The impact of implicit theories of intelligence on professional decision making

Charles Bame-Aldred
Northeastern University

ABSTRACT

Research indicates people have different views of intelligence and these views can affect their effort and performance. However, this research was conducted on children and young adults performing generic tasks. This study investigates whether implicit theories will affect effort and performance of trained individuals performing job-related tasks. We investigate this because prior research indicates that common biases may be mitigated when decision-makers perform relevant professional tasks. Results from four studies using specialists reveal no relationship between intelligence beliefs and task effort and performance. A fifth study provides data suggesting a specialist's prior successful performance may affect intelligence views.

Keywords: Implicit Theories of Intelligence, Decision Making, Achievement, Motivation and Performance

INTRODUCTION

Research indicates that people hold different views of intelligence and that a person's view can be classified as either fixed or malleable (Dweck 1999). People with a fixed view believe that humans have a certain finite amount of intelligence that is unchangeable, while people with a malleable view believe that an individual can increase their level of intelligence if they work at it (Dweck & Sorich, 1999; Dweck, 1986).

Considerable research has revealed that a person's intelligence view can have a significant impact on the effort they expend on a task as well as their performance on the task (Dweck & Elliot, 1983; Dweck, 1999). For example, when faced with new and difficult material that could lead to failure, individuals with a fixed view of intelligence are typically less persistent and exert less effort. They view additional effort as a signal to others and themselves that they do not have the ability to solve a challenging problem. This creates a helpless response, where the individual gives up because they believe they lack the basic intelligence to accomplish the task (Elliot & Dweck, 1988; Dweck & Sorich, 1999). Alternatively, individuals with a malleable view of intelligence tend to enjoy challenging environments and problems. When confronted with a challenge, their goal is not to prove their intelligence to themselves or to others, but rather to improve their intelligence through a more effortful process (Dweck & Sorich, 1999). They view effort as a learning tool, suggesting that as more effort is expended, their intelligence will continue to expand. This creates a mastery-oriented response, where the individual works to master the materials because they believe they can increase their overall intelligence (Elliot & Dweck, 1988).

The research investigating implicit theories of intelligence has typically examined the effort and performance of elementary, middle, and high school students, as well as undergraduate college students, when they perform generic tasks. For example, studies have had young students complete three dimensional figures (Dweck & Repucci, 1973), solve arithmetic problems (Dweck, 1975), learn basic principles of psychology (Licht & Dweck, 1984), solve conceptual problems (Diener & Dweck, 1978), or complete reasoning tests (Mueller & Dweck, 1998). For more advanced students (high school and university), task environments have included word recognition (Werth & Forster, 2002) and general knowledge questions (Mangels et al. 2006). The results of these studies typically reveal that individuals with a fixed view of intelligence exert less effort and do not perform as well as people with a malleable view in challenging tasks. In most all of these generic tasks, however, there is little match between the background training of the participants and the task environments. And yet, many of the important decisions in life are made in our professional careers, where we possess considerable training and experience. The question therefore arises: Will intelligence view effects hold when individuals perform tasks related to their professional careers?

The purpose of this study is to investigate whether implicit theories of intelligence will affect the effort and performance of trained individuals when they perform job-related tasks. This study investigates this issue because prior research indicates that commonly found decision biases may be mitigated or modified when professional decision makers perform tasks for which they are trained. For example, in the area of heuristics and biases, research has found that biased judgments are partially due to the mismatch between the participant and the task (Fischoff, 1982). In fact, Edwards (1983) notes that many of the prior studies that found decision biases had participants with little or no experience perform generic tasks, and that biases may be reduced with a task/participant match. Consistent with this notion, Smith and Kida (1991)

reviewed the research on one group of specialists (i.e., auditors), and report that biased decision making is often lessened when these professionals perform more familiar job-related tasks. They note that greater biases were evident when the match between participants and task was low, while the influence of heuristics and their related biases was mitigated when the auditors performed tasks related to their profession. As a result, research examining the impact of implicit theories of intelligence when individuals perform job-related tasks is needed to determine if the prior findings are generalizable to professional decision making contexts.

OVERVIEW OF THE PRESENT STUDIES

Initially, two studies test whether implicit theories of intelligence affect the professional judgments of individuals trained in a specific area of expertise (i.e., accounting). That is, this study investigated whether intelligence views affect the effort expended, and accuracy achieved, on two different accounting decision tasks. Two additional studies help determine if implicit theories affect perceived goals. That is, do intelligence views influence specialists to hold different self-reported goal preferences related to the types of tasks they prefer, the level of effort they expend, and other task related variables.

Across all four studies, there is little support for implicit theories of intelligence influencing the effort of accounting specialists when they perform job-related tasks. That is, there were no differences in the actual time spent on challenging tasks, indicating that implicit theories did not affect the participants' effort. In addition, there was little difference in self-reported measures of effort between fixed and malleable theorists. In effect, while implicit theories of intelligence would predict a mastery oriented response for malleable theorists in challenging tasks (i.e., spending more time and effort), that did not occur. Also, there were no differences in performance (i.e., decision accuracy) between individuals with a fixed and malleable view in both of the accounting task environments.

