Measuring Gifted Adolescents' Implicit Theories of Creativity

Katherine N. Saunders Wickes
Thomas B. Ward

This paper examines the structure of implicit theories of creativity in a sample of gifted adolescents and describes the development and use of the Creative Self Checklist and the Creative Individual Checklist, adjective checklists designed to assess endorsement of creativity-related personality and behavioral attributes. Findings indicate that the gifted rate aspects of risk-taking and inquisitiveness as primary facets of their own creativity while defining artistic abilities and energy and motivation as important parts of creativity in others. This study also assessed the role that these implicit theories play in the display of creative behaviors with regard to both performance on creativity tests and participation in creative hobbies. Findings indicate that while performance on creativity measures is predictive of creative hobby participation, greater self-endorsement of beliefs that are positively related to creativity also significantly predict creative behaviors.

Katherine N. Saunders Wickes is an Instructor of Psychology in the Social Sciences Division of Blinn College. Her research interests include creativity in the gifted, enrichment programs for the gifted and teaching in the community college setting. Research for this article was conducted to fulfill requirements for a Ph.D. in psychology from Texas A&M University and with cooperation from staff at the Institute for the Gifted and Talented located there. E-mail: katherine.wickes@blinn.edu

Thomas B. Ward is Professor of Psychology at the University of Alabama. His research focuses on the nature of concepts, including how they are acquired, structured, combined, and used in creative and noncreative endeavors. He has served as Associate Editor of *Memory & Cognition* and currently serves as Executive Officer of the *Cognitive Science Society* and Editor of the *Journal of Creative Behavior.*
E-mail: tward@bama.ua.edu

For decades, theorists have debated the degree to which gifted individuals are inherently creative, describing creativity as both a specific type of giftedness and an inherent component of giftedness in general (Renzulli, 1986; Sternberg & Lubart, 1993; Winner, 2000). Evidence for the creative nature of the gifted can be found in the fact that the gifted often outperform their non-gifted peers on measures of creativity, scoring in the upper bounds on standard creativity measures and tasks (Feldhusen, Treffinger, Van Mondfrans, & Ferris, 1971; Mumford, Baughman, Costanza, Uhlman, & Connelly, 1993; Plucker & Renzulli, 1999; Runco, 1986, 1987, 1993; Ward, Saunders, & Dodds, 1999). However, while superior performance on creativity measures does indicate that there is some relationship between creative or generative thought processes and giftedness, it does not clarify the nature of that relationship. Are the gifted, as theorists have suggested, simply endowed with faster processing speed and abilities and thus able to produce more answers during divergent thinking tasks than others in the normal population, or are there other metacognitive factors that might explain their creative abilities?

Research on a wide variety of metacognitive tasks shows the gifted, as compared to their non-gifted peers, seem to excel at tasks, such as problem finding, idea evaluation, and attentional focus, which involve the direction and management of thought resources in the service of creative problem solving (Groborz & Necka, 2003; Mumford et al, 1993; Runco, 1987). Further research has found that the gifted also appear to be able to tap into these skills without being instructed to do so (Runco, 1984; Ward et al., 1999). In studies looking at the role of instructions on generative thinking ability in gifted adolescents, gifted teens gave more original responses than college students when asked to create novel aliens, but their originality was not influenced, unlike the college students, by being instructed to "be creative" or original (Ward et al.). Runco (1986) also found that gifted individuals were less affected than non-gifted individuals by instructions to "be creative" and "give only original responses" in their production of original items on divergent thinking tasks. Thus, it appears that the gifted possess some metacognitive ability that provides resistance to the robust finding of the role of instructions in creative thought processes (Harrington, 1975; Ward et al.). Taken together, these results suggest that creative abilities in the gifted may be the result of both their exceptional cognitive abilities and "something" that facilitates their use of those abilities in creative situations. Looking at the research, implicit theories of creativity may be the something that accounts for resistance to the role of instructions and the general tendency that the gifted demonstrate to outperform peers on creativity tasks.

Implicit theories are our personal theories of the causal nature and structure of mental events and behaviors. They are not formal but guide us in identifying and describing those events in both the self and others (Runco & Bahleda, 1986; Sternberg, 1985). Research on implicit theories has shown that we hold implicit theories for a wide variety of mental events and that those theories influence our perception of our abilities and the abilities of others for attributes such as affect, intelligence, and achievement (Ablard & Mills, 1996; Barden, Zelko, Duncan, & Masters, 1980; Bempechat, London, & Dweck, 1991; Little & Lopez, 1997; Murrone & Gynther, 1989, 1991; Sternberg; Sternberg, Conway, Ketron, & Bernstein, 1981). Implicit theories of creativity, then, should help us define what behaviors and thought processes are a part of creativity, as well as aid us in assessing creativity in ourselves and others.

Research on implicit theories of creativity has found that individuals do hold concrete theories and use them to guide who we judge as creative (Sternberg, 1985; Runco & Bahleda, 1986). Sternberg asked college students to sort the creative attributes generated by laypeople and professionals into groups of attributes most likely to be found together in a creative person. Looking at the structure of these specific creativity attributes, Sternberg found that both professionals and laypersons generated a consistent set of adjectives that they regarded as descriptive of creativity.

The resulting group of adjectives, determined by factor analysis, produced a description of creativity with four main dimensions. The first of these dimensions included the sets of polar attributes Sternberg (1985) labeled as nonentrenchment and intellectuality, and it included attributes such as impulsivity, nonconformity, emotionality, high ability, and productivity. The second set of these dimensions contained attributes of aesthetic

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taste and imagination, such as good taste and an ability to draw, write, or compose music, as well as attributes of decisional skill and flexibility. The third dimension included attributes of perspicacity such as perceptiveness and an ability to question conventions, and a drive for accomplishment and recognition such as being energetic and highly motivated. Finally, the last dimension Sternberg referred to contains the creative attributes of inquisitiveness and intuition.

