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1. Evolution of a research program on creativity

Robert J. Sternberg

I have been studying creativity for most of my career. I first became seriously interested in creativity during the spring of 1973 as a first-year graduate student. I was visiting my undergraduate advisor from Yale, Endel Tulving, who was visiting the Center for Advanced Study in the Behavioral Sciences at Stanford University. I had just finished a first-year project on what now seems like a truly arcane topic: negative transfer in part-whole and whole-part free recall (Sternberg & Bower, 1974). The project came out great – so great that for the first and last time in my career I actually resolved a problem in the literature. There did not seem to be anything left to do on the issue. I was interested in doing something different – in particular, studying intelligence – but I did not yet know what I wanted to do. While visiting Professor Tulving, I was eating lunch with him and some of his colleagues. After I described my first-year project, one of the colleagues asked me what I planned to do next. I had no idea. The colleague looked at me as though I was a sad case – someone who had one creative idea at the beginning of his graduate-school career and now was washed up.

My new foray was not into the field of creativity. My dissertation was on human intelligence (Sternberg, 1977), and it was not until 1985 that I returned to the study of creativity (Sternberg, 1985d). I did a series of studies on people's folk conceptions (implicit theories) of intelligence, creativity, and wisdom. The idea was to examine how people understood creativity. This was the first of several phases of research.

PHASE 1: IMPLICIT THEORIES

In Phase 1 of Sternberg (1985d), I did a multidimensional scaling of the results of people's sortings of various behaviors that might be characteristic of creativity. The detailed results of nonmetric multidimensional scaling are depicted as the original table in the Appendix (Table 1A.1). Four dimensions accounted for 93 percent of the variance in the data with a stress of .08 (which is considered acceptable).

The first dimension yielded two interpretations: *nonentrenchment* for the positive polarity (e.g., makes up rules as he or she goes along; has a free spirit; is unorthodox) and *integration and intellectuality* for the negative polarity (e.g., makes connections and distinctions between ideas and things; has the ability to recognize similarities and differences; is able to put old information, theories, and so forth together in a new way).

The second dimension was also interpreted in terms of two polarities: *aesthetic taste and imagination* for the positive polarity (e.g., has an appreciation of art, music, and so forth; can write, draw, compose music; has good taste) and *decisional skill and flexibility* for the negative polarity (e.g., follows his or her gut feelings in making decisions after weighing the pros and cons; has ability to change directions and use another procedure).

The third dimension was interpreted in terms of *perspicacity* for its positive polarity (e.g., questions societal norms, truisms, assumptions; is willing to take a stand) and of *drive for accomplishment and recognition* for its negative polarity (e.g., is motivated by goals; likes to be complimented on his or her work; is energetic).

The fourth and weakest dimension was interpreted in terms of *inquisitiveness* (positive polarity) and *intuition* (negative polarity). This dimension was weak, and did not have many salient weights on either polarity.

In this work, some of the studies went beyond testing laypeople to also testing professors of art, business, philosophy, and physics. Moreover, the subjects were asked not only to characterize creativity, but also intelligence and wisdom.

First, I found that, in general, intelligence and wisdom are perceived as most closely related (median $r = .68$), intelligence and creativity as next most closely related (median $r = .55$), and wisdom and creativity as least related (median $r = .27$). The only departure from this pattern was for philosophers, for whom intelligence and creativity were considered to be more highly related ($r = .56$) than were intelligence and wisdom ($r = .42$).

Second, all of the interrelationships were positive, meaning that greater amounts of a given attribute were associated with greater amounts of each other attribute. However, there was one exception to this trend: The business professors saw greater amounts of wisdom as being associated with lesser amounts of creativity ($r = -.24$). In other words, in business, the wiser people were seen as less creative, and vice versa.

Third, there were some interesting differences in magnitudes of interrelations across groups. For example, the art, philosophy, and physics professors all saw intelligence and creativity as being highly related ($r = .55, .56, .64$, respectively) but the business professors and laypersons saw them as only weakly related ($r = .29$ and $.33$, respectively). Moreover, the relation between creativity and wisdom reached moderate levels in the

opinion of the art professors and philosophy professors ($r = .48$ and $.37$, respectively) but was low for the other groups, and, as mentioned earlier, was actually negative for the business group.