Why would implicit theories not affect professional decision making? As with the research investigating decision heuristics and biases, the influence of implicit intelligence views may be mitigated when individuals perform realistic, job-related tasks. That is, when individuals are trained to perform certain tasks, there is a match between the expertise of the individual and the task, resulting in a lower chance that other influences (e.g., general heuristics or implicit theories) affect behavior.

In addition, the findings may reflect a potentially interesting phenomenon. While the theory of implicit intelligence says that our intelligence view affects effort and performance, it also says that our intelligence view is not static, and that it can change due to a variety of different influences. For example, Dweck (1999) reported that changes to a person's intelligence view may occur because other successful people we admire hold a different view of intelligence from ourselves. For example, providing people with a description of a genius who worked hard for their accomplishments resulted in more people adopting a malleable view, while providing people with a description of the same genius described as naturally gifted at birth resulted in more people holding a fixed view of intelligence (Bergen, 1992).

Other research suggests that the type of praise an individual receives can influence their intelligence view. For example, both Kamins and Dweck (1999) and Mueller and Dweck (1998) praised individuals for either their ability or their effort when they successfully completed different generic tasks. When the individuals later failed a challenging task, the group receiving ability praise exhibited behaviors consistent with a fixed view of intelligence, as compared to

individuals praised for their effort. This suggests that individuals praised for their ability are more likely to adopt a fixed intelligence view, while individuals praised for their effort are more likely to adopt a malleable view.

This study proposes that successful people are more likely to receive ability praise as opposed to effort praise. In fact, Dweck (2006) notes that more than 80% of parents believe that it's necessary to praise their children for their ability in order to foster higher levels of self-esteem. As a result, the more success an individual experiences in life, the more ability praise they receive. This study further argues that ability praise for past performance success, like the description of a gifted genius, affects our implicit theory. The more one is told they're smart, the more they believe their success is due to their basic intelligence as opposed to their effort. Individuals experiencing more success in life are more likely to have a fixed view of intelligence, and since more successful people typically have greater achievement, fixed view individuals will not perform more poorly than individuals who hold a malleable view of intelligence. This molding of a person's intelligence view due to maturation and past success can provide a possible explanation as to why there was no difference in performance between fixed and malleable specialists on our job-related tasks.

If the argument holds, there should be a difference in the proportion of fixed and malleable individuals in groups that experience more versus less success. In order to investigate this issue, a fifth study was conducted that compared the ratio of fixed and malleable students from higher quality colleges and universities versus lower quality institutions. Significant differences were found in the proportion of fixed versus malleable students based on the quality of the academic institution, with higher quality institutions having a higher proportion of students with a fixed implicit theory of intelligence as compared to lower quality institutions.

STUDY 1

Prior research on implicit theories has examined the effort and performance of individuals when they first encounter an easy task, then a difficult task, followed by another easy task (Dweck, 1975; Dweck & Repucci, 1973). For example, Dweck and Repucci (1973) gave 5th grade students a series of easy tasks (completing colored block designs), followed by a series of difficult, challenging tasks, followed by another series of easy tasks. While both fixed and malleable theorists mastered the first set of easy tasks, differences in performance existed when they faced the challenging tasks. Individuals with a fixed view performed significantly worse, and they attributed their poor performance to personal inadequacies. Interestingly, this perceived self failure also reduced their performance on the last set of easy questions. To investigate the impact of implicit theories on specialists' judgments, the design employed is similar to the design in the first study.

Method

A total of 81 auditing students with an average of 7 months of professional auditing experience participated in the study in exchange for course credit. Ten participants at a time were seated in a lab, provided a laptop computer, given instructions, and told to commence the research project. The participants provided demographic information and responded to three questions used by Dweck and her colleagues to measure a person's implicit theory of intelligence: "You have a certain amount of intelligence, and you really can't do much to change

it," "You can learn new things, but you really can't change your basic intelligence," and "To be honest, you can't really change how intelligent you are." Their level of agreement was rated on a scale from 1 (strongly agree) to 6 (strongly disagree) for each question (Dweck, 1999).

All participants were asked to work on three sets of financial accounting problems related to accounting for investment securities. Two problems were relatively easy and one was difficult. The first problem was an easy Trading Securities case, the second problem was a very difficult Equity Method case, and the third problem was an easy Securities to Be Held to Maturity case. Participants were asked to provide the appropriate entries to the accounting records, along with the related balance sheet and income statement presentations. To help them make accurate judgments, the participants could access a number of resource documents which provided information about the accounting transactions. For example, if a participant was uncertain about the accounting for trading securities, they could click on a link which activated a document that contained textbook information about trading securities (Spiceland, 2007). [1] In addition to the documents containing the accounting problems, the participants could access seven different resource documents that presented 27 pages of material. Access to the documents used in the study allowed us to capture the level of effort expended (i.e., amount of time spent reading the documents) by the participant when attempting to solve the problems.