Research on individual's implicit theories of creativity in various domains by Runco and Bahleda (1986) found similar attributes as key facets of creativity. Interested in the differences in implicit theories of artistic, scientific, and everyday creativity, they asked artists and laypersons to generate lists of characteristics related to the various types of domain specific creativity. While there was overlap in regard to both the responses generated by artists and laypersons as well as among the three domains of creativity, each group gave a specific definition for artistic, scientific, and everyday creativity (Runco & Bahleda).

The artists described artistic creativity as expressive, imaginative, humorous, open-minded, unique, emotional, and exciting, while they described scientific creativity as perfectionistic, intelligent, curious, patient, and thorough (Runco & Bahleda, 1986). Beyond this, the artists defined everyday creativity using adjectives such as active, helpful, humorous, resourceful, open-minded, and exciting. The laypeople described artistic creativity with characteristics such as imagination, expressiveness, intelligence, originality, perceptiveness, and superior drawing ability while they described scientific creativity using terms such as intelligent, logical, experimenting, curious, intuitive, and problem solving. Once again the laypersons used a different set of attributes to describe everyday creativity, describing the everyday creative person as imaginative, having common sense, being organized, active, and able to cook well (Runco & Bahleda).

Implicit theories are of interest not only for their structure but also for the role that they play in our assessment of the behavior of ourselves and others. Sternberg (1985) examined how individuals use those theories by asking people to rate a person described via letters as creative or not. What he found was that respondents were more likely to define persons as creative when they were described as having more of the attributes related to our implicit theories, such as impulsivity, flexibility, and motivation. Further evidence of our reliance on our conceptions of creativity in making judgments about the creativity of a given idea is the finding that individuals judge items differently when asked to rate the originality or popularity of an idea (Runco, 1990). Terms like *originality* or *popularity* tap into different mental events and thus different theories. This difference in implicit theories, as represented by differing endorsements of behavioral and personality adjectives, should explain the differences in evaluation of creativity described previously (Henessey & Amabile, 1988; Runco; Sternberg).

Additional evidence for the idea that differences in implicit theories can explain differences in the conception of and evaluation of creativity can be found in research on cultural differences in implicit theories of creativity. Lim and Plucker (2001), in their research on cultural differences in implicit theories of creativity, found that Koreans held implicit theories that were similar to their Western counterparts but with more of an emphasis on deviance or unorthodoxy as a part of the behaviors of a creative person. Despite these differences in the structure of their implicit theories of creativity, the Korean sample, like their Western counterparts, relied on these theories when making judgments about the creativity of individuals described in letters that varied in the number of creative attributes they contained (Lim & Plucker).

Given the scope of implicit theories to define how we think and behave with regard to creativity, the nature of these theories in creative individuals is of particular interest. While the goal of this particular study is not comparison of the gifted with nongifted populations, prior research has portrayed the gifted as a population that exhibits greater creativity as compared to their nongifted peers, and as a group that is endowed with cognitive and motivational skills that should account for this creative ability (Mumford et al., 1993; Runco, 1987; Winner, 2000). Another possible difference between the gifted and nongifted that could account for differences in creative performance is that the gifted hold implicit theories that are different from those previously found in the lay population.

The purpose of these studies, then, was to examine the implicit theories of the gifted. To do this, a series of attribute checklists was designed that contained adjectives previously thought to be personality and behavioral characteristics of creative individuals. These checklists allowed participants to endorse those attributes that they felt best expressed their own creative traits. Because prior research had not looked at the implicit theories of the gifted, this study was particularly aimed at which attributes the gifted endorsed most frequently for their own creativity and which attributes they endorsed as characteristic of a creative other. Additionally, these studies examined how implicit theories relate to both performance on creativity measures and participation in creative hobbies. If the gifted do hold theories of creativity that are different from those found in prior research, are those theories more predictive of their participation in creative hobbies outside of the classroom than their performance on creativity measures? It is clear that implicit theories of creativity guide the presentation and evaluation of creativity by the parents and teachers of the gifted (Fryer & Collings, 1991; Lesser, 1995; Runco, 1990; Runco, Johnson, & Baer, 1993). It is not clear what type of theories are imparted to the gifted themselves and how that affects their creative behavior.

Gifted adolescents were chosen as the participants for this study because adolescence is a time of development during which both implicit theories of mental events are beginning to resemble their adult forms and creativity is on the rise (Barden, 1980; Little & Lopez, 1997; Rothenberg, 1990; Zelko, Barden, Garber, & Masters, 1986). Therefore, understanding the implicit theories of creativity in adolescence should allow researchers a glimpse into the implicit theories of gifted adults.

Study 1

Method

Participants

Participants in the study were 123, 61 males and 62 females, enrolled in a camp for gifted and talented adolescents at Texas A&M University. They ranged from grade 7 to grade 12 (mean age = 14 years). The majority of participants learned about the camp through their participation in the Duke Talent Identification Program, and they were considered gifted based on their participation in that program. Students who participate in the Duke Talent Identification program are selected by their school using grades, test scores, or teacher recommendations to take college entrance exams in the 7th grade. Those students

who score well are then given access to information about extracurricular programs, such as the camp our participants were enrolled in, which offer additional educational and enrichment opportunities for the gifted.

Procedures

Upon entrance to the camp, the participants and their parents were given a brief form describing the study and were asked to participate. All participants had received parental consent before agreeing to participate. Participants were given approximately 90 minutes to complete the task. At the completion of the task, each participant received a pen as compensation for participation.

There were two packets of tasks for each participant to complete. The first packet contained a self-report measure of their involvement in art, crafts, music, writing, math and science, performance, and other miscellaneous creative activities, called the Creative Behaviors Inventory (CBI), taken from Runco (1987) and Hocevar (1979). While many of the original items from the CBI were used, some modifications were made for the adolescent population, such as changing the item "How often have you cut a record?" to "How often have you recorded you own musical compositions?" to reflect current musical terminology. This questionnaire measured total involvement in activities capturing both the number of activities the adolescent was involved in as well as the degree of involvement, with higher scores being given for more frequent participation in each type of activity. Summary scores were then created for participation in each of the types of real-world activities (art, crafts, music, writing, math and science, performance, and miscellaneous activities), as well as a score for total activity participation.

