Quit, Persist, or... Switch?: Putting Lay Theories Into Context

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Abstract

Past research suggested that holding an incremental theory of intelligence (defined as the belief that intelligence is malleable and unstable) is more beneficial than holding an entity theory of intelligence (defined as the belief that intelligence is fixed and stable). Incremental theorists have been found to be more persistent in the face of difficulty, show more interest in learning new skills, and cope better with failure. Yet, does this lay theory lead to superior performance under all circumstances? Studies 1 and 2 presented participants with two easy anagrams, followed by an impossible-to-solve anagram, on which their persistence and behavioral choices were measured. When participants could only choose between continuing or quitting, incremental theorists showed more persistence, replicating earlier findings. However, differences in persistence between entity and incremental theorists were eliminated when presented with a "switch-to-a-different-anagram" choice option in the face of difficulty. Moreover, the majority of participants holding both theories chose to switch rather than to persist or quit when given this option. Study 3 then examined if there were differences in how different lay theorists interpreted this "switching" option.

Keywords: Lay Theories, Persistence, Failure

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Imagine for a moment two students: one whose schedule is full of honor's level courses, whose grades may hover in the B-range, and who takes classes that will be very challenging intellectually; another who takes classes that are known to be easy, whose grades never fall below an A, and who never has to study for a single test. These are examples of not only two very different students, but two very different outlooks on life. On the one hand, students of the first type may benefit more by taking courses that challenge them and develop their intellectual abilities. On the other hand, students of the second type are strategic in taking courses that they naturally excel in without much effort. Yet, how students choose their classes, structure their major, and even how they perform in these classes, are driven by reasons they are generally unaware of. Whether they strive for growth and development in their future career, or settle for complacency, is also determined by these very psychological forces. What, then, are these implicit forces that direct so much of our lives?

Previous research has shown that the answer to this question lies in our lay theories – fundamental assumptions and explanations that we make about ourselves and for things that happen in our world (Heider, 1958; Kelly, 1955; Morris, Ames, & Knowles, 2001). Each individual holds these fundamental beliefs, and they shape the way we perceive challenges and their outcomes, both good and bad (Dweck, Chiu, & Hong, 1995; Hong, Chiu, Dweck, Lin, & Wan, 1999). These beliefs motivate the way we think, feel, and even how we act (Dweck, 1996; Dweck & Leggett, 1988; Hong, Chiu, Dweck, & Sacks, 1997; Hong et al., 1999), although we hardly know that they are there. We do not know when they are working in our favor, or when they are working against us, because they are implicit (Dweck, Chiu, & Hong, 1995; Chiu, Hong, & Dweck, 1997; Hong, Levy, & Chiu, 2001).

These lay theories can be theoretically classified into two distinct categories of fixedness and malleability (Dweck, 1996; Dweck, 2000; Hong et al., 1999). Individuals who hold a fixed lay theory of intelligence are called "entity theorists," whereas those who hold a malleable lay theory of intelligence are called "incremental theorists." Entity theorists tend to hold performance-oriented goals, in which they place more importance on measuring their ability and receiving reaffirming positive judgments from others for good performance. In contrast, incremental theorists tend to hold learning-oriented goals, which emphasize finding new ways of learning and mastering the problem or material that presents as challenging (Dweck, 2000; Dweck & Leggett, 1988; Elliot & Dweck, 1988). These goals translate into different patterns of affect, cognition, and behavior, especially in response to failure (refer to Figure 1 for a detailed diagrammatic representation) (Dweck, 2000; Dweck, Chiu, & Hong, 1995). When confronted with challenge or failure, entity theorists tend to show over-simplified and rigid thinking, evaluative affect (such as contempt for higher performing peers), and less persistence on difficult tasks. In contrast, incremental theorists demonstrate more analytical thinking processes, empathetic affect (such as a cooperative feelings toward development), and mastery-oriented behavior (Dweck, Chiu, & Hong 1995). For example, they tend to become more focused on a difficult task at hand, work harder on the problem, and emphasize acquiring mastery of the relevant skills.

Domain Specificity

While these lay theories determine to a large extent how individuals operate in their daily lives, they are not confined to holding either one or the other of these beliefs. Lay theories are domain-specific, and often depend on the context in which they are held (Dweck, 1996; Chiu, Hong, & Dweck, 1997). For example, an individual could have a fixed view of morality (for

example, "something is either right or wrong with no gray area in between") but a malleable belief about intelligence (for example, "If I study hard I can do well in a challenging course."); one can hold a malleable belief about sports performance (for example, "I can practice to become better at football") and a fixed belief about love and romantic relationships (for example, "there is only one true love for me") at the same time. For the purposes of the present analysis, we will focus specifically on fixed and malleable beliefs about intelligence.

Lay Theories of Intelligence

According to Dweck and colleagues (Dweck, 1996; Dweck, 2000; Dweck, Chiu, & Hong, 1995; Hong et al., 1999), holding a fixed, or "entity," theory of intelligence entails believing that intelligence is fixed and stable. Entity theorists tend to believe that people are born with varying levels of intelligence that remain relatively stable and resistant to change throughout life. Learning new skills is a consequence of this pre-existing potential, rather than necessarily contributing to it. Entity theorists who succeed believe that they do so because they were born with natural talent at the activity. To them, effort and persistence at a task indicates a lack of ability, which undermines natural intelligence (Mueller & Dweck, 1997).

They are mainly performance-oriented, focusing on showing off their existing skill and ability rather than embracing the opportunity for personal development. Good performance leads to perceptions of positive judgments about intelligence from others. If performance is poor, entity theorists will blame the poor performance on their lack of ability or intelligence, and will believe that others will think the same. In response to failure on an intellectual task, entity theorists experience helpless cognitions, affect, and behavior (for a review, see Elliot & Dweck, 1992). For example, they tend to give up more easily. Additionally, they are less likely to try new and challenging tasks, especially those on which they doubt their ability (Dweck, 1986).