To capture participant effort, a software program, Spector Pro v. 6.0 (SpectorSoft, 2008), recorded keystrokes, movement between documents, and time spent by the participant on each document. Every time a participant accessed a document, the program recorded the time spent viewing the document. If the document was accessed several times, the time spent on the document was accumulated to determine the total time a document was viewed. To capture participant accuracy, a scoring sheet was established for each problem. Two research assistants with an average of three years of professional accounting experience scored each participant's response for decision accuracy. The assistants did not have knowledge of the participants' intelligence views, and any disagreements between their scores were reconciled.

Results and Discussion

Participants were classified as either having a fixed or malleable view of intelligence by taking the average of their responses to the three implicit theory questions. Individuals with average scores below 3.0 were classified as fixed, while those above 4.0 were classified as malleable. In addition, each of the responses to the three questions had to exhibit consistent scoring, such that all three responses had to be 3.0 or below for fixed participants, and 4.0 or above for malleable participants.

In total, 55 of the 81 participants were classified as either fixed (19) or malleable (36). Table 1 presents the data and t-tests related to the amount of effort, while Table 2 presents the data and t-tests for task accuracy. Since the first task is easy, a person's implicit theory of intelligence should have no effect on the amount of time taken and the level of accuracy achieved. As can be seen in Tables 1 and 2, there is no difference for total time taken on the first easy task (Fixed = 1:20; Malleable = 2:01, $p > 0.10$), or for decision accuracy (Fixed = 79.5%; Malleable = 76.1%, $p > 0.10$). However, implicit theories of intelligence predicts differences in effort and performance on the next two tasks. For the second, difficult task, implicit theories predicts that the malleable intelligence group will spend more time than the fixed intelligence group. Results in Table 1 reveal no differences in the time taken on the difficult task (Fixed = 8:21; Malleable = 7:56, $p > 0.10$). In fact, while not significantly different, the average time

spent on the difficult task was slightly higher for the fixed intelligence group, which is contrary to implicit theories of intelligence. Implicit theories also predicts differences in the third, easy task, with the malleable intelligence group exerting more effort than the fixed intelligence group. Again, no differences were found in effort (Fixed = 1:42; Malleable = 2:14, $p > 0.10$) between the two groups. In addition, no differences were found in the amount of time spent on other documents provided to the participants (Fixed = 32:19; Malleable = 36:50, $p > 0.10$). Overall, the data from Table 1 does not support effort differences between malleable and fixed view specialists when they perform a job related-task. See Tables 1 and 2 (Appendix).

As indicated above, implicit theories also predicts decision accuracy differences between malleable and fixed view individuals. As reported in Table 2, no differences were found in decision accuracy for the second, difficult task (Fixed = 49.4%; Malleable = 41.9%, $p > 0.10$), or the third, easy task (Fixed = 76.5%; Malleable = 70.6%, $p > 0.10$). Again, while not significantly different, the accuracy for the fixed group was slightly higher than the malleable group, which is contrary to the predictions of implicit theories of intelligence. [2]

Overall, the data from Study 1 does not support implicit theories of intelligence. No differences were found in effort or performance between people holding fixed and malleable views in the difficult task and the second easy task. It appears that specialists, holding either view of intelligence, perform job-related tasks with the same level of effort and accuracy, suggesting that the research findings from implicit theories of intelligence may not be generalizable to professional decision making contexts.

STUDY 2

To further examine the impact of intelligence views, a second study was conducted in the domain of auditing. A group of auditing students performed an analytical review, where they had to examine a large amount of information, analyze the data, and identify trends indicative of errors in the financial statements. The task requires an understanding of accounting and the interrelationships between balance sheet and income statement amounts.

Method

A total of 105 auditing students participated in the study for course credit. They first responded to the three questions designed to elicit their implicit theory of intelligence used in Study 1. Next, they were told to assume the role of auditor for a company that designs and manufactures a range of electronic components. In that capacity, they were to conduct an analytical review, which required that they examine comparative financial statements to detect material misstatements. Prior research has found low to moderate levels of accuracy when conducting analytical review for even experienced auditors (Nelson & Tan, 2005), indicating that this task environment is challenging for the participants.

In conducting the analytical review, the participants' effort was assessed by calculating the total time taken on the task. This was measured by using the finish time supplied by the participant and subtracting the uniform start time for all participants. Judgment accuracy was assessed by comparing the participant's judgment with the actual reason for the financial statement fluctuations. Two independent coders with an average of three years of professional auditing experience read each participant's final judgment and rated its accuracy between 1

(inaccurate) and 6 (accurate). Neither coder was aware of the participants' implicit views of intelligence, and any discrepancies were reconciled fully.

