your work assignments, the less intelligent you probably are.	.59	1.73	.76
5. If you are really good at your job you probably can work less hours.	.35	2.55	1.21

Table 6

Attribution of Failure to Intelligence scale item statistics

Item	Corrected Item-Total Correlation	Item Mean	Item SD
1. When I have a set-back at work, most of the time it is because I've been asked to do a task I simply am incapable of completing.	.43	2.08	.97
2. When I perform poorly at work, it is usually because I just don't have the intelligence necessary to succeed.	.56	1.69	.81
3. Performing poorly at work makes me feel dumb.	.36	2.40	1.27
4. If I fail at a work task, I'll fail if asked to perform that same task again.	.45	1.69	.73
5. When I fail at work, it's because I'm not smart enough to perform the task.	.58	1.59	.65
6. Failure on a work task is caused more by lack of intelligence than by lack of effort.	.45	1.93	.94
7. If I fail to complete a task, I'd rather not be asked to do the task again.	.43	1.92	.85

Table 7

Attribution of Failure to Effort/Strategy scale item statistics

Item	Corrected Item-Total Correlation	Item Mean	Item SD
1. Applying an incorrect strategy leads to failure at work.	.38	3.80	1.27
2. A mismatch between a person's skills and the task is often what causes poor performance at work.	.31	4.07	1.15
3. If I perform a task incorrectly, it's because I just went about it the wrong way.	.46	4.04	1.10
4. When a task at work is performed incorrectly, it's because I just don't know how to do it properly.	.41	3.51	1.22
5. I can perform any work task if someone tells me the right way to do it.	.25	4.92	1.10
6. Failing a task at work is usually caused by applying an incorrect strategy.	.57	4.24	1.06

Table 8

Utility of Training scale item statistics

Item	Corrected Item-Total Correlation	Item Mean	Item SD
1. Training is valuable because you can learn new work skills. (R)	.53	1.47	.80
2. I would be excited to go to voluntary training to learn a new skill. (R)	.63	1.58	.75
3. Training is a good way to increase my performance at work. (R)	.65	1.44	.67
4. Even if the training doesn't help my performance at work, I would enjoy learning a new skill or ability. (R)	.55	1.79	.88
5. Training is better for demonstrating skills than for developing them.	.15	2.42	1.09
6. Learning new work skills is an important outcome of training. (R)	.65	1.72	.79
7. Training provides an opportunity to learn and develop new skills. (R)	.69	1.56	.75
8. I enjoy training because I like to learn new work skills. (R)	.68	1.64	.79
9. If I knew I would fail performing a new skill during training, I would still do it as long as I learned something new. (R)	.51	2.06	.98
10. It's more important to learn a new skill at training than it is to demonstrate the skills I already have. (R)	.25	2.93	1.36
11. The purpose of training is to show the trainers the skills I've learned already.	.15	2.33	1.12

Note. (R) indicates that the item is reverse-scored.

Table 9

Means, standard deviations and correlation matrix for experimental study

Scale	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Implicit Theory of Intelligence	2.05	1.09	(.92)									
2. Implicit Theory of Morality	2.90	1.26	.18**	(.85)								
3. Implicit Theory of Kind of Person	2.76	1.07	.22**	.71**	(.84)							
4. Conception of Ability at Work	3.23	0.71	.11*	.14**	.18**	(.65)						
5. Competence Demonstration	4.09	0.61	.07	.11**	.15**	.30**	(.66)					
6. Competence Development	4.80	0.55	-.07	-.05	.01	.17**	.19**	(.72)				
7. Perception of Effort	1.99	0.64	.23**	.13**	.15**	.21**	.12**	-.04	(.70)			
8. Attribution of Failure to Intelligence	1.90	0.56	.17**	.10*	.19**	.05	.08*	-.13**	.55**	(.73)		
9. Attribution of Failure to Effort/Strategy	4.10	0.70	.13**	.11**	.15**	.21**	.24**	.19**	.17**	.08	(.66)	
10. Utility of Training	1.90	0.53	.12**	.07	.07	-.06	-.04	-.40**	.19**	.33**	-.19**	(.79)

Note. * $p < .05$, ** $p < .01$. SD = standard deviation. N = 569. Internal consistency estimates are presented in parentheses on the diagonal.

Table 10

Independent samples t-tests for sex, race, and position

	Male - Female			Caucasian - African-American			Managers - Sales		
	<u>t</u>	<u>df</u>	<u>p</u>	<u>t</u>	<u>df</u>	<u>p</u>	<u>t</u>	<u>df</u>	<u>p</u>
Implicit Theory of Intelligence	1.06	564	.29	0.16	481	.87	-1.46	475	.15
Implicit Theory of Morality	1.22	564	.22	0.73	481	.46	0.17	475	.87
Implicit Theory of Kind of Person	0.28	564	.78	0.06	481	.95	-0.19	475	.85
Conception of Ability at Work	-0.17	564	.87	-0.95	481	.34	-1.87	475	.06

Figure 1

Model 1

Note. DI = Implicit Theory of Intelligence, DM = Implicit Theory of Morality, DK = Implicit Theory of Kind of Person, CW = Conception of Ability at Work

Figure 2

Model 2

Note. DI = Implicit Theory of Intelligence, DM = Implicit Theory of Morality, DK = Implicit Theory of Kind of Person, CW = Conception of Ability at Work.