Individuals who display a malleable, or "incremental," theory of intelligence do not share this emphasis on innate ability. Instead, they view traits as malleable and changeable, and can be developed over time with sufficient practice and commitment (Dweck, 1996; Dweck, 2000; Dweck, Chiu, & Hong, 1995; Hong et al., 1999). Incremental theorists believe that intelligence is not the result of genetics, but how one applies himself to a task. They are more likely to persist at a task in order to overcome any difficulty, and construe success as being a function of such dedication and persistence. Incremental theorists tend to hold learning-oriented goals, which orientate them towards mastery of the task, learning, and personal growth (Dweck, 1986; Dweck, 2000; Hong et al., 1999). The associated affect, cognitions, and behavior are most obvious in the face of failure on an intellectual task (Dweck, 2000; Dweck & Reppucci, 1973; Heyman & Dweck, 1992; Hong et al., 1999). In fact, past research has found that incremental theorists sometimes do not even interpret their inability to complete a task or solve a problem as failing on it (Dweck, 2000; Licht & Dweck, 1984). These individuals believe that they simply have to try a little harder or approach the problem from a different perspective before they can find the right answer and succeed (Dweck, 2000; Dweck & Leggett, 1988; Hong et al., 1999).

Since entity and incremental theorists hold such different views about intelligence, it is not surprising to find that they construe effort differently too (Leggett & Dweck, 1986). As a result of performance-oriented goals, entity theorists perceive effort as unnecessary given that they shouldn't need to put forth effort if they have the skills to succeed at a task (Leggett & Dweck, 1986; Mueller & Dweck, 1998). Stable beliefs about intelligence and ability are bolstered by low effort on the task, but undermined by the requirement of high effort. Therefore, when entity theorists face a challenge that requires them to put in a substantial amount of effort, they tend to perform more poorly, and quit more easily, than incremental theorists (Dweck, 2000;

Licht & Dweck, 1984). For incremental theorists, malleable beliefs about intelligence and ability reinforce the challenging nature of the unfamiliar tasks, and allow them to try new strategies and further realize their full potential (Dweck, 2000). Since learning is prioritized, activities that require little effort may be seen as hardly a worthwhile use of their time (Dweck, 2000).

Incremental Theory Superiority

Dweck and colleagues have argued that incremental theorists possess a distinct advantage over entity theorists, as evinced by their previous research (for a review, see Dweck & Leggett, 1988). For example, a study with elementary school children tested whether a helpless-oriented response would hinder their ability to complete a task (Licht & Dweck, 1984). The students were given a booklet to read containing information about how we learn, and answered seven questions directly relating to the material. The students were identified as either entity or incremental theorists. Both types of students were randomly assigned to one of two possible conditions, non-confusion (NC) or confusion(C). They were presented with either an easy-to-understand (non-confusing, NC) or a confusing (C) passage, respectively, before answering questions about it. As expected, in the NC condition with little obstacles to learning, entity and incremental theorists performed equally well—76.6% of entity and 68.4% of incremental theorists mastered the material by the end of the study. In the C condition, they were given the same booklet, but this one began with a confusing passage that was difficult for the students to understand. In this condition, the incremental students performed 37% better on the follow-up questions than the entity students. 71.9% of incremental theorists in this condition mastered the material, while only 34.7% of entity theorists mastered the material by the end of the study. In short, when faced with this difficult challenge, incremental theorists persisted longer, attempted more solutions, learned more, and performed better than entity theorists (Licht & Dweck, 1984).

Dweck and Colleagues (Dweck, 2000; Licht & Dweck, 1984) have argued that an incremental theory is superior to an entity theory because incremental theorists can take and use constructive criticism, they have a sense of self-worth that is not contingent on the judgments of others, and they develop self-esteem that is independent of others' performance or success. All of these give incremental theorists the freedom to attempt new and challenging tasks, to realize and develop their skills; these factors allow them to cooperate instead of compete with their counterparts, and to feel good about themselves even in the face of defeat. More importantly, an incremental theory of intelligence not only allows individuals to attempt difficult tasks, but furthermore, drives them to persist at the task until they find the right strategy to complete it (Dweck, 2000). From a practical standpoint, this is hardly surprising, since some of the most influential people in the world today are those who have had to overcome great obstacles through hard work and effort. Simply stated, the world's problems are rarely solved by people who give up and walk away at the first sign of difficulty.

Is an Incremental Theory Always More Advantageous?

Nevertheless, is an incremental theory *always* more advantageous than an entity theory? Just as easily as the benefits of an incremental theory come to mind, we can also easily think of times when holding an incremental theory may have associated drawbacks.

What often comes to mind are times when persistence is taken too far. In her book, *Self-Theories,* Dweck (2000) quotes Janoff-Bulman and Brickman (1981) in saying that, "While recognizing the importance of confronting obstacles, we can also recognize the importance of knowing when to opt out of a task – say, when it is truly beyond someone's current capabilities of when the cost of persisting is too great." However, she offers the counterargument that incremental theorists are completely capable of deciding when they lack the skills necessary to

solve a problem – in fact, an incremental theory may actually aid in an individual's decision to quit a task, because one can do so without shame or perceived lack in ability (Dweck, 2000). However, these claims remain empirically untested.