The next part of the first packet, called the Creative Self Checklist (CSC), asked participants to rate themselves using a 9-point Likert scale on a set of 40 positive and negative attributes taken from self-report measures of implicit theories of creativity (Runco & Bahleda, 1986; Sternberg, 1985). Looking at the CSC in Figure 1, the adjectives listed were picked based on their prior inclusion in the implicit theories of creativity of adults. There were 2 types of creative attributes that were included in the CSC. Positive creative attributes, such as imaginative or unorthodox, were those that participants in prior studies of implicit theories of creativity had listed as being important to creativity (Runco & Bahleda; Sternberg). Negative creative attributes, such as bookish and popular, were ones that participants endorsed as being less related to creativity. A mean positive and negative creative beliefs score was generated for each participant based on their endorsement of attributes, such as imaginative or bookish, previously found to be more or less reflective of creativity. It was predicted that participants' positive and negative creative belief scores would also relate to their performance on later tests of creative skill. Finally, participants were given 5 minutes to complete a revised 12-item version of the Remote Associates Test (RAT) to measure associative thought ability (Allen, Sifonis, & Smith, 1998). After completing these measures, participants were given a second packet to complete.

In the second packet, which was completed in the remaining time, participants were asked to draw a fruit that might exist on another planet (the Design-a-Fruit task) and, after completing the drawings, were instructed to describe any factors that they could think of that influenced their creations. Participants were randomly assigned to one of two conditions. Those in the Specific Fruit group ($N = 51$) were given instructions to think of a specific Earth fruit while completing the task, whereas those in the Properties condition ($N = 50$) were instructed to think of properties that fruit need to survive while completing the task.

Two independent judges coded the Design-a-Fruit drawings and responses for properties that people typically listed as being characteristic of Earth fruit (e.g., Tversky & Hemenway, 1984). Judges were college students untrained in art who were instructed in coding of creative products for originality and use of attributes or exemplars of Earth fruit. They also assigned each drawing a rating of originality using a 7-point scale on which low numbers indicated less originality. Additionally, the descriptions were coded for any mention of the use of an Earth fruit as the source of the novel product. Ratings of the fruit originality for both judges were significantly correlated: $r(97) = .882$, $p < .001$; and were averaged for additional analyses.

Results

Participants' responses to the Creative Self Checklist were analyzed in several ways. Mean endorsements of attributes thought to be either positively related to creativity (such as intelligent, unorthodox, or can write, draw, or compose music) or negatively related to creativity (such as bookish, boring, lazy, and wealthy) were computed across the sample to allow for examination of the role of such perceived creative competencies in actual creative behaviors. Based on prior research studies, it was expected that these adolescents would have higher scores for attributes that reflected positive aspects of creativity, such as originality or artistic, literary, or musical

Creative Self Checklist (CSC) - Long Form

The following is a list of terms sometimes used to describe people. Please rate each item with regards to how it describes **you as an individual** using the following scale of 1 to 9 on the sheet marked "Creative Self Checklist".

1 extremely uncharacteristic 2 3 4 5 6 7 8 9 extremely characteristic

1. impulsive
2. emotional
3. nonconformist
4. unorthodox
5. productive
6. intelligent
7. possesses ability for high achievement
8. can write, draw, or compose music
9. imaginative
10. questions conventions
11. perceptive
12. energetic or active
13. has a sense of humor
14. inquisitive or curious
15. intuitive
16. intrinsically motivated
17. can sustain effort over long tasks
18. questions assumptions
19. original
20. willing to take risks
21. adventurous
22. has a wide knowledge base
23. alert to gaps in knowledge
24. inventive
25. has problem solving skills
26. capable
27. individualistic
28. bookish
29. boring
30. lazy
31. conforming
32. skilled at speaking
33. awkward
34. commonplace
35. wealthy
36. popular
37. apathetic
38. dull
39. physically attractive
40. tall

Figure 1

skill (Runco & Bahleda, 1986; Sternberg, 1985). Additionally, an exploratory factor analysis was conducted on the CSC to examine the structure of the adolescents' implicit theories.

The Structure of Implicit Theories of Creativity

Factor analysis of the 40 items in the CSC was conducted using principal components analysis. Although items on the CSC should have some relationship to one another, a promax rotation was used in generating the PCA solution to force items into the most distinctive solution possible. This analysis resulted in a six-factor solution which accounted for 49.91% of overall variance. The six factors were labeled as risk-taking, likableness, inquisitiveness, productivity, dullness, and nonconformity, and had eigenvalues of 7.241, 3.976, 2.865, 2.134, 2.003, and 1.745 respectively. Items and factor loadings corresponding to each of the above factors are listed in Table 1.

Factor Loadings for Key Items from the Creative Self Checklist

Factors	Items	Component loadings	Variance explained (%)
Factor 1: Risk-taking			18.101
	Impulsive	.503	
	Willing to take risks	.889	
	Adventurous	.850	
Factor 2: Likeableness			9.939
	Skilled at speaking	.579	
	Wealthy	.682	
	Popular	.707	
Factor 3: Inquisitiveness			7.163
	Questions conventions	.742	
	Inquisitive	.621	
	Questions assumptions	.746	
	Alert to gaps in knowledge	.636	
Factor 4: Productivity			5.335
	Productive	.760	
	Intrinsically motivated	.502	
	Capable	.637	
Factor 5: Dullness			5.008
	Boring	.764	
	Awkward	.805	
	Dull	.667	
Factor 6: Nonconformity			4.363
	Nonconformist	.717	
	Unorthodox	.559	
	Imaginative	.515	
	Original	.592	

Table 1

Relationship Between Implicit Theories and Creativity Task Performance.

