Manipulation of Self-Efficacy in Participants with Incremental or Entity-Implicit Theories of Knowledge

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Introduction

Abstract

Self-efficacy is the strength of one's personal beliefs in his or her ability to complete a task. Implicit theory of knowledge is a mindset which is related to beliefs about abilities (i.e. that ability is limited (entity mindset) or that ability is changeable (i.e. incremental mindset)) and that can predict how an individual will react when given feedback on a task. This study compared the effects of different types of feedback on performance in college students (*n=25*) with entity and incremental theories of knowledge. The hypothesis was those given negative feedback in the entity group would perform worse on a later task than those in the incremental group. There was no significant difference in performance on a task between groups.

Literature Review

Self-efficacy is the strength of one's personal beliefs in his or her ability to complete a task and can be influenced through performance accomplishments, vicarious experience, verbal persuasion, and verbal arousal (Bandura, 1977). Self-efficacy has been related to success in the academic environment and in athletics (Bandura, 1977). Individuals perform better when their efficacy is heightened. For example, students who believe that they are capable are more self-regulated, and more likely to persist at difficult or uninteresting academic tasks (Pintrich & De Groot, 1990). Efficacy judgements also determine persistence and effort, which will accompany performance, particularly in the face of adversity (Relich, Debus, & Walker, 1986). In Relich (1986), participants had their self-efficacy manipulated by giving individuals either positive or negative feedback. Also participants had their Implicit Theories of Knowledge measured to determine if the effects of an efficacy manipulation on performance would be moderated by implicit theory.

Performance accomplishments in the form of mastery experiences are influenced by efficacy and they are associated with future performance when given a similar or the same task (Bandura, 1977). If the individual has a positive outcome, it is suggested that his or her self-efficacy will increase. With the increased self-efficacy, the task once performed will be better and their abilities will strengthen. Further research shows that a heightened sense of efficacy helps to sustain task motivation, which leads to greater skill acquisition (Schunk, 1983). The reverse is true for performance failure: if the individual doesn't perform up to his or her standards, self-efficacy will decrease. The next time they come across the same task or something similar, their performance will suffer.

Studies have been conducted to understand if one's self-perceptions of efficacy can be modified to predict accomplishments of a specific task. For example, Luzzo, Hasper, Albert, Bibby, and Martinelli (1999) placed college student participants into one of four treatment conditions: performance accomplishments only, vicarious learning only, combined treatment (which consisted of both performance accomplishment and vicarious learning), and the control group. Participants in the accomplishment condition were given an easy goal (i.e., to solve at least 6 math problems out of 12 in 10 minutes). All participants in accomplishment condition received a passing score and Luzzo et al. (1999) found that those participants showed greater levels of confidence in their ability to earn a letter grade of a B or higher in their future math and science courses. In other words, participants who met the goal developed higher self-efficacy.

In addition to actual experience through performance, efficacy can be influenced by verbal persuasions. Verbal persuasion is simply influencing efficacy by speaking with individuals (Bandura, 1977). Verbal persuasion is not as strong an influence as performance accomplishment since one does not have the proper resources to judge mastery from verbal persuasion. Past performance provides authentic information for judging personal capabilities (Schunk, 1982). Even so, verbal persuasion is commonly used in self-efficacy experiments.

For example, Tuckman and Sexton (1991) responded to individuals who emailed their professor and gave participants either a positive statement of encouragement or no encouragement feedback. Their results showed that those who were given the positive encouragement after the first exam increased their perception of their capability to perform better on their second exam. As a result of their increased perception, those who received the positive feedback did significantly better on the second exam than those who received the neutral e-mail (Tuckman & Sexton, 1991).

Park and John (2014) found that undergraduate students given a pen with MIT engraved on it showed higher self-efficacy and higher performance than participants who used a Pilot or Uni-Ball pen when taking the practice GRE. Their results showed that brand use can enhance feelings of self-efficacy, which can lead to better task performance.