In addition, a theory that inclines one towards persistence is only beneficial depending on the nature of the task and the context. Take for example, a student sitting for an important examination in which she is given a certain number of questions to answer in a predetermined amount of time. During this examination, let us say that the following common scenario occurs: the student comes across an answer she does not readily know the answer to. In other words, she feels stumped by a difficult question. Assuming that she does not intend to walk away from the examination entirely, the student has two obvious options: she can attempt the difficult problem, but in doing so, she would lose valuable time that she can otherwise spend on answering other questions. Alternatively, she could choose to skip it in favor of answering more manageable questions first.

The former option is in line with an incremental mindset: the student comes across a challenging problem and persists until she overcomes it. However, this choice is not always the better of the two. Under time pressure, prioritization and time management become more strategic than blind persistence at a problem. In this paper, we are particularly interested in considering not just differences between entity and incremental theorists, but rather, how these differences interact with the environment that they are in.

Overview

In sum, Dweck and colleagues have argued that an incremental theory is more advantageous than an entity theory, while admitting that there may be a few circumstances under which this advantage may not hold. For instance, persistence that is taken too far when clearly

one lacks the ability to complete the task, and when there are opportunity costs that are higher than are worth risking. However, no studies have been conducted to test these exceptions to the incremental advantage theory, thereby leaving empirically unopposed the assumption that an incremental theory is always superior.

Here, we attempted to address this gap in the literature by considering the *context* in which people and their lay theories are embedded. When faced with only the options of quitting or persisting on a difficult problem, incremental theorists have been shown to persist longer than entity theorists (Elliot & Dweck, 1988; Licht & Dweck, 1984). But what about a context in which they are offered the option to switch out of the problem to another one of a similar type, as suggested in the aforementioned scenario? Would incremental theorists still show higher levels of persistence, and in larger proportions? In three studies, we addressed this research question: do incremental theorists persist more than their entity counterparts on a difficult problem when offered the option to switch problems? Study 1 tested whether incremental theorists are more likely to choose to persist (proportions), and if they do so longer (duration) than entity theorists when given unlimited time to solve an impossible anagram. Study 2 was similar to Study 1, except that a time pressure was imposed. Study 3 attempted to measure if there were differences in how entity theorists and incremental theorists construed switching behavior.

Study 1: Persistence and Choice when Faced with an Impossible Task

This study directly tested whether incremental theorists would persist longer, and choose to persist in larger proportions, than entity theorists when offered the choice among quitting, persisting, and switching problem.

We measured participants' lay theory of intelligence, and randomly assigned them to one of two conditions which determined what choice options they were given in attempting the

anagram questions. The two main outcome measures of interest were persistence and response

choice on the impossible anagram. An impossible-to-solve anagram was used because it best

represented a difficult challenge that allowed for unlimited persistence and no differentiation of

performance based on previous skill with such verbal ability questions. On the persistence

measure, we expected to replicate Dweck's previous findings, showing that incremental theorists

persist longer than entity theorists on the impossible anagram. On the choice measure, we

expected entity theorists to choose the switching option over quitting and persisting. We did not

have any a priori predictions for how the incremental theorists would respond to the additional

switching option.

Method

Participants

123 online participants (54.5% males, M_{age}= 33.8 years, geographic location: United

States of America) from Amazon Turk participated for monetary compensation in this study.

Procedure

The online experiment was completed on computers using standard Qualtrics survey

software. Participants were first asked to complete the following four items which measured their

lay theories of intelligence: "You can learn new things, but you can't really change your basic

intelligence"; "You have a certain amount of intelligence, and you can't really do much to

change it"; "Your intelligence is something about you that you can't change very much"; and

"To be honest, you can't really change how intelligent you are." These were directly taken from

Dweck's measures (Chiu et al., 1997; Hong et al., 1999). Participants rated to what degree they

agreed with the above statements on a 6-point Likert scale, ranging from strongly disagree (1) to

strongly agree (6). The internal consistency of these measures was supported with a Cronbach's

alpha of .97.

All participants read the same instructions for every anagram they were presented with:

"In the next few pages, we will present anagrams for you to solve. Basically, you will get letters that you have to rearrange to form a new and valid word. Please use every letter given, and use each letter only once. Please type your solution to the anagram in the box provided under the anagram."

They were also instructed to only form a single word from the scrambled letters rather than multiple words.

Participants were shown two easy anagrams, and then an impossible-to-solve anagram, one after the other in this specific order. The first anagram presented was "RETE." The solutions to this anagram included "TREE" and "RETE." Next, participants were given the second anagram, "MODR," the solution for which was "DORM." In the first two anagrams, all participants had the options of persisting on the anagram and eventually giving an answer to it, or to quit it and leave the questionnaire at any time. Participants who chose to answer the anagram could input their answers in the space that was provided at any time, and were directed to the next anagram[1]. If they chose to quit the questionnaire altogether, they were directed to the end of the questionnaire where demographic information was collected. After completing each anagram, participants rated its difficulty on a Likert-type scale (1=very difficult, 7= very easy). The purpose of the easy anagrams was to give them a practice and an idea of how to approach anagrams, and to build their confidence so that when they arrived at the impossible-to-solve anagram they would at least make a reasonable attempt to solve it.

Regardless of the accuracy of their responses, anyone who answered the first two easy anagrams then moved on to the third anagram "DUITBALNBIEE" that was impossible to solve.

This anagram consisted of the word "INDUBITABLE" with an extra "E" to make it impossible to complete. The word "INDUBITABLE" was chosen for the impossible anagram because 1) it is a relatively unfamiliar word to many people, 2) it is a relatively long word with many letters, which increases the perception of possible variations that could be used to make a word, and 3) it has a lot of vowels which adds to the complexity of the anagram. Pretesting showed that almost no one could actually tell that the anagram was unsolvable. At this impossible anagram, participants were randomly assigned to one of two possible conditions that determined the choice options presented to them on this anagram – Dweck's Options (DO) or Additional Options (AO) conditions.