PHASE 2: THE THREE-FACET MODEL

After this initial foray into understanding creativity through implicit theories, I made another attempt through an explicit theory – the three-facet model of creativity (Sternberg, 1988). This model proposed that creativity involved three facets: namely intellectual, stylistic (styles of thinking), and personality.

With regard to the intellectual element of creativity, the three-facet model drew heavily on my triarchic theory of human intelligence (Sternberg, 1985a, 1986, 1997c; contrast conventional theories as described in Sternberg & Grigorenko, 2002). The main element of creativity with regard to intelligence of course is creative intelligence, or the ability to generate original and effective ideas (Sternberg, 2005). I believed that insight is a key to such creative thinking (Sternberg & Davidson, 1982, 1983). But creativity writ large also involves analytical and practical intelligence. Creative intelligence is involved in generating ideas, analytical intelligence in ascertaining whether the ideas are good ones, and practical intelligence in convincing other people of the value of the ideas.

With regard to styles of thinking, styles are not about abilities, which are covered under the intellectual component. Rather, here one deals with a stylistic component – a preference for thinking in certain ways. The most relevant styles are what I have referred to as the legislative and liberal styles (Sternberg, 1997b). The legislative style characterizes people who like to do things their own way and come up with new ideas. They may or may not be good at coming up with such ideas – the style refers to the preference, not the ability. This style is especially in contrast to the executive style, characterizing people who like to be told what to do. The liberal style refers to liking to do things in new rather than old ways. It is in contrast to a conservative style, or a preference for things the way they are.

With regard to personality, the main characteristics, I believed, are tolerance of ambiguity, willingness to surmount obstacles, willingness to grow, intrinsic motivation, moderate risk-taking, desire for recognition, and willingness to work for recognition. In other words, creative people have personality dispositions that incline them to do creative work, regardless of their particular levels of abilities or styles.

In this phase, most of my and my colleagues' research was on the

intellectual component of creativity. At this point, my measures of creative intelligence were fairly narrowly construed.

Fluid Thinking

Earliest attempts in this program of work to measure creativity were through measures of fluid intelligence. These efforts (e.g., Sternberg, 1977, 1985a, 1985b; Sternberg & Davidson, 1983) involved fluid-ability tests such as analogies, classifications, and series completions. At the time of this research, I believed that creativity, or at least creative intelligence, could be understood in terms of human information processing (Sternberg, 1985b, 1985c), although I recognized that people's folk conceptions of intelligence went beyond information processing (Sternberg, 1985d). The idea was to isolate the components of inductive reasoning most germane to fluid intelligence, which in turn has been viewed as a major component of creativity (Sternberg, 1984, 1985a, 1988). The problems we used assumed normal reading capabilities. But because all of them contained verbal information, students with severe difficulties in reading could have been disadvantaged (Spear-Swerling & Sternberg, 1994).

Here are examples of the kinds of items we used (e.g., Sternberg & Davidson, 1983) – with correct answers here and elsewhere asterisked for convenience (although subjects did not see the asterisks):

What is the correct completion of this analogy? – WASHINGTON is to 1 as LINCOLN is to (a. 2, b. 12, *c. 16, d. 25)

Which word below belongs with this group? – GRANT, EISENHOWER, MCKINLEY (a. LEE, b. MACARTHUR, c. FRANKLIN, *d. MADISON)

What number comes next in the following series? – 2, 7, 13, 20, ? (a. 21, b. 27, *c. 28, d. 30)

The work focused on constructing information-processing and corresponding mathematical models of inductive reasoning. The mathematical models were used to predict response times and error rates to problems of varying difficulty. The models were successful, usually accounting for over 80 percent, and sometimes over 90 percent, of the variation in the response-time data.

From the standpoint of measuring creativity or that part of it that constitutes creative intelligence, it is clear in retrospect that the items were inadequate. The items could measure quality of thinking, but not whether the thinking produced any element of novelty or surprise. Indeed, the items were standard for conventional intelligence tests and hence, for a

Western population, were neither novel nor particularly surprising – nor were the responses to the items novel or surprising.

Nonentrenched Thinking

These efforts led to subsequent efforts to measure thinking that was nonentrenched – to the subjects, more novel and surprising than typical inductive-reasoning tasks.