To examine the relationship between these implicit theories of creativity and actual creative task performance, composite scores of the average endorsement of positive and negative creative attributes were used to assess the relationship between the originality of participants' imaginary fruit and their beliefs about their own creativity. Only the endorsement of negative attributes of creativity was significantly related to originality of Design-a-Fruit creations: $r(101) = .206$, $p < .05$; although the reasons for this relationship are unclear. However, the high levels of endorsement of theoretically negative attributes, such as bookishness and skillfulness at speaking, by this population may account for some of this relationship since they would be useful elements of academic giftedness. No significant relationship was found between performance on the RAT and endorsement of positive or negative creative attributes. While there was no expected difference between this sample and those of Sternberg (1985) and Runco and Bahleda (1986) in terms of the positive or negative valence of traits, further research may need to examine if the pattern of endorsements of attributes listed in the CSC matches the type of positive and negative creative attributes adolescents self-report.

Role of Instructions

Prior research with college students has indicated instructions that direct participants to focus on concrete features of an object inhibits creative performance; however, past studies using leading instructions with the gifted have failed to find such an effect (Ward, Patterson, & Sifonis, 2004, Ward et al., 1999). To examine the effect of instructions on creativity in the gifted, an ANOVA was performed on the fruit tasks to determine if there were differences in originality between the participants asked to focus on specific earth fruit as compared to those asked to focus on more general properties of fruit. However, as in previous research, we failed to find a significant effect of instruction on performance on the fruit task, $F(1,94) = .995$, MSE = 3.120, p = n.s..

Predicting Real-World Creative Participation

One of the key facets of an implicit theory is its role in influencing behavior. To examine the role of implicit theories of creativity in predicting creative behavior, a stepwise regression was conducted with total creative real-world activity participation as the criterion variable and fruit originality, total RAT score, and positive and negative creative beliefs as predictors. As can be seen in Table 2, this regression produced a model with RAT score, endorsement of positive creative attributes, and originality of fruit as significant predictors of creative behaviors, $F(3,97) = 9.011$, $p < .05$.

Predictors of Creative Hobby Participation

Model	ß	t	p
Intercept	-13.141	-1.196	.235
RAT score	2.561	3.293	.001
Positive creative beliefs	3.943	2.443	.016
Novel fruit originality	1.676	2.058	.042

Note. Predictors also entered: Negative creative beliefs

Table 2

An additional relationship was found between gender and creative behaviors. Females participated in more creative activities than males in general: $r(123) = -.241$, $p < .05$. Looking at this relationship, females participated in literature, craft, performance, and miscellaneous activities more than males, $r(123) = -.271$, $-.377$, $-.390$, and $-.190$ respectively, $p < .05$. However, in accord with other research indicating a greater prevalence of males in math and science programs (Feldhusen & Willard-Holt, 1993; Lubinski & Benbow, 1992; Olszewski-Kubilius & Yasumoto, 1995), males did participate in more math and science activities than females, $r(123) = .239$, $p < .05$.

Study 2

The results of the first study indicated that there was a significant relationship between participation in creative activities and implicit theories of creativity. The more positive creative attributes that the gifted adolescents endorsed, the more creative activities that they were likely to be involved in. The role of the positive attributes in the structure of the implicit theories of the gifted was further evidenced in the factor structure that the Creative Self Checklist generated. While performance on creativity measures, such as the RAT and generative thinking fruit task, significantly predicted participation in creative hobbies, the relationship between creativity measures and implicit theories found in this study was not clear. A second study was designed to measure the relationship between implicit theories of the gifted and performance on two verbal measures of generative thinking as opposed to using both a verbal associative task such as the RAT and a figural generative task such as the fruit drawing task. Using the Just Suppose task from the verbal form of the Torrance Test of Creative Thinking and a sport generation task as measures of creativity enables the examination of the relationship between both assessment tools as well as their individual relationship to the implicit theories of creativity. This study also sought to clarify the structure of the gifted adolescents' theories of creativity by examining their implicit theories of their own creativity as well as their theories of the creativity of others and how those theories relate to other measures of creativity.

Method

Participants

One hundred fifty-seven adolescents, 86 males and 72 females, enrolled in a camp for gifted adolescents at Texas A&M University participated in this study. Participants ranged in age between 10 and 17 with a mean age of 12 years 9 months. Participants were considered gifted on the basis that most participants were recruited for participation in this camp through the Duke Talent Identification Program. A further questionnaire given to the parents of the participants indicated that 144 of the 157 participants were identified as gifted by their school at the time of their participation in camp. Additionally, several of the participants were home-schooled and were therefore not in school-based programs for the gifted but had been referred to the Duke program or the camp on the basis of achievement tests and grades.

Procedure

As in Study 1, participants were given two packets. The first packet contained a measure of adolescents' involvement in "real-world" creativity identical to the one used in Study 1: the Creative Behaviors Inventory. As in the last study, subjects were coded for participation in each of the types of real-world activities (art, crafts, music, writing, math and science, performance, and miscellaneous activities), as well as total activity participation. In the second part of the first packet, participants were given two questionnaires, the Creative Self Checklist (CSC) and the Creative Individual Checklist (CIC), which included identical sets of adjectives derived from lists of implicit theories of creativity found in Sternberg (1985) and Runco & Bahleda (1986). Questionnaire items for the CSC and CIC corresponded to key attributes related to the factors extracted in Study 1 and were representative of the original attributes identified in prior studies as either positively or negatively related to creativity (Runco & Bahleda; Saunders, Dodds, & Ward, 2000; Sternberg). However, the CIC asked each participant to rate how well each of the adjectives previously used in the CSC related to the behaviors and characteristics of the ideal creative person. Each of the questionnaires asked the participants to rate either themselves (CSC) or an ideal creative person (CIC) on a 9-point Likert scale, ranging from extremely uncharacteristic to extremely characteristic, for each of the 22 adjectives given. Examples of both of the revised questionnaires are included in Figure 2. Participants' responses were then coded for mean positive and negative creative beliefs (such as unorthodox versus bookish) about themselves and an ideal creative other.

