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Consequences of Beliefs about the Malleability of Creativity

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Abstract

Attempts to maximize creativity pervade corporate, artistic, and scientific domains. This research investigated how individual's implicit theories about the malleability of creativity affect several creativity related constructs. Through two correlational and one experimental study we examine the relationship between implicit theories about creativity and their effect on both creative problem solving and lifetime creative achievement. In Study 1 incremental theories in creativity are associated with interest in creative thinking, self-reported creativity, and creative problem-solving. In Study 2, incremental theories are associated with lifetime creative achievements in a cross-cultural, professional sample. In Study 3, incremental primes of creativity led to increased creative problem-solving. Further, all studies establish discriminant validity and domain-specificity for implicit theories of creativity. Specifically, Studies 1 and 2 control for individual differences in implicit theories of intelligence, suggesting that implicit theories of creativity and intelligence are meaningfully distinct. Study 3 finds that incremental theories of creativity enhance creative problem-solving but not problem-solving more generally.

Keywords: Creativity; Implicit theories; Entity; Incremental

Consequences of Beliefs about the Malleability of Creativity

"The key question isn't "What fosters creativity?" But it is why in God's name isn't everyone creative? Where was the human potential lost? How was it crippled? I think therefore a good question might be not why do people create? But why do people not create or innovate? We have got to abandon that sense of amazement in the face of creativity, as if it were a miracle if anybody created anything."

— Abraham Maslow

Creativity and innovation are increasingly coveted in a range of fields and disciplines and were recently ranked as the most sought after attributes in today's corporate world (IBM, 2010). In seeking to maximize creativity, organizations adopt several strategies, among which are: recruiting individuals that exhibit more creative qualifications (Ford, 1999), establishing corporate cultures that promote innovation (Amabile, 1998; Nemeth, 1997), and integrating employees into teams to facilitate the sharing and distribution of ideas (Paulus & Yang, 2000). Yet these methods generally focus on alterations to the environment or creating incentives to extract creativity. Less dominant in the organizational literature is how an individual's beliefs, attitudes, and expectations about creativity influence their creativity and whether these beliefs can be adjusted to maximize creative performance. Yet this seems a fruitful approach, as previous work highlights the integral role expectations, self-efficacy, and implicit theories play in determining performance (Bandura, 1977; Dweck, Chiu, & Hong, 1995).

In the present research, we examined implicit theories about the fixed vs. malleable nature of creativity. In fact, the nature of several attributes is viewed along a continuum where one end represents an attitude that attributes are fixed, trait-like entities (*entity* theory). At the other end, attributes are viewed as more dynamic, malleable, and capable of being developed

(*incremental* theory). In the area of intelligence, the work of Carol Dweck and colleagues (Dweck et al, 1995) is illustrative, demonstrating that implicit theories can influence perceptions of ourselves and our own behaviors (Dweck et al., 1995; Kray & Haselhuhn, 2007; Nussbaum & Dweck, 2008). Often, people with more incremental theories about an attribute perform better than people with more entity theories in that domain. For instance, holding entity theories of intelligence often lead to: fewer learning-oriented goals, deficient coping of negative feedback, and a tendency to attribute failures to the self rather than to some aspect of the environment (Hong, Chiu, Dweck, Lin, & Wan, 1999), which can subsequently lead to poorer academic performance (Blackwell, Trzesniewski, & Dweck, 2007). An individual with an entity view of intelligence, upon receiving a failing grade or job rejection letter for example, may attribute the failure to her given abilities, consequently leaving her less likely to strive for improvement in the future, believing she is powerless to do so (Nussbaum & Dweck, 2008). In keeping with this previous work on implicit theories, we anticipate that entity views of creativity are associated with less creativity on a variety of creative criteria.

Our view is that implicit theories about creativity are domain specific, as has been found in the domains of intelligence and personality (Levy, Stroessner, & Dweck, 1998), emotion (Tamir, John, Srivastava, & Gross, 2007), and morality (Chiu, Dweck, Tong, & Fu, 1997). In the domain of intelligence, to which creativity is inordinately compared, people can and do discriminate between intelligence and creativity in terms of lay definitions and the behaviors associated with each (Sternberg, 1985). There is a lay consensus of the distinctions between intelligence and creativity (Amabile, 1996) in addition to the extensive empirical distinctions between the two constructs, which are correlated only modestly (Nemeth & Nemeth-Brown, 1993; Preckel, Holling, & Wiese, 2006). Further, these distinctions stem in part from the