Conceptual-projection items based on the new riddle of induction

The new riddle of induction was proposed by Goodman (1955). Suppose we define a new concept, *grue*, such that a certain thing, *X*, is said to be *grue* at a certain time *t* if and only if

X is green at *t* and *t* is before 3000 or *X* is blue at *t* and *t* is during or after 3000.

[Note: Writing in the early 1950s, Goodman used the year 2000 as a basis for the distant future; but at this point in time the year 3000 is more appropriate.]

Although it could be said that 100 percent of the times people have observed emeralds they have been green, it could equally well be said that 100 percent of the times that people have observed emeralds the emeralds have been *grue*. People thus could conclude reasonably that the next emerald they see will be *grue* and, indeed, that emeralds they see, say, in the year 3000 will also be *grue*. Similarly, we define a new concept, *bleen*, such that a certain thing *X* is said to be *bleen* at a certain time *t* if and only if

X is blue at *t* and *t* is before 3000 or *X* is green at *t* and *t* is during or after 3000.

Thus, sapphires might equally well be either blue or *bleen*. There is nothing in our empirical experience to distinguish between the two possibilities.

It was possible to create items that would measure subjects' ability to think in a nonentrenched way, using concepts such as *grue* and *bleen* as well as others (Sternberg, 1981, 1982). A typical item in one of several experiments would look as follows, where the first term refers to an actual or hypothesized observation in the present and the second an actual or hypothesized observation in, say, the year 3000 (again, the year 2000 was used in the original items because the study was published before 2000). The correct answer refers to the true color of the item. Here is an example:

GRUE [PICTURE OF A BLUE BALL] *(a) GRUE, (b) GREEN, (c) BLEEN, (d) BLUE

In this item, the first term is a word, GRUE. The second term is a physical appearance of a ball – in this case, a blue ball. The question is: If the object is thought to be grue now and physically appears to be blue in 3000, what is the ball actually shown to be in 3000? The correct answer is GRUE. In the present, the observer thought the item was GRUE, meaning that its physical appearance was green and the observer predicted it would change in physical appearance to blue. In the year 3000, its physical appearance is blue. Thus, the item did indeed change in physical appearance from green to blue, meaning that it is actually grue. Here is a second example:

[PICTURE OF A BLUE BALL], [PICTURE OF A GREEN BALL] (a) GRUE, *(b) BLEEN, (c) GREEN, (D) BLUE

The correct answer here is BLEEN. The ball changed in physical appearance from blue to green, meaning that the ball was actually bleen.

Using a mathematical model, it was possible to account for over 90 percent of the variation in the response-time data. That is, it was possible to predict which items were easier to solve and which items harder to solve. Individual parameter estimates were correlated with scores on psychometric tests of induction and deduction. Although there were significant correlations with both, the correlations with the inductive measures were higher, and remained significant after the deduction test scores were partialled out.

Insightful Thinking

In several projects (e.g., Sternberg & Davidson, 1982, 1983), we used insight items in order to measure creative intelligence. Here are two examples:

You are at a party of truth-tellers and liars. The truth-tellers always tell the truth, and the liars always lie. You meet a new friend. He tells you that he just heard a conversation in which a girl said she was a liar. Is your new friend a liar or a truth-teller? Why?

*He must be a liar because if the girl were a truth-teller she would say she was telling the truth, and if she were a liar she still would say she was telling the truth. Hence, she actually said she was telling the truth and your new friend is a liar.

You have black socks and brown socks in a drawer mixed in a ratio of 4:5, respectively. How many socks do you need to take out of the drawer to be assured of having at least two socks of the same color?

*3. If, on the first two tries, you get two socks of the same color, you are done. If you get one black and one brown sock on the first two tries, on the third try the third sock must match one of the other socks. The ratio information is irrelevant.

We found that these items were highly correlated with various measures of inductive reasoning and were not correlated with abilities deemed to be irrelevant.