In this first packet, participants were also asked to complete the Just Suppose task from the Torrance Test of Creative Thinking-Verbal Form: a measure of divergent thinking ability (Torrance, 1972, 1974). Two independent judges coded responses to the Just Suppose task for fluency, flexibility, and originality. Judges had access to TTCT scoring instruction manuals and several practice trials using previously codes responses. Judges' ratings were then correlated to assess reliability, fluency $r(154) = .977$, $p < .001$; flexibility $r(154) = .978$, $p < .001$; originality $r(154) = .958$, $p < .001$. Both judges ratings for fluency, flexibility, and originality were averaged for further analyses.

Revised Creative Self and Individual Checklists

Creative Self Checklist

The following is a list of terms sometimes used to describe people. Please rate each item with regards to how it describes *you as an individual* using the following scale of 1 (extremely uncharacteristic) to 9 (extremely characteristic) on the sheet marked "Creative Self Checklist".

1. impulsive
2. unorthodox
3. intelligent
4. can write, draw, or compose music
5. questions conventions
6. energetic or active
7. has a sense of humor
8. inquisitive or curious
9. intrinsically motivated
10. questions assumptions
11. willing to take risks
12. adventurous
13. alert to gaps in knowledge
14. individualistic
15. boring
16. skilled at speaking
17. awkward
18. commonplace
19. wealthy
20. popular
21. dull
22. physically attractive

Creative Individual Checklist

The following is a list of terms sometimes used to describe people. Please rate each item with regards to how it describes *the ideal creative individual* using the following scale of 1 (extremely uncharacteristic) to 9 (extremely characteristic) on the sheet marked "Creative Individual Checklist".

1. impulsive
2. unorthodox
3. intelligent
4. can write, draw, or compose music
5. questions conventions
6. energetic or active
7. has a sense of humor
8. inquisitive or curious
9. intrinsically motivated
10. questions assumptions
11. willing to take risks
12. adventurous
13. alert to gaps in knowledge
14. individualistic
15. boring
16. skilled at speaking
17. awkward
18. commonplace
19. wealthy
20. popular
21. dull
22. physically attractive

Figure 2

In the second packet, participants were asked to complete a generative thinking task similar to the task in Study 1. In this task, participants were to design a novel sport and describe both the rules and structure of this sport. After completing the design of their sport, participants were then asked to discuss what sports or games influenced their design. A pair of independent judges assigned each drawing a rating of originality using a 9-point scale on which low numbers indicated less originality. Judges again were college students who were not sport or art experts. Coders were given instructions on coding for originality and responses resembling Earth sports, such as basketball or football. Originality ratings for both judges were significantly correlated, $r(92) = .909$, $p < .001$, and were averaged for additional analyses. Additionally, the descriptions were coded for any mention of the use of an Earth sport in the design of the novel product.

Results

The Structure of Implicit Theories of Creativity of the Self and Another

To explore the structure of the gifted adolescents' implicit theories of creativity, participant responses for each questionnaire were analyzed using principal components analysis with a varimax rotation. For the adolescents' ratings of their own creativity, a four-factor solution was chosen, which accounted for 47.859% of the variance. These four factors found were called risk-taking, awkwardness, intellect, and impulsiveness and had eigenvalues of 4.954, 2.065, 1.949, and 1.560 respectively. For the adolescents' ratings of creativity in others, a four-factor solution was also chosen, accounting for 52.094% of the variance. The four factors found were artistic individualism, activity level, popularity, and questioning, and they had eigenvalues of 3.509, 2.929, 2.752, and 2.271 respectively. Items and loadings corresponding to each of these factors can be found in Tables 3 and 4.

Factor Structure for the Creative Self Checklist (Revised)

Factors	Items	Component loadings	Variance explained (%)
Factor 1: Risk-taking			14.536
	Energetic or active	.638	
	Has a sense of humor	.630	
	Willing to take risks	.674	
	Unorthodox	.819	
	Skilled at speaking	.529	
	Physically attractive	.521	
Factor 2: Awkwardness			11.417
	Dull	.795	
	Boring	.683	
	Awkward	.656	
	Popular	-.606	
Factor 3: Intellect			8.944
	Intelligent	.771	
	Alert to gaps in knowledge	.694	
	Intrinsically motivated	.514	
Factor 4: Impulsiveness			8.396
	Impulsive	.843	
	Unorthodox	.615	

Table 3

As in Study 1, composite scores were created to measure the average endorsement of attributes thought to be positively related to creativity (i.e., original, productive, and willing to take risks) and those thought to be negatively related to creativity (i.e., dull, commonplace, awkward, and wealthy). An initial examination of the relationship between the positive and negative attributes of creativity in the self and other can be seen in Table 5. As would be expected, there was a significant negative relationship between endorsement of positive attributes of creativity and negative attributes of creativity in the self, but this relationship was not found for beliefs about the creativity of others. There was however a relationship between the adolescents' endorsement of both positive and negative beliefs about themselves and others as seen in Table 5. Adolescents' ratings of both the positive and negative aspects of their own creativity were significantly related to their endorsement of those attributes as being representative of the ideal creative other.

Age and gender were also related to the adolescents' beliefs about their own creative nature. Younger students generated higher ratings of their own positive creative attributes than the older students did; but no such relationship was found for their ratings of their own negative creative attributes, $r(118) = -.218$, $p < .05$. Interestingly, as can be seen in Table 5, there was a significant relationship between gender and negative creative beliefs about the ideal creative individual. Males were much more likely to express beliefs about the attributes of an ideal creative other that included negative attributes, such as being bookish or commonplace. However, these gender differences may also be due to the greater number of males found in this study.