Results and Discussion

Similar to Study 1, participants were classified as either having a fixed or malleable view of intelligence by taking the average of their responses to the three implicit theory questions. In total, 81 of the 105 participants were classified as either fixed (28) or malleable (53). Tests were performed for participant effort, judgment accuracy, confidence in the final judgment, and number of hypotheses generated. No differences were found in effort (Fixed = 24:42; Malleable = 24:02, $p > 0.10$), judgment accuracy (Fixed = 3.00; Malleable = 2.81, $p > 0.10$), or confidence in the final judgment (Fixed = 2.57; Malleable = 2.13, $p > 0.10$). There was also no difference in the number of hypotheses generated (Fixed = 3.39; Malleable = 3.94, $p > 0.10$). As in Study 1, the average time spent and accuracy of the fixed group was slightly higher than the malleable group (which is contrary to implicit theories of intelligence), but once again these differences did not reach statistical significance. These results, from a professional decision making context, do not support the predictions of the implicit theories of intelligence framework that fixed view individuals, facing a difficult challenge, will exert less effort and be less accurate than malleable view individuals.

These two studies of implicit theories of intelligence in separate domain specific contexts (i.e., financial accounting and auditing/analytical review) failed to show increased effort or performance enhancements for individuals holding a malleable versus a fixed view of intelligence. Prior research shows that effort and decision accuracy differences develop from the motivational goals that each group possesses (Dweck & Leggett, 1988; Dweck, 1999). Recall that the implicit theory of intelligence model predicts that people holding a fixed theory should prefer performance goals (i.e., desire to do well on tasks), and people holding a malleable theory should prefer learning goals (i.e., desire to learn something new). Since no actual effort or performance differences were found in Study 1 and 2, Studies 3 and 4 were conducted to determine if implicit theories affect perceived goals. That is, does fixed or malleable intelligence views lead these accounting specialists to hold different self-reported goal preferences related to the types of tasks they prefer, the level of effort they expend, as well as differences on other general task related variables.

STUDY 3

Method

A total of 288 auditing students from 4 different universities provided responses relating to their goal preferences. As in the first two studies, the three questions designed to elicit a participant's implicit theory of intelligence were also included. The goal preference items are divided into 4 categories: Type of Tasks (8 items), Effort on Tasks (3 items), General Task Items (5 items), and Additional Items (18 items). For items related to the type of tasks, effort on tasks, and general task items, participants provided their level of agreement from 1 (strongly agree) to 6 (strongly disagree) to items such as, "I prefer to work on tasks that I know well so that I won't make mistakes," "If I feel like I don't really understand something well, I want to work hard to reduce my deficiency and increase my understanding," and "I tend to believe that the more effort

you have to put into a job, the less intelligent you probably are." For the additional items, participants were asked to attribute their performance on a task to six different causes, including "The difficulty of the task," "My intellectual ability," and "My interest in the task." Finally, they were asked to rate the importance of nine different attributes concerning their job on a 5-point importance scale. Items included "Working on interesting projects," "The opportunity to challenge yourself," and "The opportunity to make a large amount of money." Based on prior research, differences should exist between participants holding a fixed versus malleable view of intelligence, with participants holding a malleable view agreeing more with learning goals, disagreeing with performance goals, and preferring challenging tasks requiring more effort, as compared to participants with a fixed view (Dweck, 1999; Mueller & Dweck, 1998; Leggett & Dweck, 1986).

Results and Discussion

As in the prior studies, participants were classified as either having a fixed or malleable view of intelligence based upon their responses to the three implicit theory questions. In total, 218 of the 288 participants were classified as either fixed (72) or malleable (146). Eleven items relate to type of task and effort preferences. Implicit theories of intelligence predicts differences in self-reported goals between fixed and malleable views. However, only 2 of the means were significantly different at $p < 0.05$ ("I prefer to work on tasks that I know well so that I won't make mistakes" and "If I feel like I don't really understand something well, I want to work hard to reduce my deficiency and increase my understanding"), and none were significant after controlling for experiment wide error using the Bonferroni correction. There appears to be little support that implicit theories affect the self-reported goals of the accounting specialists concerning task selection and effort. The general items relate to the definition of fixed and malleable theorists (e.g., "I tend to believe that the more effort you have to put into a job, the less intelligent you probably are"). Given that 4 of the 5 items are significant before the Bonferroni correction, and 3 after the correction, these items support the classification of fixed and malleable intelligence views within the participant group.

The additional items suggest a similar story. Of the 18 additional items, only 3 were significant, and after controlling for experiment wide error, only 2 of the 18 were significant. These two significant items were related to the definition of fixed and malleable intelligence views, confirming the intelligence view classification of the participants. Consistent with the definition of fixed and malleable, fixed view participants believed that intelligence ("Performance on a task is attributable to my intellectual ability", Fixed = 4.03; Malleable = 3.61, $p < 0.05$) versus effort ("Performance on a task is attributable to the effort I put in to the task", Fixed = 4.11; Malleable = 4.49, $p < 0.05$) was responsible for their performance on tasks, as compared to malleable view participants. However, none of the other items were significant at conventional levels after controlling for experiment wide error. Overall, there is little evidence to suggest substantive differences in perceived goals between fixed and malleable accounting and auditing specialists.

STUDY 4

Study 4 examines the relationship between implicit theories and motivational goals of individuals with significantly more professional experience than upper division accounting and

auditing students. The participants in this study had an average of 8.3 years of business experience and were mostly managers working in a number of different industries.