diverging cognitive processes associated with creativity and intelligence. The increased reliance on original and divergent thinking during creative problem solving contrasts with the algorithmic, evaluative, and convergent thinking more integral to tasks commonly associated with intelligence (Cropley, 2006; Runco, 1991). Given the distinctions between intelligence and creativity and the domain-specificity displayed by implicit theories, we anticipated discriminate validity between implicit theories of creative and intelligence. Further, given the valuation ascribed to creative abilities in numerous domains (IBM, 2010; Sternberg & Lubart, 1996), we hope to shed light on a novel predictor of creative performance, namely the effect of people's implicit theories about creativity on performance, and thereby also suggest a potential method of intervention to facilitate creative problem-solving and performance.

Overview of Studies

In Study 1 we examined the relationship between implicit theories in the fixed/malleable nature of creativity and several measures of creativity: self-perceptions of creativity, enjoyment in creativity thinking, and creative problem-solving using a modified Unusual Uses task (Guilford, 1967). In Study 2 we examined the relationship between implicit theories in creativity and self-reported creative performance and achievements over the lifespan. Additionally, in both Studies 1 and 2 we tested the discriminant validity between implicit theories of creativity and implicit theories of intelligence by including the latter in all analyses. In Study 3 we primed implicit beliefs about creativity in order to experimentally examine their relationship to creativity problem-solving.

Study 1

In Study 1 we examined the relationship of both implicit theories of creativity and of intelligence with a variety of creativity-related measures: self-perceptions of creativity, interest

and enjoyment in the creative process, and creative problem-solving as measured by the Unusual Uses Task. Consistent with the domain-specificity often demonstrated between specific implicit theories (Chiu et al., 1997; Dweck et al., 1995; Levy et al., 1998; Tamir et al., 2007) and the lay and empirical distinctions between creativity and intelligence (Amabile, 1996; Cropley, 2006; Preckel et al., 2006; Runco, 1991) we expected that beliefs of creativity alone would predict creativity-related criteria.

Method

Participants

Two hundred thirty three students (72% female; 56% Asian/Asian-American, 25% White/European-American, 10% Latino/Latino-American, 2 % Black/African-American, 7% Other) participated in exchange for partial course credit. Participants ranged in age from 18 to 36 years old (M = 20.63, SD = 2.59). Participants were recruited for a study "assessing their attitudes toward creativity." All study materials were completed online.

Measures

Measurement of implicit theories. Participants completed the 3-item Hong et al. (1999) implicit theory of intelligence scale (α = .93) and 5 items generated by the authors assessing implicit theory of creativity (α = .77). The 5 items were: "You have a certain amount of creativity and you really can't do much to change it"; "Creativity can be increased and fostered through hard work and personal effort" (*reverse-coded*); "You are stuck with whatever amount of creativity you are born with"; "It is easy to increase one's creativity through practice and education" (*reverse-coded*); and "Your level of creativity stays the same throughout your lifespan."

Interest/enjoyment in creative thinking. Participants completed an 8-item scale (α = .81) designed to assess their interest in engaging in creative thinking and tasks (e.g., "I often find that I strive to be as creative as possible when performing any task I am interested in" and "I enjoy thinking and acting creatively").

Measures of creativity. Participants completed two measures of creativity. We assessed subjective levels of creativity by asking participants to rank their own creativity relative to fellow students (1 = less creative; 7 = more creative). Additionally, participants completed a version of Guilford's (1967) Unusual Uses task as an assessment of creativity problem-solving. In this instantiation of the task, participants were given 90 seconds to write down as many uses they could for a roll of toilet paper. An independent coder, blind to the hypotheses and to participant's implicit theory scores, coded responses on four components: (1) fluency – total number of non-redundant responses, (2) elaboration – amount of detail (i.e., 1 point for each additional subject or verb further specifying the use), (3) flexibility – number of unique categories (e.g., "mummy costume" and "cheap dress" were both included in a "clothing" category), and (4) originality – uniqueness of response relative to rest of the sample (i.e., 1 point for the most common response, 2 points for the second most common response, and so forth).[1] We also created a composite score for each participant based on the mean of their 4 component scores. Each component score was first standardized to account for the variations in component scaling.