In the DO condition, participants were given only Dweck and colleagues' dichotomous options to either "quit" the questionnaire entirely, or to "persist" by continuing to try and answer the anagram given to them (for examples, see Dweck & Reppucci, 1973; Mueller & Dweck, 1998). In the AO condition, participants were given these two choice options plus the additional option, "Please switch me to a different anagram!"

Participants who chose to answer the impossible anagram were told that their answer was incorrect, and then directed to complete the last few questions at the end of the questionnaire. Those who decided to quit it were similarly directed to the end of the questionnaire. Participants in the AO condition who chose to switch to a different anagram were told that there was no additional anagram for them to solve, and were then directed to the end of the questionnaire. We had them stop after this impossible anagram because our main dependent variables were collected on this attempt, namely (1) persistence on the impossible anagram and (2) choice of action on the impossible anagram.

We asked participants whether or not they had any previous experience with anagrams.

This was necessary to ensure that all participants were on the same playing field in terms of experience and ability with anagrams. Participants were also asked how they felt at that time on a Likert scale (-5=very bad, 5=very good), and provided demographic information, such as age, sex, ethnicity, and academic major.

Results

Manipulation Checks

Prior to completing the anagram task, participants reported their previous experiences and abilities with anagrams. On a scale of 1 (*Not sure what they are*) to 8 (*Very good*), participants reported a mean skill level of 5.32 ($SD = 1.71$), which most closely corresponds to the label "Neither good nor bad." As Dweck and colleagues (Elliot & Dweck, 1988; Licht & Dweck, 1984) have noted in previous research findings, it is important that both entity and incremental theorists enter the task at the same skill level. In line with this, we found no significant differences in pre-existing skill level between entity and incremental theorists ($p = .35$), and none between choice option conditions ($p = .76$).

Further manipulations checks validated the difficulty levels of our anagrams. A repeated measures analysis of variance (ANOVA) showed that participants ranked the easy anagrams as fairly easy ($M_{Tree} = 4.35$; $M_{Dorm} = 5.27$), and the impossible anagram as significantly more difficult ($M_{Impossible} = 1.21$), $F(2,240) = 507.73$, $p < .001$. There were no significant differences between the perceived difficulty of each anagram between conditions ($p = .20$).

In line with Dweck and colleagues' previous analyses (for example, see Chiu, Hong, & Dweck, 1997), a categorical lay theory of intelligence variable was created from the continuous scale measure to differentiate the clearly entity and incremental theorists. After averaging the responses across the four lay theories of intelligence measures, we obtained a lay theories of

intelligence scale score for each participant. Those with a mean score at and below 3.0 were considered entity theorists. Those with a mean score at and above 4.0 were considered incremental theorists. As in Chiu, Hong, and Dweck (1997), "participants who scored between 3.0 and 4.0 on the lay theory of intelligence measures were excluded from the theory groups." This allowed us to compare between *clearly* entity and *clearly* incremental theorists, as is common practice in past literature (Chiu, Hong, & Dweck, 1997; Elliot & Dweck, 1988; Hong et al., 1999; Licht & Dweck, 1984).

Out of the two easy anagrams presented, 3 (2.4%) participants answered both of them incorrectly, 23 (18.7%) participants answered one correctly and one incorrectly, and 97 (78.9%) participants answered both of the easy anagrams correctly. We ran the analyses first with all of the data, and then only participants who answered both easy anagrams correctly.

Persistence Outcomes

Our persistence measure, page submit duration, measured the amount of time between first being presented with the impossible anagram and submitting one's response choice. We decided to use page submit duration as our primary measurement of persistence because it not only accounted for the time it took participants to choose their response, but also included any time in between the selection of their response option and submission of the page, during which participants may have been typing out their answers, deliberating over their answers, or checking them.

As expected, in the Dweck Options condition, when only presented with the choices to quit or persist on the impossible anagram, we replicated her previous findings – incremental theorists tended to persist longer than entity theorists, $F(1,49) = 3.04$, $p = .08$. However, this difference in persistence was eliminated in the AO condition ($p = .21$), where participants had the

additional third option of switching to a different anagram. These results are represented in

Figure 2.

Because of unequal variances, an ANOVA on page submit duration showed no significant

interaction of lay theory and condition ($p = .11$), even though the pattern of results suggests a

classic interaction effect. However, we found significant main effects for both lay theory and for

condition. Incremental theorists ($M = 115.73$) spent a significantly longer duration on the page

than entity theorists ($M = 52.41$), $F(1, 105) = 3.92$, $p = .05$. Participants in the DO condition (M

$= 140.16$) spent a significantly longer duration on the page than participants in the AO condition

($M = 27.98$), $F(1, 105) = 12.30$, $p = .001$. Considering between-condition persistence for each

theory group, entity theorists spent a significantly lower duration working on the impossible

anagram in the AO condition than in the DO condition, $F(1,38) = 17.14$, $p < .001$. Incremental

theorists similarly spent a significantly lower duration on the impossible anagram in the AO

condition than in the DO condition, $F(1,67) = 11.66$, $p = .001$. Therefore, having the third

switching option available and salient to participants made them less inclined to persist on the

impossible anagram overall, regardless of what lay theory they held.

Choice Outcomes

A frequency analysis showed that the responses of participants in the DO condition were

significantly different from the responses of participants in the AO condition[2]. However, there

were no significant differences in choices between entity and incremental theorists within each

condition. Our results show that participants preferred the switching option over quitting or

answering, regardless of whether or not they held an entity or incremental theory of intelligence.