Method

A total of 109 individuals attending professional management training courses participated in the study. They responded to the three questions designed to elicit their implicit theory of intelligence as in the prior studies, and provided their level of agreement to a number of the goal preference items from Study 3. The items are divided into 3 categories: Type of Tasks (2 items), Effort on Tasks (2 items), and Satisfaction (2 items). For items related to the type of tasks, effort on tasks, and 1 satisfaction item, participants provided their level of agreement from 1 (strongly agree) to 6 (strongly disagree) to items such as, "I prefer to work on tasks that I know well so that I won't make mistakes," "If I feel like I don't really understand something well, I want to work hard to reduce my deficiency and increase my understanding," and "I get a lot of satisfaction from learning new things even if it takes a lot of time and effort." Participants were also asked "How often do you enjoy learning new and difficult things," responding on a 6-point scale with the endpoints labeled 1 (Never) to 6 (Always).

As in Study 3, implicit theories of intelligence would predict differences between fixed and malleable view individuals, with participants holding a malleable view agreeing more with learning goals, disagreeing more with performance goals, and preferring challenging tasks requiring more effort, as compared to participants with a fixed view (see, e.g., Dweck, 1999; Mueller & Dweck, 1998; Leggett & Dweck, 1986).

Results and Discussion

Participants were classified as having a fixed or malleable view as in the prior studies. In total, 99 of the 109 participants were classified as fixed (42) and malleable (57). Tests reveal that out of the 8 items, there were no significant differences between the means of the two groups. In addition, none of the correlations were significant (all p-values > 0.10).

The results from studies 1 through 4 provide little support for implicit theories of intelligence guiding goal preferences and performance differences of specialists when facing difficult tasks within their area of general expertise. Why would intelligence views not affect the performance of professionals in job-related tasks? As discussed in the overview of the paper, this study argues that one possible explanation is that the type of praise an individual receives throughout their life impacts their intelligence view, and that successful people are more likely to receive ability praise (i.e., praise for being smart) as opposed to effort praise. The more a person is told they're smart, the more they believe their success is due to their basic intelligence as opposed to their effort, which is likely to lead to a fixed view of intelligence (Dweck, 1999). And since more successful people have greater achievement in life, people with a fixed view will not perform more poorly than people with a malleable view of intelligence.

This line of argument is supported by prior research. For example, Dweck and her colleagues (Kamins & Dweck, 1999, Mueller & Dweck, 1998) found that when individuals performing generic tasks receive ability praise when they're successful, they continue to enjoy engaging in the tasks. And, if an individual is praised for their ability, they develop new or enhanced beliefs about those capabilities (i.e., intelligence) (Schunk, 1995; Schunk & Cox, 1986). They begin to believe their success is based on ability rather than on the effort expended.

To this point, Dweck and Kamins (1999) suggest that ability praise may alter a person's intelligence view from malleable to fixed. For example, they report that individuals with repeated successes followed by ability praise begin to behave consistent with people possessing a fixed view of intelligence. As a result, individuals that were formerly malleable in their formative years begin to believe intelligence is fixed (Dweck, 1999). As people select their specialty (i.e., an area where they excel) and receive ability praise, many of these individuals shift their implicit theory of intelligence from malleable to fixed.

If successful individuals who received ability praise during their life are more likely to hold a fixed view of intelligence, differences in the proportions of individuals holding different views of intelligence should exist, depending upon their level of past success. One metric of success is the type of college or university an individual attends. Prestigious schools typically accept more successful individuals than less prestigious schools. If the argument holds, lower quality institutions should have more malleable view individuals as compared to higher quality institutions. The next study investigates this issue.

STUDY 5

Method

Participants from six universities that range in prestige from a state college to a prestigious private school were included in the study. Responses from a total of 476 accounting and auditing students were analyzed. These include 369 participants from studies 1, 2 and 3, as well as 107 additional accounting and auditing students from a prestigious private school.

All 476 participants responded to the three questions designed to elicit their implicit theory of intelligence as in the previous studies. The median SAT scores and the acceptance rates were obtained from the Office of Institutional Research at each school. The Office of Institutional Research compiles university level data for inclusion into reports for institutional rankings (i.e., US News and World Reports or Business Week) and for federal and state funding.

Based on the SAT scores and acceptance rates, each university was ordered from lower quality to higher quality, with the highest SAT scores and lowest acceptance scores representing the highest quality institution. The additional 107 students from the prestigious school represented the highest quality institution (median SAT 1280 and acceptance rate 32.4%) and the 91 students from the state college represented the lowest quality institution (median SAT 1025 and acceptance rate 74.0%).

Results and Discussion

Participants were classified as having either a fixed or malleable view using the procedures outlined previously. Of the 476 students, 125 (36.1%) were classified as fixed and 221 (63.9%) were classified as malleable. As shown in Table 3, a Chi Square test for proportional differences between the universities' ratios of fixed and malleable individuals was significant ($p < 0.05$), indicating that there are basic differences between universities in the proportion of students holding fixed versus malleable views. To further examine the issue, the top three and bottom three quality schools were combined. The top three schools had significantly more fixed view students than the three bottom quality schools (41.6% versus

28.9%, $p < 0.05$). In addition, when the highest quality and lowest quality school are examined, the differences are even greater (46.6% versus 22.1%, $p < 0.01$). See Table 3 (Appendix).