Results and Discussion

Theory of intelligence was positively correlated with theory of creativity, $r = .50$, $p < .001$. Despite this moderate sized correlation between our predictors, we expected only beliefs in creativity to predict the creativity criteria. Thus, we conducted a series of regression analyses

using standardized scores of the two implicit theory measures as predictors of the creativity variables (Table 1). Endorsement of an entity theory of creativity was associated with lower interest in creative thinking, $\beta = -.31$, $t(224) = -4.23$, $p < .001$, less self-reported subjective creativity, $\beta = -.26$, $t(220) = -3.46$, $p < .001$, and overall, less creativity as measured by a composite index of scores on the Unusual Uses Task, $\beta = -.21$, $t(224) = -2.78$, $p < .01$. Further, as shown in Table 1, implicit theory of creativity significantly predicted 3 components of the Unusual Uses composite index (fluency, originality, and elaboration) and marginally predicted the flexibility component. That implicit theory of intelligence was included in this model further attests to the discriminant predictive validity of theory of creativity. An entity theory of intelligence was not significantly related to lower scores on any of the creativity measures in this regression model. Thus, Study 1 demonstrated that a more entity and less incremental theory of creativity uniquely predicts lower self-reported creativity, less interest in creativity, and poorer creative problem-solving.

Study 2

Previous work on implicit theories demonstrates the compounding longitudinal effects of holding entity theories. Students who are entity theorists of intelligence, for instance, increasingly develop detrimental strategies in educational domains, which facilitate declines in academic achievement (Blackwell et al., 2007). While Study 1 assessed the relationship between beliefs in creativity and creative problem-solving on a single task, we expect that these beliefs influence creativity over a full lifespan. To test this, we employed a self-report assessment of lifetime creative achievement over a broad range of creativity-relevant domains. To widen the age, professional, intellectual, and cultural diversity to allow for variability in lifetime creative achievement, we sampled Japanese professionals working in a range of industries.

Method

Participants

Two hundred and eighteen Japanese citizens (44% Female) participated in exchange for 300 yen (~2.80USD). Participants ranged in age from 18 to 58 years old (M = 36.88, SD = 11.89). Participants were largely from a range of working and professional classes. Participants were recruited by a marketing firm for an online study "assessing their attitudes toward creativity." This participant pool was weighted so that its demographic composition was similar to that of the Japanese population.

Measures

Measurement of implicit theories. Participants completed a translated version of the 3-item implicit theory of intelligence scale (α = .83) from Hong et al. (1999) and the 5-item assessment of implicit theory of creativity (α = .69) used in Study 1.

Measure of lifetime creative achievement. We assessed self-reported, lifetime creativity using a translated version of the Creative Achievement Questionnaire (CAQ) from Carson et al. (2005). The CAQ assesses creative achievements across 10 domains of creativity (e.g., visual arts, music, scientific discovery, culinary, etc.). The CAQ shows strong construct validity with other self- and expert-ratings of creativity and was chosen because it assesses creativity over a wide-range of domains over the course of a respondent's lifetime.

Results and Discussion

As in Study 1, theory of intelligence was correlated with theory of creativity, r = .39, p < .001. Therefore we followed a similar data analytic strategy as in Study 1, entering standardized scores of theory of intelligence and creativity into a regression model predicting our creativity criterion – CAQ scores. Because the distribution of overall CAQ scores was highly positively

skewed (*skewness* = 3.39, SE = .17; Shapiro–Wilkes W = 0.61, p < .001), we performed a natural log data transformation on the CAQ data. The regression analysis showed that more entity beliefs of creativity were associated with lower CAQ scores, β = -.29, $t(208) = -3.98$, $p < .001$. As in Study 1, implicit theory of intelligence was unrelated to our creativity outcome variable, β = .11, $t(208) = 1.50$, $p = .13$. Thus, an entity theory of creativity alone predicted less lifetime creative achievements. Additionally, this study suggests a cross-cultural consistency in the link between an entity theory of creativity and reduced creative performance.

Study 3

The previous two studies provide evidence for the discriminant validity for implicit theories of creativity, as they, and not implicit theories of intelligence, are associated with creative outcomes. To this point however our results were correlational. Thus in Study 3, we primed entity and incremental theories of creativity and assessed their effect on creative and non-creative tasks. Previous work demonstrates that both implicit theories (Chiu, Hong, & Dweck, 1997; Dweck, 2008; Levy et al., 1998) and creativity (Gino & Ariely, 2012) are susceptible to manipulation. We devised a novel procedure in order to prime theories of creativity in a manner that would be valid and replicable within organizational and educational settings. Specifically, we primed implicit theories by having participants read a series of ostensibly accurate quotations – from respected innovators, intellectuals, and leaders. We then assessed performance on two tasks – one related to creativity (the Unusual Uses task) and another, while related to intelligence and motivation, is unrelated to creativity (anagrams). We anticipated that the belief in creativity primes would influence creative performance but not performance in other domains such as anagram-solving, further validating the domain-specific effect of implicit theories of creativity.