Even though self-efficacy can be manipulated, there may be cases when the feedback may not change how an individual feels about his or her results. For example, an individual's implicit theory of knowledge can create a mindset which can cause an individual to believe that his or her abilities are limited and not changeable. In other words, implicit theory can predict how an individual will react when given feedback on a task. Implicit theory, otherwise termed mindsets, refer to the beliefs people hold about specific human attributes such as intelligence, personality, and athletic ability, with a particular focus on whether these qualities are considered immutable or changeable (Dweck & Leggett, 1988). Implicit theory comes in two forms: entity and incremental. Individuals who endorse an entity theory view qualities such as intelligence or personality as stable and trait-like, and believe opportunities for change or development are not within one's control. Individuals who endorse incremental theory view personal attributes as malleable and open to development or change (Gucciardi, Jackson, Hodge, Anthony, & Brooke, 2014). This mindset holds that traits can be learned and further improved. The two mindsets have been related to different outcomes.

For example, Davis, Burnette, Allison, and Stone (2011) placed college students into one of two conditions: an underdog condition or top dog condition. Participants in the underdog condition were told that for the competition they would be going against students from Massachusetts Institute of Technology who had an average SAT score of 750 and they were ranked in the 99th percentile of overall SAT scores. Participants in the top dog condition were told that for the competition they would go up against students from Riverside Community College who had an average SAT score of 500 and they were ranked in the 49th percentile overall SAT scores. Davis et al. (2011) found that those in the underdog condition reported a greater feeling helplessness based on the extent they held entity versus incremental beliefs. Those with the entity theory of knowledge felt as if they did not have a chance in the competition if they were told that their opponents were MIT students. However, for the incremental theory of knowledge results showed that individuals were willing to believe that their math skills could change so that it would be equal or surpass those who had better math skills than they did.

Hong, Chiu, Dweck, Lin and Wan (1999) studied implicit theories and effort versus ability attributions following negative feedback on a task. In this experiment, undergraduate participants were asked to fill out an implicit theories measure. Then participants worked on a test at the same time as another participant. After the test was complete, the participants were showed their results compared to other test taker. All participants were told their scores were lower than those of the person they were testing with (i.e., all participants were given negative feedback in this experiment). After the test, participants were asked to fill out a questionnaire regarding their test evaluation. The results were that participants' effort attribution was significantly predicted by incremental and entity theories. Incremental theorists assigned the same amount of weight to effort in explaining their poor performance, but entity theorists believes that their ability was at its peak and noted that the reason they did so poorly was due to their lack of ability and not the amount of effort they used.

The purpose of this study was to determine if manipulating self-efficacy would impact performance on a challenging task. Another purpose of this study was to determine if the effects of an efficacy manipulation would be moderated by implicit theory. It is predicted that those with entity theory of knowledge would perform worse on a future task than those with incremental theory of knowledge when given negative feedback.given negative feedback.

Method

Participants

Participants were 25 undergraduate male Hampden-Sydney students and from various psychology classes. The participants were selected based on their scores on an implicit theories of knowledge test that they were given (selection ranged from high on entity/low incremental and high on incremental/low on entity) and they were randomly assigned to positive or negative feedback conditions.

Materials

The Implicit Theories of Intelligence Scale Form for Adults (Dweck, 1999) was administered first. The Implicit Theories of Intelligence Scale Form for Adults is an 8 question test to measure entity or incremental theory of intelligence. Items include "You can always substantially change how intelligent you are", and "No matter how much intelligence you have,

you can always change it quite a bit". Half of the statements assess incremental mindset and the other half assesses entity mindset. Participants indicated the extent to which they agree or disagree with the statements. The scores on the Implicit Theories of Intelligence were calculated by taking the sum of the questions and dividing the sum by the number of questions on the form.

A spatial test was administered after the individual decided to take part in the experiment. The spatial test was a cognitive test which the participants mentally manipulated a 2-dimensional figure to determine its 3-dimensional shape. The participant was given six 2-dimensional version shapes and for each shape the participants had to choose one of the 3-dimensional shapes that were accurate to the 2-dimensional shape.

The last test administered was a 60 item test similar to the Raven's Progressive Matrices, which measures reasoning ability.