These data support the proposition that successful individuals, who likely receive a greater amount of ability praise, are more likely to hold a fixed view of intelligence as compared to less successful individuals. And, since a greater proportion of successful individuals hold a fixed intelligence view compared to less successful individuals, fixed view individuals will not perform more poorly on challenging tasks. Of course, the data presented here do not provide a definitive causal link between past success in life, praise and a person's intelligence view. This is a potential interesting issue for future research. However, the results do indicate that the findings from implicit theories of intelligence research may not be generalizable to more mature professionals who perform job-related tasks.

DISCUSSION

The results of studies 1 through 4 suggest that implicit theories of intelligence, while important to student development, may have little relationship to professionals' effort and performance when working within their chosen field. Participants in studies 1 and 2 that held a malleable view of intelligence did not perform any better than participants with a fixed view on any of the tasks investigated. Implicit theories of intelligence predicts greater effort, usually resulting in greater performance, by people holding a malleable view when facing challenging tasks. There were no significant differences in the effort expended between the two groups. In fact, the participants with the fixed view of intelligence worked slightly longer and were slightly more accurate than their malleable view counterparts, although these differences were not significant. These expected differences in effort expended and performance are based on prior research links to motivational goals that each group possesses. Our examination of each groups' goals in studies 3 and 4 generated few statistically significant differences, even with experienced managers.

Study 5's findings suggest that the proportion of people holding a fixed versus a malleable view is related to the quality of the academic institution they attend, with a greater proportion of fixed theorists in higher quality universities. This study suggests that ability feedback may explain these results. As students progress in their selected field of study and encounter success, they receive praise or feedback for a job well done or a high test grade. While some feedback may come in the form of effort praise, the argument exists that most feedback is in the form of ability praise targeted at the individual's intelligence. To support this notion, Dweck (2006) reports that over 80% of parents provide ability praise to their children following success. Research suggests that praising an individual for their intelligence or natural ability can improve their level of achievement on similar future tasks (e.g., Schunk & Cox, 1986). While Kamins and Dweck (1999) demonstrate that intelligence praise negatively affects future performance after an individual faces significant challenges and fails, this effect was typically found when inexperienced individuals performed generic tasks. Accounting graduate and upper division undergraduate students possess a degree of general expertise in their area of specialty. They continue to study and work in this area due to prior successes and receive ability feedback for those successes. As a result, the often found effects of fixed and malleable intelligence views in generic tasks may not hold when individuals perform job-related tasks.

Research has found that a person's implicit theory of intelligence can change due to contextual influences. Merely describing Albert Einstein's intellect as something genetically

predisposed, or alternatively developed through effortful processes, can change how an individual views their own implicit theory of intelligence (Bergen, 1992). In addition to descriptions of intelligence exemplars (e.g., Einstein), ability praise or feedback for success on easy tasks can alter an individual to respond to difficulty in a manner similar to someone with a fixed view of intelligence. Specifically, individuals praised for ability following success tend to experience the same helpless response that fixed theorists exhibit when experiencing failure (Kamins & Dweck, 1999). This leads us to believe that as individuals with a malleable view of intelligence find an area where they are successful and therefore praised for their ability, they may ultimately alter their own view of intelligence, switching from malleable to fixed.

The results from study 5 support this notion. Student populations from higher quality schools have a different proportion of fixed versus malleable theorists than lower quality schools. Accounting students enrolled in high quality business schools receive praise from a number of sources, both direct (i.e., you are really good at accounting and other quantitative skills) and indirect (i.e., periodicals that rank business institutions, such as US News and World Report). Continuous feedback from a number of sources could influence the proportion of fixed and malleable theorists relative to lower quality institutions. For example, an individual accepted to a high quality business school has likely received direct ability praise from family members, teachers and peers. In addition, publications that rank these institutions convey exclusivity to the admitted students, not based on the amount of effort they invested in their studies, but rather on the ability level of their incoming freshman class, focusing on their standardized test scores, grade point averages, and number of valedictorians. This is likely to lead students to think they have high ability and intelligence.

The implications of the findings from studies 1 through 4, combined with the differences in proportions of implicit theorists across different institutions of quality, create some questions as to whether implicit theories of intelligence become less important to the general working population as people self-select into occupational fields. Prior successes within a specialty likely outnumber the number of failures a person experiences. This is especially true in a highly technical field, such as accounting and auditing. Our findings indicated that the helpless and mastery oriented responses predicted by implicit theories of intelligence did not exist when accounting specialists performed job-related tasks. This study proposes that a person's professional training and prior successful experiences likely reduce effort and performance differences between fixed and malleable theorists. While data provided is consistent with this notion, future research is needed to further examine any causal link between the success one experiences as they mature in life, the praise they receive for that success, and their implicit view of intelligence. In addition, future research is needed to determine if the results found here are generalizable to other professional contexts.