These raw frequencies and percentages are summarized in Figure 3.

In comparing only the percentages of participants who chose to quit versus not to quit

(either to answer or to switch), we were able to conduct Fisher's exact test analyses on the data due to violations of the normal chi-square analyses assumptions. For both entity and incremental theorists in the DO condition, the proportions of participants choosing to quit versus not to quit were similar and fairly evenly split. However, these even proportions were drastically changed in the AO condition where the switching option was very attractive to most participants. In fact, now 94.7% of entity theorists chose not to quit over quitting, and 100% of incremental theorists chose not to quit over quitting. Whereas these between-theory differences were not significant, the between-condition differences for entity theorists as well as incremental theorists were significant (Fisher's exact test $p = .008$ and $< .001$, respectively).

Filtering for Correct Responses

We repeated the same analyses with only data from participants who had gotten both easy anagrams correct. We replicated the same pattern of results and significances as when all the data was used, both for our measures of persistence and choice outcomes.

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Discussion

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Our results show that incremental theorists do tend to spend, and therefore waste, more time on an impossible problem, as compared to entity theorists. Although they may experience an advantage in learning new skills and in facing obstacles to their goals, this comes at the cost of also wasted time in persisting on challenges that may very well be beyond their ability altogether. Furthermore, although incremental theorists tended to persist longer in the face of difficulty than entity theorists, they only did so when given only two options – to try or to quit – on a problem. However, when presented with the opportunity to switch to another similar problem as a third option, the otherwise observed difference in persistence between entity and incremental theorists was eliminated. Both incremental and entity theorists showed significantly

lower, and no different, persistence durations when given the option of switching problems. Under these circumstances, incremental theorists who, under Dweck's classic choice options, would normally act according to a mastery-oriented approach to learning and challenge showed equal tendencies to ask for a different question when faced with difficulty as their entity theory counterparts, who have been labeled by previous studies as "quitters."

Study 2: Choice Under Time Pressure

Study 1 showed that incremental theorists persisted longer on an impossible anagram when given only the option to persist or quit in the face of difficulty. Moreover, entity theorists and incremental theorists were equally as likely to choose the additional option to switch to a different anagram when given that choice. However, in Study 1, participants had an unlimited amount of time to attempt the anagrams presented. This study attempted to simulate the many instances in real life where we do not have the luxury of time to embrace challenge. Here, we tested whether our findings would hold true if participants were put under a strict time pressure on every anagram.

Method

Participants

204 (68.6% male, M_{age} = 29.8 years, geographic location: United States of America) participants from Amazon Turk participated in this study for monetary compensation. 6 of the questionnaires were mostly incomplete, leaving 198 completed questionnaires for analysis.

Procedure

We used the same procedure as in Study 1: Participants filled out lay theory of intelligence measures, were randomly assigned to either the DO or AO condition, and then given two easy anagrams followed by an impossible one to attempt. The major difference in this study

was that participants were given a 30-second time limit to solve each anagram, instead of the

unlimited time allowed in Study 1. After the 30-second time limit was up, participants were

automatically taken to the next page of the questionnaire, regardless of their response or lack

thereof.

Results

In this study, we only considered choice outcomes because the short time limit given to

participants on each anagram precluded accurate measurement of persistence on the impossible

anagram.

Manipulation Checks

Similar to study 1, a repeated measures ANOVA and post-hoc tests showed that

participants reported significant differences in the difficulty ratings among the easy ($M_{Tree} = 4.35$;

$M_{Dorm} = 5.27$) and impossible ($M_{Impossible} = 1.21$) anagrams, $F(1.86, 362.34) = 361.7$, $p < .001$[3].

Furthermore, these difficulty ratings did not significantly interact with condition ($p = .91$),

therefore suggesting that there were no significant differences in difficulty ratings between

conditions.

Of the two easy anagrams, 14 (6.9%) participants completed both incorrectly, 88 (43.1%)

participants completed one correctly and one incorrectly, and 102 (50.0%) participants

completed both correctly. As in Study 1, we analyzed all of the data together and then filtered the

data to include only those participants who answered both easy anagrams correctly.

Choice Outcomes

We found the same pattern of results as in Study 1. Nearly all participants in the AO

condition, regardless of their lay theory of intelligence (entity = 88.2%; incremental = 90.4%)

chose the additional option to switch anagrams. For DO entity theorists, 8 (40.0%) chose to quit,

while 12 (60%) chose to persist. For AO entity theorists, 1 (5.9%) chose to quit, 1 (5.9%) chose

to persist, and 15 (88.2%) chose to switch. For DO incremental theorists, 7 (36.8%) chose to

quit, while 12 (63.2%) chose to persist. For AO incremental theorists, 0 chose to quit, 5 (9.6%)

chose to persist, and 47 (90.4%) chose to switch. A summary of these results can be found in

Figure 4[4].

Filtering for Correct Responses

The pattern and significances of our choice outcome results remained the same when the

analyses were rerun with only participants who answered both easy anagrams correctly.

Discussion

Under time pressure, our choice outcome findings replicated those in Study 1—both

entity and incremental theorists gravitated towards the option to switch when they had that

option available. This reinforces the notion that an incremental theory may only prove superior

for persistence under conditions of forced choice between quitting and persisting. Furthermore,

when the option is made available to them, incremental as well as entity theorists choose to

switch in much higher proportions than to answer the question or quit altogether. Does this

suggest that an incremental theorist would make no more persistent a choice when given the

option to change problems than an entity theorist? Or does this pattern of results arise because of

differences in how the switching option is perceived? Perhaps entity theorists may see switching

as an opportunity to stop doing the difficult problem, whereas incremental theorists may construe

it as an opportunity to continue working on more anagrams for personal development. Study 3

explicitly tests these possible differences in interpretation of switching behavior.