Procedure

Participants first took the implicit theory test. Students were selected based on entity and incremental theories scores and were contacted via email to participate in the experiment. Participants were taken into a laboratory setting in which they were informed that they will complete a series of skill tasks. The first task that was given was a spatial test. Once the participant finished the spatial test the participant was randomly assigned to receive either positive or negative feedback. For the positive feedback the participants were told that their scores were in the 80th percentile and they did a considerable job. Participants in the negative feedback condition were told that their scores were in the 30th percentile and that they did not do as well as others. After the verbal feedback was given, the participants were given the reasoning test where they were instructed that they will be given 15 minutes to complete as many as possible. After the participants finished the matrices, or when the 15 minutes were over, the participants were debriefed.

Results

To test the hypothesis that participants in entity theory of knowledge condition would perform worse, a two-way Analysis of Variance was used. The design was 2-by-2 with feedback (positive or negative) and theory (entity or incremental) as the independent variables. The dependent variable was scores from matrices task. The data focused on the number of matrices attempted by each condition and the portion of correct related to how many that were attempted. Means and standard deviations are on Table 1.

Table 1

Number of matrices attempted and percent correct by implicit theory and self-efficacy condition

	Entity		Incremental	
	Negative	Positive	Negative	Positive
	M(SD)	*M(SD)*	*M(SD)*	*M(SD)*
Matrices Attempted	48.5 *(3.9)*	48.8 *(8.8)*	50.8 *(9.4)*	46.7 *(9.6)*
Accuracy	82.9%	80.4 %	81.2%	77.5%

There was no significant main effect for implicit theory for either on the number of problems attempted (F (1, 20) = .001, p = .97) or for percent correct (F (1, 20) = .003, p = .18). There was no significant main effect for feedback on the number attempted (F (1, 20) = .26, p = .62) or for percent correct (F (1, 20) = .34, p = .57). There was no significant interaction between theory and feedback for either number attempted (F (1, 20) = .36, p = .55) or for percent correct (F (1, 20) = .01, p = .91).

Discussion

The purpose of this study was to determine if manipulating self-efficacy would impact performance on a difficult or challenging task. Another purpose was to determine if the effects of an efficacy manipulation would be moderated by implicit theory. The hypothesis was that those with an entity theory of knowledge would perform worse on a future task than those with incremental theory of knowledge when given negative feedback. The hypothesis was not supported. There was no significant interaction between implicit theory and type of feedback on the number of matrices attempted or the percent correct. These results may mean that one's implicit theory may not be a predictor of how one may take feedback on a specific task.

My data is not consistent with current research. The theory is that those who are given negative feedback are seen to perform worse than those given positive feedback. In the Tuckman and Sexton (1991) students performed better on the second exam when given positive feedback. Those in the neutral condition did not have a heightened self-efficacy and in return performed significantly worse than the positive condition. As for implicit theories of knowledge in Davis, Burnette, Allison, and Stone (2011), students with the entity mindset when placed in the lower efficacy group believed they did not have a chance against the MIT students. Therefore in their experiment it was understood that those with an entity mindset in the negative self-efficacy group developed a helpless attitude and essentially gave up on the situation. Another example is the Park and John (2014) experiment. Individuals with their self-efficacy heightened simply through brand usage performed

better on the GRE. However, with no significant data it is possible to believe that implicit theory may not be a proper predictor for how one may take feedback.

One limitation may have been the amount of time allotted for the task progressive matrices. If the amount of time was shorter, then those in the negative feedback could have felt the hopelessness of the task which could have been a factor for predicting the amount of questions attempted as opposed to the positive group. An example of this idea is the Davis et al. (2011) where those who were placed in the underdog condition, who were entity theorists, had a lower efficacy. The individuals who were entity theorists were already mentally defeated even before the competition. The lowered time would give entity theorists, who are given negative feedback, the notion that the task is difficult and cannot be finished in the allotted time, which could also lower the ability to persist on an uninteresting task.

A future project could be to subject everyone to the negative feedback condition. The reason is because those with heightened efficacy would perform better which of course would outperform those in the negative condition. However, if everyone is in the negative feedback condition it would be easier to focus on two cells as opposed to four cells. Also this could possibly cause for a controlled condition. This may reveal if it is the negative feedback, or if the task at hand is simply too difficult.

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