NOTES

1. These resource links included the Introduction to Accounting for Investment Securities, Trading Securities, Securities to Be Held to Maturity, Securities Available for Sale, The Equity Method, The Equity Method: Additional Information and Further Illustrations, and Securities Available for Sale.

2. Additional covariate analysis, using student's self-reported grade point average, revealed no differences in effort or performance between fixed and malleable view groups.

REFERENCES

Bergen, R.S. (1991). *Beliefs about intelligence and achievement-related behaviors.* (Doctoral dissertation.) Available from ProQuest Dissertations and Theses database. (UMI No. 9210743).

Collins, J.C. (2006). *Good to great: why some companies make the leap…and others don't.* New York, NY: HarperCollins Publishers, Inc.

Diener, C.I., and Dweck, C.S., (1978). An analysis of learned helplessness: continuous changes in performance, strategy, and achievement cognitions following failure. *Journal of Personality and Social Psychology, 36,* 451-462.

Dweck, C.S. (1975). The role of expectations and attributions in the alleviation of learned helplessness. *Journal of Personality and Social Psychology, 31,* 674-685.

Dweck, C.S. (1986). Motivational processes affecting learning. *American Psychologist, 41,* 1040-1048.

Dweck, C.S. (1999). *Self-theories: their role in motivation, personality, and development.* Philadelphia, PA: Psychology Press.

Dweck, C.S. (2006). *Mindset the new psychology of success.* New York, NY: Ballantine Books.

Dweck, C.S., and Elliot, E.S. (1983). Achievement motivation. In Mussen, P., and Hetherington, E.M. (Eds.), *Handbook of child psychology,* 643-691. New York, NY: Wiley.

Dweck, C.S., and Leggett, E.L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95,* 256-273.

Dweck, C.S., and Repucci, N.D. (1973). Learned helplessness and reinforcement responsibility in children. *Journal of Personality and Social Psychology, 25,* 109-116.

Dweck, C.S., and Sorich, L.A. (1999). Mastery-oriented thinking. In Snyder, C.R. (Ed.), *Coping,* 232-251. New York, NY: Oxford University Press.

Edwards, W. (1983). Human cognitive capabilities, representativeness, and ground rules of research. In Humphreys, P.C., Svenson, O., and Vari, A. (Eds), *Advances in psychology: analyzing and aiding decision processes, 18,* 507-513.

Elliot, E.S., and Dweck, C.S. (1988). Goals: an approach to motivation and achievement. *Journal of Personality and Social Psychology, 54,* 5-12.

Fischoff, B. (1982). Debiasing. In Kahneman, D., Slovic, P., and Tversky, A. (Eds.), *Judgment under uncertainty: heuristics and biases,* 422-444. New York, NY: Cambridge University Press.

Grant, H., and Dweck, C.S. (2003). Clarifying achievement goals and their impact. *Journal of Personality and Social Psychology, 85,* 541-553. doi:10.1037/0022-3514.85.3.541

Kamins, M.L., and Dweck, C.S. (1999). Person versus process praise and criticism: implications for contingent self-worth and coping. *Developmental Psychology, 35,* 835-847.

Licht, B.G., and Dweck, C.S. (1984). Determinant of academic achievement: the interaction of children's achievement orientations with skill area. *Developmental Psychology, 20,* 628-636.

Mangels, J.A., Butterfield, B., Lamb, J., Good, C., Dweck, C.S., (2006). Why do beliefs about intelligence influence learning success? A social cognitive neuroscience model. *SCAN, 1,* 75-86. doi: 10.1093/scan/ns1013

Mueller, C.M., and Dweck, C.S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology, 75,* 33-52.
Nelson, M., and Tan, H. (2005). Judgment and decision making research in auditing: a task, person, and interpersonal interaction perspective. *Auditing: A Journal of Practice and Theory, 24 (Supplement)*, 41-71.
Schunk, D.H. (1983). Ability versus effort attributional feedback: differential effects on self-efficacy and achievement. *Journal of Educational Psychology, 75,* 848-856.
Schunk, D.H. (1995). Self-efficacy and education and instruction. In Maddux, J.E. (Ed.). *Self-efficacy, adaptation, and adjustment: theory, research and application.* 281-303. New York, NY: Plenum.
Schunk, D.H., and Cox, P.D. (1986). Strategy training and attributional feedback with learning disabled students. *Journal of Educational Psychology, 78,* 201-209.
Schunk, D.H., and Swartz, C.W. (1993). Goals and progress feedback: effects on self-efficacy and writing instruction. *Contemporary Educational Psychology, 18,* 225-230.
Smith, J.F, and Kida, T. (1991). Heuristics and biases: expertise and task realism in auditing. *Psychological Bulletin, 109,* 472-489.
SpectorSoft. (2008). *Spector Pro*. Vero Beach, FL: SpectorSoft Corporation.
Spiceland, J.D., Sepe, J.F., and Tomassini, L.A. (2007). *Intermediate Accounting, 4/e.* New York, NY: McGraw Hill.
Werth, L., and Forster, J. (2002). Implicit person theories influence memory judgments: the circumstances under which metacognitive knowledge is used. *European Journal of Social Psychology, 32,* 353-362.
doi: 10.1002/ejsp.95