Counterfactual Inductive Reasoning

In another set of studies, we studied creative intelligence by counterfactual analogies (Marr & Sternberg, 1986; Sternberg, 1993; Sternberg & Gastel, 1989a, 1989b). In this work, we informed subjects that each analogy would be preceded either by a factual or by a counterfactual presupposition. The subjects should solve the given analogy assuming the presupposition is true. We presented analogies such as these:

Chalk is used for writing. INK: PAPER:: CHALK: (a) WORD, *(b) BLACKBOARD, (c) ERASER, (d) CLASSROOM
The hand is the organ of hearing. EYE: BLINDING:: HAND: (a) SMOOTH, (b) TOUCHING, *(c) DEAFENING, (d) WORN

In the first analogy, the presupposition is factual so it does not change the answer. Just as ink writes on paper, chalk writes on a blackboard. The answer to the first analogy is thus (b) because the presupposition is factual and does not change the correct answer. In the second analogy, the presupposition is counterfactual. It *does* change the answer. The answer to the second analogy is (c) because the counterfactual presupposition changes the answer. A very strong visual signal can be blinding to the eye. A very strong auditory signal (because the hand is now said to be the organ of hearing) can deafen the ears.

There were also two other versions, ones where there were factual or counterfactual presuppositions irrelevant to the solution to the analogy. Moreover, there also were classification and series-completion items that functioned in the same way.

The results were as we hypothesized. Response times on the items correlated significantly and moderately with scores on inductive reasoning tests. They did not correlate significantly either with vocabulary or

perceptual speed. So, once again, we were able to measure an aspect of nonentrenched reasoning.

Everyday Prediction and Postdiction

In a third type of item, we looked at everyday prediction and postdiction (Sternberg & Kalmar, 1997). We told subjects the state of an object with respect to an attribute (such as physical location) in the present. The subjects had to predict or postdict the future or past state of the object with respect to that particular property. Here are two examples:

Object	Property	Date	State
OAK LEAF	PHYSICAL LOCATION	JUNE 12	ON THE TREE
		DECEMBER 12	(a) ON THE TREE *(b) OFF THE TREE

TEENAGER	HEIGHT	OCTOBER 1994	5' 10"
		OCTOBER 1984	(a) 5' 10" *(b) 3' 10"

In half the items, there was a change in state, and in half there was not. Response times for both prediction and postdiction were highly correlated with inductive-reasoning tests but not with deductive reasoning or vocabulary tests.

Measures of Thinking Styles

We typically measured thinking styles using the Thinking Styles Inventory (see Sternberg, 1997b). An example of a legislative item would be: "When I am working on a project, I like to plan what to do and how to do it." An example of a liberal item would be: "I like to avoid situations where I'm expected to do things in some established way." Subjects would rate statements such as these on a 1–9 scale, where 1 indicates little agreement and 9 an extremely high level of agreement. The internal-consistency reliability of the legislative scale is .81 and of the liberal scale .88.

We found that styles of teachers vary, with grade with teachers becoming more conservative with increasing grade level – perhaps because of the increasingly narrow requirements for achievement in higher grades. We also found that styles of teachers vary with subject matter, with science

teachers more conservative than humanities teachers. Styles of teachers also vary across schools, with more conservative schools, perhaps predictably, having teachers who are on average more conservative.

The results for students were quite interesting. We found that the correlation of styles with school grades varied across schools. In a Catholic parochial school, for example, we found that the executive and conservative styles predicted higher achievement, whereas in a progressive private school we found the exact opposite pattern of correlations. That is, the signs of correlations actually were inverse across the schools. We also found that styles predicted school achievement over and above the level of prediction obtained from ability tests.

PHASE 3: THE INVESTMENT THEORY OF CREATIVITY

The main idea of the investment theory is that creative people defy the crowd – they are defiant in their attitude toward life. On this view, creativity is largely, although certainly not solely, an attitude toward life.

Defying the Crowd

Creative people tend to defy the crowd. It is hard to defy the crowd because others do not like their ideas being challenged. Ideas that challenge the existing order often are very hard to get accepted (Hunter et al., 2007; see essays in Sternberg, 2003; Sternberg et al., 2016).

Defying the crowd is difficult because creative people, perhaps even more than some uncreative ones, want to be appreciated for their work. Part of what motivates them is the renown that may result from their creative ideas. But individuals, including creative ones, often become uncomfortable, irritated, or downright angry when their ideas are challenged. In the long term, creative people know that ideas that defy the crowd are the ones that change a field. But they also know that, in the short term, it is easier to get ideas accepted if one plays to the crowd. As a result, often what pays off most in the long term with regard to creative performance – defying the crowd – pays off least in the short term.