Relationship Between Implicit Theories and Creative Task Performance

Once again analyses were conducted to examine the role of beliefs about creativity in predicting creative task performance. While there was no relationship between endorsement of positive creative attributes in the self and performance on either the sport generation or TTCT Just Suppose tasks, there

Factor Structure of the Creative Individual Checklist

Factors	Items	Component loadings	Variance explained (%)
Factor 1: Artistic individualism			15.949
	Can write, draw, or compose music	.746	
	Alert to gaps in knowledge	.741	
	Individualistic	.671	
	Inquisitive or curious	.589	
	Intrinsically motivated	.566	
Factor 2: Activity level			13.315
	Energetic or active	.609	
	Boring	-.779	
	Dull	-.756	
	Adventurous	.532	
Factor 3: Popularity			12.507
	Wealthy	.837	
	Popular	.864	
	Physically attractive	.818	
Factor 4: Questioning			10.323
	Questions assumptions	.600	
	Commonplace	-.619	
	Unorthodox	.537	
	Questions conventions	.571	

Table 4

Correlations Between Creativity Beliefs of the Self and Other

	PCS	NCS	PCO	NCO	Gender	Age
Positive creative self beliefs (PCS)	1.000					
Negative creative self beliefs (NCS)	.166* (156)	1.000				
Positive creative other beliefs (PCO)	.327** (154)	.126 (154)	1.000			
Negative creative other beliefs (NCO)	.043 (154)	.438** (154)	.035 (154)	1.000		
Gender	-.094 (156)	-.035 (156)	-.046 (154)	-.203* (154)	1.000	
Age	-.218* (118)	-.005 (118)	.084 (118)	-.118 (118)	-.272** (119)	1.000

Note. * $p < .05$, ** $p < .01$

Table 5

was a significant relationship between low scores for endorsement of negative creative attributes (such as bookishness) and higher originality, fluency, and flexibility scores on the TTCT Just Suppose task, $r(155) = -.189$, $p < .05$; $r(155) = -.181$, $p < .05$, and $r(155) = -.174$, $p < .05$ respectively. Furthermore, there was a significant relationship between ratings for positive and negative creative attributes in others and better performance on creative tasks. For the sport task, high scores for the positive attributes and low scores for the negative attributes in the CIC were both significantly related to higher originality, $r(92) = .294$, $p < .01$ and $r(92) = -.222$, $p < .05$. For the TTCT task, originality was also related to greater endorsement of positive attributes and lower endorsement of negative ones, $r(153) = .191$, $p < .05$ and $r(153) = -.271$, $p < .01$. Likewise, fluency and flexibility were significantly related to higher positive and lower negative attribute endorsements for the creativity of another, $r(153) = .185$, $p < .05$ and $r(153) = -.237$, $p < .01$ for fluency, $r(153) = .180$, $p < .05$ and $r(153) = -.246$, $p < .01$ for flexibility. Thus, the adolescents who endorsed the same attributes that prior research on implicit theories of creativity described as related to creativity also seemed to be the ones who performed well on various measures of creative skill.

Predicting Real-World Creative Performance

As in Study 1, one of the goals of this study was to determine if implicit theories of creativity in the self, as measured by the revised CSC, or theories about the creativity of an ideal creative other, as measured by the CIC, were uniquely predictive of involvement in creative hobbies. To examine this, a stepwise regression analysis was conducted with total creative hobby participation as the criterion variable, as indicated by a summarized total score on the Creative Behavior Inventory, and positive creative beliefs about the self and others, negative creative beliefs about the self and others, sport originality, and the originality of the TTCT Just Suppose task as predictor variables. This regression produced an overall model with three significant predictors: $F(3, 91) = 14.695$, MSE = 185.099, $p < .001$, $R = .311$. Once again, endorsement of positive creative attributes in the self proved to be a significant predictor of participation in creative activities, as seen in Table 6. The originality of the TTCT Just Suppose task and greater endorsement of positive attributes as characteristic of a creative other were also significant predictors of hobby participation.

For this study, there was no significant relationship between gender and participation in creative hobbies. However, for the specific subscales of the CBI, females were significantly more involved in literary, musical, and performance hobbies, $r(157) = .185$, $p < .05$; $r(157) = .173$, $p < .05$; and $r(157) = .334$, $p < .05$, respectively. Furthermore, males were more likely to participate in math and science creative hobbies than females, $r(157) = -.222$, $p < .05$. Such findings lend further credibility to the claims of gender differences in the domains chosen for creative expression (Feldhusen & Willard-Holt, 1993; Lubinski & Benbow, 1992; Olszewski-Kubilius & Yasumoto, 1995).

Discussion

The goal of these studies was to examine the structure of implicit theories of creativity in the gifted using the CSC and CIC and the relationship of these theories to the exceptional creative abilities of the gifted. The first study found that gifted adolescents hold implicit theories, as assessed by the Creative Self Checklist, in which they define their creativity along many facets including impulsive and adventurous, skilled at speaking and popular, inquisitive and questioning, productive and intrinsically motivated, somewhat awkward or boring, and nonconformist and imaginative.

In the second study, a revised form of the Creative Self Checklist was used to assess the structure of implicit theories of creativity in the gifted through endorsements of attributes. This study, like the previous study, found that the gifted held implicit theories of themselves as risk-taking, adventurous, intelligent, intrinsically motivated, impulsive, and unorthodox. However, this sample held a belief that they were awkward and boring, in direct opposition to the prior study, in which participants viewed themselves as popular and skilled at speaking. One possible explanation for this difference may be that the two groups of adolescents differed with regard to their self-concepts of their own giftedness, which clouded the reporting

Beliefs and Creativity Tasks Predictive of Creative Activity Participation

Model	*B*	*t*	*p*
Intercept	-12.365	-1.133	.260
Positive creative beliefs-self	9.492	6.181	.001
TTCT originality	.829	3.025	.003
Positive creative beliefs-other	-3.641	-2.490	.015

Note. Predictors also entered: Sport originality, negative creative belief-self, negative creative belief-other

Table 6

of their self-perceptions with regard to creativity. One way to examine this issue would be to administer the CSC to additional gifted and nongifted populations. Another source of variance may be the gender and age differences between the adolescents in Study 1 and Study 2. Participants in Study 2 were younger and there were a greater number of males in that sample. Such differences may be why there were differences in the types of hobbies that were most frequently endorsed as well as the differences in attributes listed as part of their theory of creativity. While both samples rated themselves as dull or boring to some extent, these attributes were more central to the views of creativity for the participants in Study 2.