Table 1
Time Taken on Task Data in Study 1

	Intelligence Type Classified as:	
	Fixed (n = 19)	Malleable* (n = 36)
Time on Easy Task Data *(mm:ss)*:		
Trading Securities (First Task)		
M	1:20	2:01
SD	1:33	2:28
Held to Maturity Securities (Last Task)		
M	1:42	2:14
SD	2:06	1:54
Total Time on Easy Task Data		
M	3:02	4:15
SD	3:10	3:30
Time on Difficult Task Data:		
Equity Method Securities		
M	3:57	4:26
SD	3:34	5:14
Expanded Discussion of Equity Method Securities		
M	4:25	3:31
SD	6:10	5:00
Total Time on Difficult Task Data		
M	8:21	7:56
SD	6:12	7:15
Time on Additional Task Data:		
Background Case Material		
M	29:21	32:56
SD	11:24	10:01
Introduction to Securities		
M	1:14	1:01
SD	1:41	1:07
Available for Sale Securities		
M	1:44	2:54
SD	2:33	2:58
Total Time on Additional Task Data		
M	32:19	36:50
SD	12:16	10:56
Total Time on Task Data		
M	44:26	50:46
SD	18:06	14:04

Note. Of the 81 participants, 55 were classified as fixed or malleable. This classification provides a clear distinction between participants' intelligence views. That is, average scores on the three implicit theory questions had to be below 3 (fixed) and above 4 (malleable), and each of the responses had to exhibit consistent scores of 3 or below (fixed) and 4 or above (malleable).
* t-tests performed between the fixed and malleable groups revealed that all p-values were insignificant at conventional levels (all p values > 0.10).

Table 2
Decision Accuracy in Study 1

	Intelligence Type Classified as:	
	Fixed (n = 19)	Malleable* (n = 36)
Problem 1: Easy Decision (Trading Security)		
M	79.5%	76.1%
SD	0.21	0.21
Problem 2: Difficult Decision (Equity Method Security)		
M	49.4%	41.9%
SD	0.20	0.20
Problem 3: Easy Decision (Held to Maturity Security)		
M	76.5%	70.6%
SD	0.21	0.27

Note. Decision accuracy scores were calculated based on the number of points achieved by the participant divided by the total points for each problem. Of the 81 participants, 55 were classified as fixed or malleable. This classification provides a clear distinction between participants' intelligence views. That is, average scores on the implicit theory questions had to be below 3 (fixed) and above 4 (malleable), and each of the three responses had to exhibit consistent scores of 3 or below (fixed) and 4 or above (malleable).

* t-tests performed between the fixed and malleable groups revealed that all p-values were insignificant at conventional levels (all p values > 0.10).

Table 3
Number and Percent of University Participants Classified as Fixed or Malleable

	University Statistics			Intelligence Type Classified As:			
				Fixed		Malleable	
	Median SAT Scores	Acceptance Rate	n	n	%	n	%
Individual University Data:[*]							
University A	1,025	74.0%	91	15	22.1%	53	77.9%
University B	1,060	76.8%	76	23	38.3%	37	61.7%
University C	1,105	76.6%	29	5	23.8%	16	76.2%
University D	1,120	57.6%	92	29	42.0%	40	58.0%
University E	1,160	61.3%	81	19	34.5%	36	65.5%
University F	1,280	32.4%	107	34	46.6%	39	53.4%
Bottom and Top University Group Data:[a,*]							
Bottom University Group	1,063	75.8%	196	43	28.9%	106	71.1%
Top University Group	1,187	50.4%	280	82	41.6%	115	58.4%
Bottom and Top University Data:[**]							
University A	1,025	74.0%	91	15	22.1%	53	77.9%
University F	1,280	32.4%	107	34	46.6%	39	53.4%

Note: The majority of participants were senior accounting and auditing students. The median SAT Scores and Acceptance Rates are taken from university published statistics. Of the 476 participants, 346 were classified as fixed or malleable. This classification provides a clear distinction between participants' intelligence views. That is, average scores on the implicit theory questions had to be below 3 (fixed) and above 4 (malleable), and each of the three responses had to exhibit consistent scores of 3 or below (fixed) and 4 or above (malleable).
[a] Using a combination of SAT Scores and Acceptance Rates, the universities were divided into bottom and top groups. The Bottom University Group is composed of Universities A, B, and C. The Top University Group is composed of Universities D, E, and F. We calculated the average of the median SAT Scores and the Acceptance Rates for both groups.
[*] χ^2 (Chi Square) test indicated significant differences between the universities at $p < 0.05$,
[**] χ^2 (Chi Square) test indicated significant differences between the universities at $p < 0.01$

ACKNOWLEDGEMENTS

This research was supported by in part by Northeastern University. We would like to thank Jim Smith, Kathryn Sullivan, Stefanie Tate, Steve Perreault, James Wainberg and Benjamin Luippold for their comments and assistance.