Method

Participants

A total of 127 students participated in exchange for partial course credit. Ten participants were excluded from analyses because during the manipulation check they admitted to using alternative means (e.g., internet web searches) to find answers for their performance tasks.[2] Thus, 117 participants were included in the analyses (57% female; 52% Asian/Asian-American, 27% White/European-American, 11% Latino/Latino-American, 3% Black/African-American, 7% Other). Participants ranged in age from 18 to 39 years old (M = 20.21, SD = 2.92). Participants were recruited online and were only informed that they would be completing a series of performance tasks. There was no mention of creativity in the recruiting or instructional materials. All study materials were completed online.

Procedure

For the priming procedure, participants were instructed they would engage in a multiple choice task where they would see a series of ostensibly accurate quotations. Their task was to select the author of the quotation from a list of three individuals. After this guess, participants were given an ostensibly correct answer. Participants were given a total of eight quotes. The first six quotes made no mention of creativity, performance, or motivation. The final two quotations served as the experimental manipulation. In the entity prime condition participants saw two quotes promoting the idea that creativity is inherited and relatively fixed (e.g., "Most artists and supposed creative types just copy someone else. They adjust, tweak a little, but overall, it's just the same thing. But some people have some inherent quality that lets them see the bigger picture and do something truly creative." Answer: Steve Jobs). In the incremental prime condition participants' final two quotes were adjusted to promote the idea that creativity is malleable and subject to change (e.g., "Most artists and supposed creative types just copy someone else. They

adjust, tweak a little, but overall, it's just the same thing. But some people work to a point that lets them see the bigger picture and do something truly creative." Answer: Steve Jobs). Participants saw the experimental quotations for 20 seconds each before the survey software provided an answer.

Participants were then randomly assigned to complete one of two performance tasks – either the toilet paper version of the Unusual Uses task used in Study 1, or an anagram task. While the Unusual Uses Task served as an assessment of creativity, the anagram task served as an alternative problem-solving task requiring both motivation and skill, but not requiring creativity (Hicks, Hicks, & Mansfield, 1969; Shaw & Conway, 1990). Participants were given 2 minutes to complete whichever task they were assigned.

Dependent Measures

Creativity task. We used the same version of the Unusual Uses task as in Study 1. In scoring the responses, we assessed two components: fluency and originality (Amabile, 1996; Campbell, 1960). We followed the same scoring procedures for these two components as in Study 1. Participants' fluency scores were again determined as the total number of non-redundant responses. Originality scores were again determined through a rank-ordering point system. There were 16 unique response tallies. Thus the most unique responses (e.g., pencil/pen holder, blindfold) received 16 points, while the most common responses (e.g., cleaning, wiping) each received 1 point.

Anagrams. Participants in the anagram performance condition received 10 anagrams and were instructed to complete as many as possible. All anagrams were 5 letters and all had between 3 and 7 solutions. Participants were instructed to only provide a single solution for each anagram.

Task motivation. To assess and control for any differences in task motivation between conditions, we had participants complete 3 items assessing how motivated, concerned, and focused they were during their task on a 7 point scale ($\alpha = .80$). One concern was that because the incremental prime stresses the value of effort, this prime may prime motivation rather than implicit beliefs about the nature of creativity. Assessing task motivation allowed us to test this alternative explanation.

Results and Discussion

Participants receiving the prime for incremental creativity provided significantly more original responses ($M = 55.48$, $SD = 30.28$) on the Unusual Uses task than participants who received the prime for entity creativity ($M = 38.75$, $SD = 22.40$), $F(1, 55) = 5.59$, $p = .02$. Participants in the incremental condition ($M = 9.03$, $SD = 3.50$) also provided marginally more responses on the Uses task than participants in the entity condition ($M = 7.54$, $SD = 2.66$), $F(1, 55) = 3.30$, $p = .08$. We also created a ratio score of these two scoring components (originality/fluency) to control for the possibility that greater fluency accounted for the relationship between the incremental prime and increased originality. However, this was not the case, as the incremental condition was also associated with higher scores on this originality/fluency ratio, $F(1, 55) = 5.07$, $p = .03$.