The second study also sought to assess the adolescents' implicit theories of creativity in others. Results from the Creative Individual Checklist indicated that the gifted adolescents believed that creative others were artistic and inquisitive, energetic, popular, and questioning of assumptions and conventions. Comparisons of the two surveys indicated that this group of gifted adolescents endorsed many of the same attributes for themselves as they did for an ideal creative other, believing both to be inquisitive, adventurous, and impulsive. This dual endorsement of creative attributes can be seen as a self-view of creative competence in the gifted. Based on prior research, then it is probable that the relationship between creative performance and giftedness is impacted by their beliefs in their own creative competence.

Another issue from these findings concerns the similarities and differences from the implicit theories of creativity described in prior research. As in prior studies, both groups of adolescents held implicit theories of creativity that contained aspects of adventurousness, intelligence, impulsivity, and inquisitiveness (Runco & Bahleda, 1986; Sternberg, 1985). However, compared to prior research, these adolescents' theories lacked mention of artistic or musical creativity and consistently contained references to self-concept, such as popular or boring. This focus on internal states of creativity, particularly with regard to the elements of creativity as a reflection of popularity and awkwardness found in each of the studies, may be the result of adolescent egocentric thought patterns as a part of identity formation. Further studies on the implicit theories of children as well as those of adolescents would help clarify the developmental changes in such personal theories of creativity.

These studies also examined the relationships among variables such as creativity measures, participation in creative hobbies, and implicit theories of creativity. The first study found that implicit theories were related to creative behaviors such that greater endorsement of positive attributes, or a belief in one's creative competence, predicted increased participation in creative hobbies better than performance on these pen-and-paper measures of creativity alone. Furthermore, this relationship occurred despite the fact that there was a limited relationship between creative beliefs and performance on pen-and-paper creativity measures. A positive implicit theory of creativity appears to be one reason that some individuals, gifted or not, may choose to engage in creative activities regardless of their creative processing abilities.

The second study also found a relationship among performance on creativity measures, participation in creative hobbies, and implicit theories of creativity. With regard to performance on creativity measures, an implicit theory that contained fewer negative creative attributes was related to better performance on the TTCT and, for adolescents' theories of others, the sport generation task. Implicit theories that do not contain attributes such as boring or awkward may be ones that reflect a greater sense of creative competence. Likewise, an implicit theory of another that contained more positive attribute endorsements was significantly related to greater performance on the TTCT and sport generation task. From these results, it appears that both a sense of personal creative competence and a well-defined general implicit theory of creativity are related to more creative output on standard creativity tasks.

As in the first study, there was a significant relationship among creativity measures, implicit theories of creativity and participation in creative hobbies. Again, a positive theory of creative competence was the most predictive of adolescents' participation in creative hobbies. Additionally, originality on the TTCT and a positive implicit theory of creativity in others also were related to hobby participation. Taken with the findings of the first study, it appears that implicit theories of creativity are a more consistent predictor of participation in later creative activities than performance on pen-and-paper tasks.

An additional finding of these studies indicated that what activities the gifted chose to engage in may in part be driven by gender, with males in this study much more likely to participate in math and science hobbies than females who typically chose literary, performance, or crafting hobbies. Due to both the small size of our study and the gender bias of the sample in Study 2, an accurate assessment of gender differences in the implicit theories of creativity was not feasible. Further research into gender differences in theories of creativity, particularly with adults and younger children, is needed to examine if differences in activity preferences by gender alters our implicit theories of creativity in any way.

One major drawback of this study in understanding the role that implicit theories play in the creativity of the gifted is the lack of a nongifted comparison sample. Further study of implicit theories of creativity with a gifted and nongifted sample would allow for better understanding of the implicit theories of creativity in the self and others for a normative adolescent population as well as their similarity to those theories held by the gifted. Although the attributes endorsed by the gifted adolescents as representative of creativity in this study were similar to those found in prior research with adults, there were some notable differences. Therefore, it may be possible that nongifted adolescents hold implicit theories that are different from both groups.

In conclusion, these studies found that gifted adolescents hold implicit theories of creativity that are similar to those found in prior research with adults. Furthermore, these implicit theories are more consistent predictors of their participation in "real-world" creative activities than performance on generative and divergent thinking tasks. This finding that adolescents' implicit theories influence their creative task performance and creative hobby participation conforms to prior findings of the impact of implicit theories on creative behavior (Lim & Plucker, 2001; Sternberg, 1985). It appears then, that implicit theories of creativity, with their power to shape an individual's concept of creativity, are indeed a major component of what differentiates those who display creativity from those who do not. As such, it may be the key component explaining the consistent link that has been made between creativity and giftedness.

REFERENCES

Ablard, K.E., & Mills, J. A. (1996). Implicit theories of intelligence and self-perceptions of academically talented adolescents and children. *Journal of Youth and Adolescence, 25,* 137-148.

Allen, C. F., Sifonis, C. M., & Smith, S. M. (1998, August). Tests of remote association. *Proceedings of the Twentieth Annual Meeting of the Cognitive Science Society.* Madison, WI.

Barden, R. C., Zelko, F. A., Duncan, S. W., & Masters, J. C. (1980). Children's consensual knowledge about the experiential determinants of emotion. *Journal of Personality and Social Psychology, 39,* 968-976.

Bempechat, J., London, P., & Dweck, C. S. (1991). Children's conceptions of ability in major domains: An interview and experimental study. *Child Study Journal, 21,* 11-36.

Chan, L. S. K. (1994). Motivational orientations and metacognitive abilities of intellectually gifted students. *Gifted Child Quarterly, 40,* 184-194.

Feldhusen, J. F., Treffinger, D. J., Van Mondfrans, A. P., & Ferris, D. R. (1971). The relationship between academic grades and divergent thinking scores derived from four different methods of testing. *Journal of Experimental Education, 40,* 35-40.

Feldhusen, J. F., & Willard-Holt, C. (1993). Gender differences in classroom interactions and career aspirations of gifted students. *Contemporary Educational Psychology, 18,* 355-362.