Study 3: Is Switching Question Quitting or Persisting?

Thus far, Studies 1 and 2 have reliably shown that a switching option is highly attractive

to both entity and incremental theorists. Not only does it eliminate differences in effort spent on a challenging question, but it furthermore exerts a significant effect on how people choose to react to difficulty above and beyond their lay theories of intelligence. Yet, what exactly does this act of switching anagrams mean to each of these theorists? Do these different mentalities cause us to construe switching differently, as we construe failure and effort differently?

Since entity theorists have been shown to quit faster and in greater proportions than incremental theorists, they may very well be attracted to the switching option because they liken it to quitting the problem. On the other hand, incremental theorists may equate switching with persisting on anagrams in general, such that switching anagrams would give them the opportunity to do more, and hence, get better at these types of verbal problems. In sum, this switching option may very well mean different things to different lay theorists. Study 3 was designed to measure participants' perceptions about switching problems. Its aim was to examine to what extent entity and incremental theorists viewed switching problems as quitting or persisting. We expected that entity theorists would view switching to a different type of anagram, but not quitting the entire task, more as quitting-oriented behavior than incremental theorists would, and vice versa.

Method

Participants

74 participants (63.9% male, $M_{age} = 31.4$ years, geographic location: United States of America) were recruited from Amazon Turk.

Procedure

Participants responded to a questionnaire asking them the degree to which they thought an action should be considered quitting or persisting. All of the scenarios were related to

anagrams, in order to make the data relevant to our previous findings. Participants read the following four scenarios: "I write down an answer to the anagram given to me, and move on to the next question"; "I stop doing the anagram and do not continue doing any more anagrams"; "I stop doing the current anagram and switch to another anagram instead"; and "I switch from the current anagram to a similar type of word-rearrangement problem." They responded to each statement using a Likert-type scale, ranging from clearly quitting (1) to clearly persisting (5).

After participants completed the short questionnaire about perceptions of quitting, they were asked to complete the same lay theory of intelligence measures as used in studies 1 and 2. Demographic information such as age, gender, and ethnicity were then collected.

Results & Discussion

Independent t-tests were conducted to examine different theorists' conceptions about quitting behavior. Most importantly, we found no significant differences between incremental and entity theorists' perceptions of switching behavior ($p > .05$). Entity and incremental theorists did not show any differences in how they construed each of the other three behaviors, namely answering the anagram given, stopping all anagrams, and switching to another type of word-rearrangement problem altogether (all $p > .05$). These results are represented in Table 1.

We can thereby infer that both theorists are relatively similar in the way they explicitly interpret all of these behaviors. Therefore, we can conclude that the options we present to our participants on the anagram tasks in studies 1 and 2 are construed no differently among entity and incremental lay theorists. In light of these findings, we can interpret our results from the previous two studies as suggesting that entity theorists may not necessarily be quitters in the face of difficulty. Rather, given that they are choosing to switch to another anagram in much higher proportions than to quit, perhaps what past studies considered "quitting behavior" and "helpless

responses" is merely the inclination to move on to another exemplar of the same type of problem in the face of difficulty, thus ensuring another opportunity to succeed and learn.

General Discussion

We found support for our research question exploring the differences in persistence behaviors between entity and incremental lay theorists. Incremental theorists do tend to persist longer than entity theorists, but only when given a forced choice between quitting or persisting on a problem. However, when offered a third option of switching problems, these differences in persistence duration are eliminated (Study 1). In addition, this perceived incremental superiority depends highly on the context. When given a third option to switch, on top of the options to quit and to persist, similarly large proportions of incremental theorists chose the switching option over the other two, just as their entity counterparts (Studies 1 and 2). Lastly, we found that the results are not due to differences in how these lay theorists construe switching behavior, since both lay theorists interpret the options given in the same way (Study 3).

Theoretical Implications

These results have significant implications for Dweck and colleagues' previous research about lay theories of intelligence. Dweck and colleagues' (Dweck, 2000) have argued that incremental theorists are "real go-getters, thriving on challenge, persisting intensely when things get difficult, and accomplishing more than expected," and that an incremental theory of intelligence is generally superior to an entity theory of intelligence. Our findings question those assumptions by showing that, firstly, incremental theorists only persist longer than entity theorists under conditions of limited choice, but not when those choices are expanded to be more in line with reality (Study 1), and secondly, that the response options made available to a student may very well change the behaviors that they chose to respond to difficulty with (Studies 1 and

2).

        Our findings also question the theoretical validity of Dweck's proposed helplessness-oriented response to failure. If entity theorists truly did display a helpless response, our results would have shown that entity theorists would be more likely to quit the anagram task regardless of the additional option to switch. However, because entity theorists in the AO condition chose to switch to a different anagram, they were not displaying the helpless-oriented response as described by past research. Even though they could not solve the anagram – a failure that should provoke feelings of inadequacy for a performance-oriented participant – they still tended to choose to attempt another similar type of problem. This suggests that perhaps Dweck and colleagues' found the entity theorists' helpless pattern of behavior because they limited the potential choices of participants to either "quit" or "persist," as much as incremental theorists' persistence was shown to be limited to these conditions of forced choice. While more experimentation will be necessary to conclusively support this, it points to the possibility that Dweck's notion of superiority is basically one that exists within the bounds of such dichotomous choice options. As in our studies, had her participants been given an additional option with which to respond to difficulty and challenge, a different pattern of lay theory-driven behavior could very well have emerged instead.