We next assessed the effect of the prime on the anagram task. Since anagram performance is not typically associated with creativity, we did not expect the prime to affect this task. As expected, as participants in both the entity condition ($M = 5.94$, $SD = 2.87$) and incremental condition ($M = 6.25$, $SD = 2.75$) did not significantly differ in number of correct anagram responses, $F(1, 62) = .20$, $p = .66$. Nor did participants in the entity ($M = 1.97$, $SD =$

2.19) and incremental (M = 1.44, SD = 1.90) conditions differ in the number of incorrect anagram responses given, $F(1, 62) = 1.07$, $p = .30$.

To examine the role of task motivation, we conducted a 2(prime: entity vs. incremental) × 2(task: Unusual Uses vs. anagrams) ANOVA on the self-reported task motivation index. Participants in the entity (M = 5.41, SD = 1.27) and incremental (M = 5.52, SD = 1.20) conditions reported similar levels of motivation during their tasks, $F(1, 123) = .27$, $p = .61$. Further, reported motivation did not differ by task, $F(1,123) = 1.39$, $p = .24$, nor was the interaction between prime and task significant, $F(1, 123) = .58$, $p = .48$. Thus, there is no evidence that the incremental prime led to an increased motivation to perform well. This null result is in line with work on implicit theories of intelligence. Entity theorists are not necessarily unmotivated in a given domain, but instead have different goal orientations than incremental theorists. While incremental theorists hold learning-oriented goals that focus their attention and motivations, entity theorists espouse performance goals that focus their attention, in the hope they demonstrate to themselves or others that they possess a certain trait (Dweck, 2011; Mangels, Butterfield, Lamb, Good, & Dweck, 2006).

General Discussion

These three studies are consistent with previous work on entity theories in other domains, illustrating the negative performance consequences associated with such beliefs (Blackwell et al., 2007). Yet, the findings need not paint a bleak picture. Prior work also highlights the malleability of implicit theories (Chiu et al., 1997) and Study 3 demonstrates that creativity can be increased simply by reading statements that promote incremental ideas of creativity.

Future research should investigate the mechanism through which implicit theories of creativity influence creativity. Study 3 suggests that at least for a short, one-time creativity task,

motivation is not the process linking implicit theories and creative performance. Previous work on implicit theories of intelligence does find, however, that entity theorists can become less motivated in certain contexts, but that this decrease in motivation likely occurs over long periods of time, as the entity theorist begins to internalize and come to expect failures (Blackwell et al., 2007). Thus it is possible that over time, entity theorists of creativity will lose motivation for tasks they have extended experience with.

A possible mechanism worth examining is whether incremental thinking about creativity promotes divergent thinking by broadening the expectations of what is creatively possible. Fundamentally, incremental theories do not constrain the possibilities of what one can do or achieve. This mindset may facilitate divergent thinking, which is implicated as an antecedent to creative thinking (McCrae, 1987; Runco, 1991, 2008). Recall that in Study 1, entity theorists were less interested in creative thinking, which mirrors work on implicit theories of intelligence (Hong et al., 1999). This may reflect an acquired aversive or perceived futility for thinking in ways that lead to creativity. Since creativity and intelligence are distinct cognitive processes, it is likely that processes specific to creative thinking (e.g., balancing divergent and convergent thinking) are the mechanisms through which implicit theories affect creative performance.

Overall, our findings distinguish implicit theories in creativity from implicit theories in intelligence. Further, an entity theory of creativity was associated with less creative production during the lifespan and with less creative problem-solving in both correlational and experimental settings. Messages priming incremental thinking about creativity lead to more original creative problem-solving. The priming method employed in Study 3 suggests that statements from managers, teachers, peers, parents and others that advocate incremental thinking about creativity may be enough to at least temporarily increase creative output in others. Previous intervention

studies show that introducing incremental belief mindsets has persistent and stable benefits (Blackwell et al., 2007; Yeager, Trzesniewski, & Dweck, 2012). Considering the ever-growing value placed on creativity and innovation in our society, the present research offers a simple method for facilitating creativity, one that has face value and is ecologically valid.

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Footnotes

[1] These components and their scoring were similar to traditional scoring procedures (e.g., Guilford et al. 1951; Wilson et al., 1954; Torrance, 1962), though with some variations, specifically to the originality component. Rank-ordering by response frequency allowed for 27 unique point totals. The most unique responses in this sample (e.g., “as a bookmark” and “as a color swatch”) were given only once and thus each received 27 points. A response given by 2 participants (e.g., “use as a blindfold”), was valued at 26 points.

[2] These participants did not appear to disproportionately come from specific conditions. Between our four experimental conditions, two to four participants in each group admitted to using alternate means.