In this phase, we moved to performance-based measures of creativity. Multiple-choice items proved not to be an effective way to measure creativity. Two sets of studies (Sternberg et al., 2001; Sternberg & the Rainbow Project Collaborators, 2006) suggested that when multiple-choice format is used, it is difficult (or perhaps impossible!) to separate a creative-thinking factor in factor analysis from a fluid-ability factor.

Whereas in earlier research the two had been treated as very closely related, as accompanying theories of creativity expanded their range (e.g., Sternberg & Lubart, 1995), it became clear that there was much more to creativity than fluid intelligence or even nonentrenched thinking of the kind measured by the item types described above. Creativity is not just an ability; it is also an attitude to life (Sternberg & Lubart, 1995).

A transition was made to performance- and project-based assessments of creativity. In one set of studies (e.g., Lubart & Sternberg, 1995), subjects were tested for creativity in the domains of writing, art, advertising, and science. Writing projects involved presenting titles, such as “Beyond the Edge” or “A Fifth Chance.” Subjects selected two titles from a long list and wrote creative short stories. Art projects involved doing creative drawings with given titles such as “A Dream” or “Earth from an Insect’s Point of View”. In the domain of advertising, subjects prepared creative advertisements for boring-seeming products such as “Brussels sprouts” or “the Internal Revenue Service.” And, in the science condition, subjects were asked questions such as “How might we determine if someone has been on the moon in the past month?” (*e.g., they would not be adjusted to Earth gravity) or “How might we find out if extraterrestrial aliens are living among us?” (*e.g., they probably would not know common-cultural tacit knowledge people learn as young children).

We found that creativity could be judged reliably – with inter-rater reliabilities usually at the .8 level; that the art and story projects (more familiar) were more creative than the advertising and science projects (less familiar); and that creativity is relatively domain-specific.

In later research (Sternberg, 2010, 2016; Sternberg & The Rainbow Project Collaborators, 2006), we expanded the range of projects, allowing students to write counterfactual histories (e.g., What might the world be like today if some historical event of your choice had come out a different way?), to write short stories (e.g., “The End of MTV”, “Confessions of a Middle School Bully”), to design experiments to test a scientific hypothesis of the subjects’ choice, or to draw a creative picture or design a creative advertisement. We found that we could: (a) clearly separate a creative factor from an analytical (inductive-reasoning) factor; (b) double predict freshman-year grade point average (GPA) by using creative measures, over and above the prediction provided by the SAT; (c) predict success in extracurricular activities; and (d) substantially reduce ethnic-group differences in performance on our assessments relative to the SAT. Moreover, in contrast to the SAT and ACT, subjects actually liked the tasks. We further found cross-national differences in assessed levels of creativity (Niu & Sternberg, 2002), in our case favoring U.S. over Chinese students, regardless of whether the judges were American or Chinese.

PHASE 4: A TRIANGULAR THEORY OF CREATIVITY

My new triangular theory (Sternberg, 2018a, 2018b, 2018c) expands upon the investment theory of creativity (Sternberg & Lubart, 1995) as well as on the three-facet model of creativity (Sternberg, 1988; Zhang & Sternberg, 1998). The triangular theory holds that creativity can be understood not just in terms of defying the crowd – that is, other people with more conventional conscious beliefs – but also in terms of defying oneself and one's own beliefs as well as defying the usually unrecognized presuppositions we all have – our *Zeitgeist*.

Kinds of Defiance in Creativity

There are three kinds of defiance in the triangular theory: of the crowd, of the self, and of the *Zeitgeist*. I have already discussed defying the crowd above. I discuss here only defying oneself and defying the *Zeitgeist*.

Defying oneself

An even greater challenge, at times, is defying oneself and one's own set of beliefs. It is a greater challenge, in part, because one does not easily recognize it as a challenge. Defying oneself is challenging because virtually everyone tends to become entrenched and tends to accept her/his own entrenchment, usually viewing others rather than themselves as problematic for creativity. In other words, one can be one's own worst enemy in generating creative ideas.

Research has shown the susceptibility of experts to entrenchment effects (e.g., Adelson, 1984; Frensch & Sternberg, 1989). Often, we are our own greatest obstacle. We may have the disposition to create – the attitude that we are willing to blaze our own path (Grant, 2016; Schank & Childers, 1988) – but we keep blazing the same path again and again.