        Additionally, because incremental theorists also chose the additional option to switch, these findings make a compelling case for the importance of the context in behavioral outcomes. Once both groups of lay theorists were given the option to switch, neither group acted according to what previous theorizing and results predicted. This suggests that environmental factors may override the foundation of an individual's lay theory in determining their behavior.

Limitations and Future Directions

One limitation of this study is that participants who chose the additional option to switch were automatically directed to the end of the study. Without actually providing additional anagrams, it is possible that the patterns we found captured only a snapshot of a larger pattern of behavior. While this cross-sectional data tells one story, perhaps simulating the real test-taking environment to a greater extent, such as offering participants multiple anagrams to solve in any chosen order with time pressure on the whole event, could very well offer a more comprehensive picture of the differences that emerge among lay theorists. How long and over how many anagrams would entity versus incremental lay theorists choose to persist? Would a one-shot failure versus multiple similar failures be equally daunting to both lay theorists? These are questions worth pursuing in future studies.

A secondary limitation to the present analysis is a behavioral test of differences in the perception of switching behaviors between entity and incremental theorists. Although our analysis from Study 3 showed no difference between the explicit construal of switching behavior between these two groups, our data did not capture how entity and incremental theorists might have interpreted the behavior differently at the implicit level. For example, an incremental theorist might implicitly consider the option to switch anagrams as persisting rather than quitting, because to them, attempting more anagrams could be interpreted as practicing or gaining valuable experience with these word problems in general. An entity theorist, on the other hand, may implicitly consider the switching option more as quitting than persisting because it gave them the opportunity to stop dealing with the difficult anagram – and strategically so without out-rightly having to admit defeat. While the incremental theorist may have viewed the switch as necessary for development and practice, the entity theorist may have viewed the switch as a procrastination of their inevitable failure—thereby protecting their self-esteem and perceived

ability, at least in the immediate moment. By offering them a viable exit option that may not necessarily be considered quitting, we may very well have given entity theorists an easy-out that protects their self-esteem while allowing them to escape from their failure. Future studies should tease apart these differences more thoroughly, thereby extending our examination of the possible differences in construal of switching behavior beyond just self-reports.

Conclusion

These findings suggest that a greater importance should be placed on the context in which lay theories influence behavior. Dweck and colleagues have previously found very distinct behavioral differences between entity and incremental theorists, generally when they are given the options of quitting versus persisting on a difficult task. Our analysis shows that these behavioral responses to difficulty and one's available response options are not independent of each other. Rather, how we respond to challenge is largely affected by what response alternatives we are presented with. This is an important avenue of research, and future studies could consider the proposition that neither theory of intelligence is superior per se, but instead, both have distinct advantages and disadvantages that are dependent on the *context* in which they are held.

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Footnotes

[1]It is important to note that participants were not given any feedback about the accuracy of their responses. Those who chose to give an answer were automatically directed to the next anagram regardless of whether or not their answer was correct. We later coded for the accuracy of their responses.

[2]Because of asymmetries in the number of choice options given, traditional chi-square analyses, binary logistic regression, and multinomial logistic regression methods could not be used here.

[3]Greenhouse-Geisser statistics are reported here since the assumption of sphericity was violated (Mauchly's test of sphericity was significant).

[4]Because of asymmetries in the number of choice options given, traditional chi-square analyses, binary logistic regression, and multinomial logistic regression methods could not be used here.

Author Note

Table 1

Perceptions of Quitting Behavior Between Entity and Incremental Theorists

	All Respondents		Entity Mean		Incremental Mean	
Statement	*M*	*SD*	*M*	*SD*	*M*	*SD*
Continue	4.10	0.97	4.29	0.69	4.11	1.0
Discontinue	1.42	1.0	1.76	1.4	1.22	0.73
Switch to same type	3.20	1.0	3.29	1.2	3.28	0.98
Switch to different type	2.99	1.0	3.12	0.99	3.02	1.1

Note. Continue = "I write down an answer to the anagram given to me, and move on to the next question."; Discontinue = "I stop doing the anagram and do not continue doing anymore anagrams."; Switch to same type = "I stop doing the current anagram and switch to another anagram instead."; Switch to different type = "I switch from the current anagram to a similar type of word-rearrangement.". No significant differences were found between incremental and entity theorists' ratings on all of these behaviors (all $p > .05$).

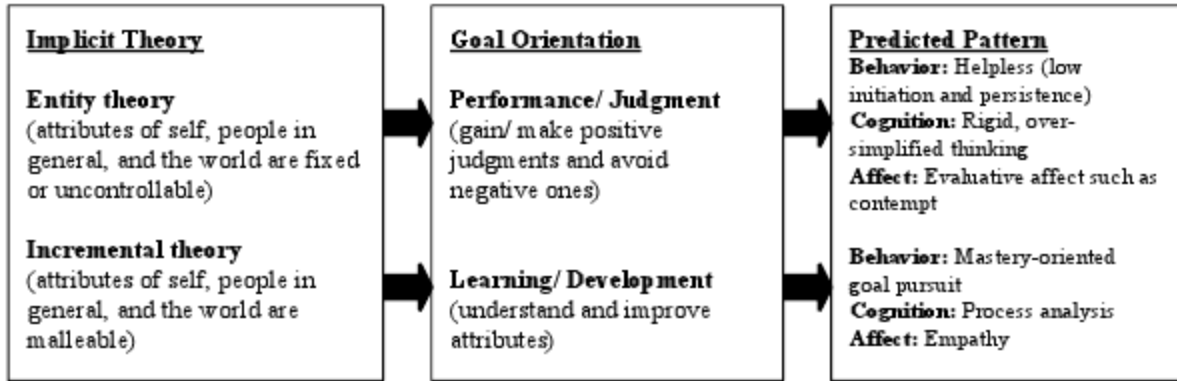| Implicit Theory	Goal Orientation	Predicted Pattern
Entity theory (attributes of self, people in general, and the world are fixed or uncontrollable)	**Performance/ Judgment** (gain/ make positive judgments and avoid negative ones)	**Behavior:** Helpless (low initiation and persistence) **Cognition:** Rigid, over-simplified thinking **Affect:** Evaluative affect such as contempt
Incremental theory (attributes of self, people in general, and the world are malleable)	**Learning/ Development** (understand and improve attributes)	**Behavior:** Mastery-oriented goal pursuit **Cognition:** Process analysis **Affect:** Empathy