Fryer, M., & Collings, J. A. (1991). British teachers' views of creativity. *Journal of Creative Behavior, 25,* 75-81.

Groborz, M., & Necka, E. (2003). Creativity and cognitive control: Explorations of generation and evaluation skills. *Creativity Research Journal, 15,* 183-197.

Harrington, D. M. (1975). Effects of explicit instructions to "be creative" on the psychological meaning of divergent thinking test scores. *Journal of Personality, 43,* 434-454.

Hennessey, B. A., & Amabile, T. A. (1988). The conditions of creativity. In R.J. Sternberg (Ed.), *The nature of creativity* (pp. 11-38). New York: Cambridge University Press.

Hocevar, D. (1979, April). *The development of the Creative Behavior Inventory.* Paper presented at the Rocky Mountain Psychological Association. (ERIC Document Reproduction Service No. ED 170 350)

Lesser, M. A. (1995). Teachers' implicit theories of creativity (Doctoral dissertation, Fordham University, 1994). *Dissertation Abstracts International, 55*(11A), 3454.

Lim, W., & Plucker, J. A. (2001). Creativity through a lens of social responsibility: Implicit theories of creativity with Korean samples. *Journal of Creative Behavior, 35,* 115-131.

Little, T. D., & Lopez, D. F. (1997). Regularities in the development of children's causality beliefs about school performance across six sociocultural contexts. *Developmental Psychology, 33,* 165-175.

Lubinski, D., & Benbow, C. P. (1992). Gender differences in abilities and preferences amongst the gifted: Implications for the math/science pipeline. *Current Directions in Psychological Science, 1,* 61-66.

Mumford, M. D., Baughman, W. A., Costanza, D. P., Uhlman, C. E., & Connelly, M. S. (1993). Developing creative capacities: Implications of cognitive processing models. *Roeper Review, 16,* 16-21.

Murrone, J., & Gynther, M. D. (1989). Implicit theories or halo effect? Conceptions about children's intelligence. *Psychological Reports, 65,* 1187-1193.

Murrone, J., & Gynther, M. D. (1991). Teacher's implicit 'theories' of children's intelligence. *Psychological Reports, 69,* 1195-1201.

Olszewski-Kubilius, P., & Yasumoto, J. (1995). Factors affecting the academic choices of academically talented middle school students. *Journal for the Education of the Gifted, 18,* 298-318.

Plucker, J. A., & Renzulli, J. S. (1999). Psychometric approaches to the study of human creativity. In R. J. Sternberg (Ed.), *Handbook of Creativity* (pp. 35-61). Cambridge, MA: Cambridge University Press.

Renzulli, J. (1986). The three-ring conception of giftedness: A developmental model for creative productivity. In R. J. Sternberg and J. A. Davidson (Eds.), *Conceptions of Giftedness* (pp. 53-92). Cambridge, MA: Cambridge University Press.

Rothenberg, A. (1990). Creativity in adolescence. *Psychiatric Clinics of North America, 13,* 415-434.

Runco, M. A. (1984). Teachers' judgments of creativity and social validation of divergent thinking tests. *Perceptual & Motor Skills, 59,* 711-717.

Runco, M. A. (1986). Maximal performance on divergent thinking tests by gifted, talented, and nongifted children. *Psychology in the Schools, 23,* 308-315.

Runco, M. A. (1987). The generality of creative performance in gifted and nongifted children. *Gifted Child Quarterly, 31,* 121-125.

Runco, M. A. (1990). Implicit theories and ideational creativity. In M. A. Runco & R. S. Albert (Eds.), *Theories of creativity* (pp 234-252). Newbury Park, CA: Sage.

Runco, M. A. (1993). Divergent thinking, creativity, and giftedness. *Gifted Child Quarterly, 37,* 16-22.

Runco, M. A., & Bahleda, M. D. (1986). Implicit theories of artistic, scientific, and everyday creativity. *Journal of Creative Behavior, 20,* 93-98.

Runco, M. A., Johnson, D. K., & Baer, P. J. (1993). Parents' and teachers' implicit theories of children's creativity. *Child Study Journal, 23,* 91-113.

Saunders, K. N., Dodds, R. A., & Ward, T. B. (2000, August). *Beliefs, activities, and attitudes related to creativity in gifted adolescents.* Paper presented at the 108th convention of the American Psychological Association, Washington, D.C.

Sternberg, R. J. (1985). Implicit theories of intelligence, creativity, and wisdom. *Journal of Personality and Social Psychology, 49,* 607-627.

Sternberg, R. J., Conway, B. E., Ketron, J. L., & Bernstein, M. (1981). People's conceptions of intelligence. *Journal of Personality and Social Psychology, 41,* 37-55.

Sternberg, R. J., & Lubart, T. I. (1993). Creative giftedness: A multivariate investment approach. *Gifted Child Quarterly, 37,* 7-15.

Torrance, E. P. (1972). Predictive validity of the Torrance Tests of Creative Thinking. *Journal of Creative Behavior, 6,* 236-252.

Torrance, E. P. (1974). *Torrance Tests of Creative Thinking.* Bensenville, IL: Scholastic Testing Services.

Tversky, B., & Hemenway, K. (1984). Objects, parts, and categories. *Journal of Experimental Psychology: General, 113,* 169-193.

Ward, T. B., Patterson, M. J., & Sifonis, C. M. (2004). The role of specificity and abstraction in creative idea generation. *Creativity Research Journal, 16,* 1-9.

Ward, T. B., Saunders, K. N., & Dodds, R. A. (1999). Creative cognition in gifted adolescents. *Roeper Review, 21,* 260-266.

Winner, E. (2000). Giftedness: Current theory and research. *Current Directions in Psychological Science, 9*(5), 153-156.

Zelko, F. A., Duncan, S. W., Barden, R. C., Garber, J., & Masters, J. C. (1986). Adult's expectancies about children's emotional responsiveness: Implications for the development of implicit theories of affect. *Developmental Psychology, 22,* 109-114.