Figure 1. Model of implicit (lay) theories showing the mindsets, goal orientations, and predicted behavioral patterns of entity and incremental theorists.
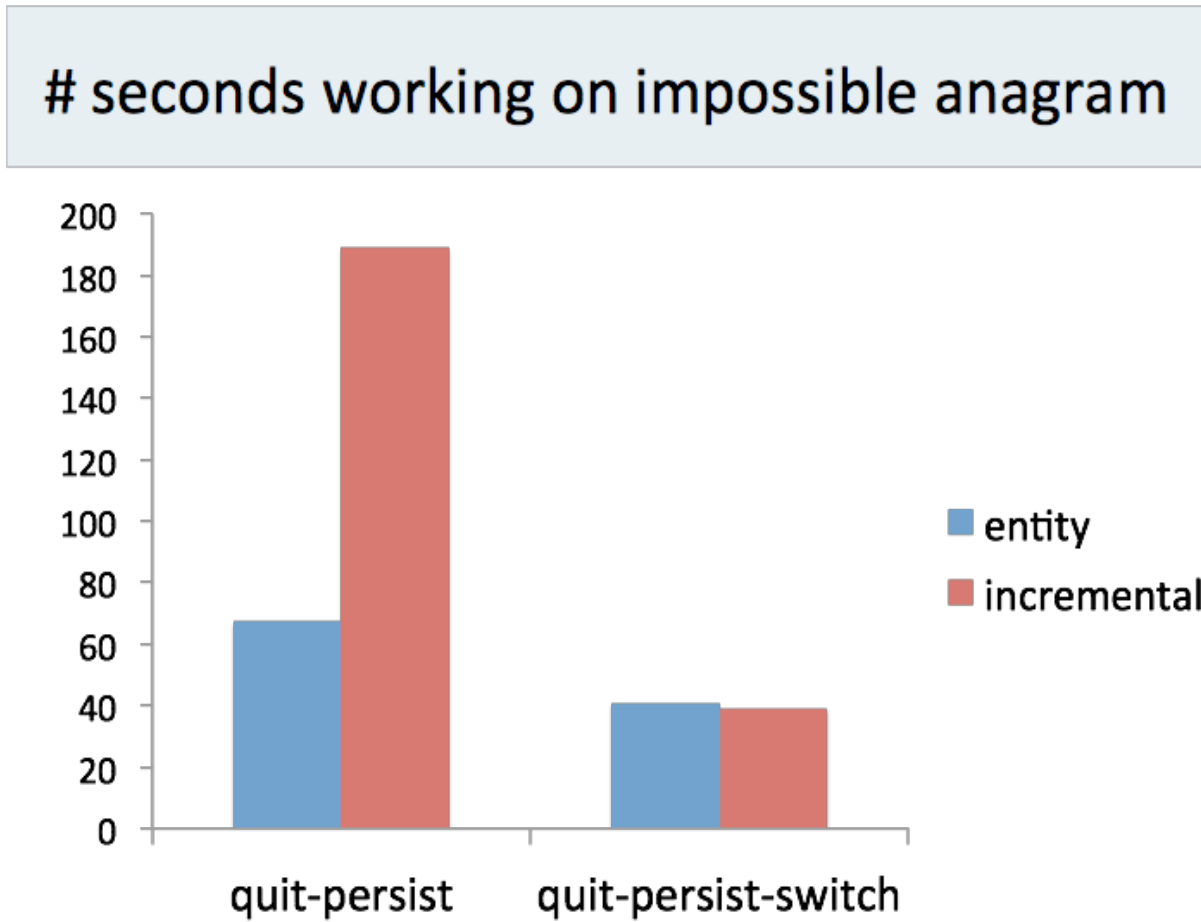
Figure 2. Mean differences in persistence (number of seconds spent on the impossible anagram before submitting response) found in Study 1 between entity and incremental theorists in the Dweck's Options (quit-persist) condition and the Additional Options (quit-persist-switch) condition.

	Entity		Incremental	
	DO	**AO**	**DO**	**AO**
Quit	45% (9)	5.3% (1)	53.3% (16)	0% (0)
Answer	55% (11)	0% (0)	46.7% (14)	2.6% (1)
Skip	-	94.7% (18)	-	97.4% (38)
Total	20	19	30	39

Figure 3. Study 1 choice outcome data showing the frequencies and percentages of both lay theorists' responses to the impossible anagram in the DO and AO conditions. No time limit was imposed on attempting this impossible anagram.

	Entity		Incremental	
	DO	**AO**	**DO**	**AO**
Quit	40.0% (8)	5.9% (1)	36.8% (7)	0% (0)
Answer	60.0% (12)	5.9% (1)	63.2% (12)	9.6% (5)
Skip	-	88.2% (15)	-	90.4% (47)
Total	20	17	19	52

Figure 4. Study 2 choice outcome data showing the frequencies and percentages of both lay theorists' responses in each condition to the impossible anagram. Across both DO and AO conditions, a 30-second time limit was imposed on all participants who attempted the anagram.