Defying the *Zeitgeist*

The greatest threat to creativity, for most of us, is not the set of conscious beliefs we or others (the crowd) are aware of having, but rather the set of presuppositions we often do not even consciously know we have. They are the common-cultural presuppositions on which our field and often our world is built – the so-called *Zeitgeist*. Even those with a creative, defiant attitude cannot easily defy beliefs they do not consciously know they, or others, have. For the most part, we buy into paradigms embedded in the *Zeitgeist* without even consciously realizing that these paradigms are the result of untested and often untestable assumptions.

As Kuhn (1970) recognized, revolutionary, Zeitgeist-defying creativity inconsistent with current paradigms in research is fundamentally different from normal creativity within a paradigm because it challenges the often unconscious assumptions we hold about what science (or art or literature or whatever) is and can be. Zeitgeist-defying creativity pits one against a whole cultural way of thinking, whether it is a geographic culture, a scientific culture, an artistic culture, or whatever (see Glăveanu, 2015; Niu & Sternberg, 2002). In Zeitgeist-defying creativity, the scientist or artist or writer questions the very presuppositions about what is acceptable for the discipline (Kaufman & Sternberg, 2010; Sternberg, 1999; Sternberg et al., 2002).

The three types of defiance are not entirely independent. Both the self and others are embedded in a society that has various aspects to its Zeitgeist. One often does not realize how the Zeitgeist – and how other people – affect the way one thinks. And even when one defies the Zeitgeist and others, one inevitably relies on one's own and others' past work, even if it is to tear it down. Hopefully, future theorists of creativity will show the full triangular set of attributes of creativity: they will produce new theories of creativity and new research that defies the crowd, the individuals who create the theories, and the Zeitgeist of old theories!

CONCLUSIONS

As my theorizing about creativity evolved through four phases, so did the measures my collaborators and I used (see also Sternberg, 2017). Multiple-choice items, or really any items that converge upon a single correct response, do not provide an effective way to measure creativity. Using project- and performance-based items can reveal aspects of performance that are left untouched by conventional standardized tests, that increase prediction of academic and extracurricular success, and that reduce ethnic-group differences.

Most importantly, theorists of creativity need themselves to be creative. They need to put their own theories into practice (Sternberg & Grigorenko, 2004) and think creatively and critically about their own work (Sternberg, 1985e). They also need the “practical intelligence” about their own careers to realize that they are as susceptible to becoming entrenched as anyone else (Sternberg, 1997a; Sternberg & Hedlund, 2002; Sternberg & Smith, 1985). Often the greatest challenge for them is to defy themselves – to let go of the theories they formulate early in their careers, or, at the very least, to build on these theories to create better and more comprehensive theories. It is perhaps ironic that creativity theorists and researchers, like any other scholars,

can get stuck in their early work and then have trouble going beyond it. It's happened to me at phases in my career. But if creativity researchers want to be role models of creativity, they must do what all creative scientists must do – defy the crowd, defy themselves, and defy the Zeitgeist.

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APPENDIX

Table 1A.1 Full results from multidimensional scaling of ratings of implicit theories of creativity

Scaling solutions	Weight
Dimension 1	
Positive polarity: Nonentrenchment	
Makes up rules as he or she goes along	2.34
Is impulsive	2.13
Takes chances	2.02
Tends not to know own limitations and tries to do what others think is impossible	1.92
Is emotional	1.89
Has a free spirit	1.69
Builds castles in the sky	1.51
Is a nonconformist	1.49
Is unorthodox	1.47
Negative polarity: Integration and intellectuality	
Makes connections and distinctions between ideas and things	-2.10
Has the ability to understand and interpret his or her environment	-2.05
Has the ability to recognize similarities and differences	-1.96
Is able to grasp abstract ideas and focus his or her attention on those ideas	-1.82
Is productive	-1.80
Has a high IQ level	-1.58
Attaches importance to ideas	-1.56
Possesses ability for high achievement	1.52
Is always thinking	-1.49
Is able to put old information, theories, and so forth together in a new way	1.16
Dimension 2	
Positive polarity: Aesthetic taste and imagination	
Has an appreciation of art, music, and so forth	1.90
Likes to be alone when creating something new	1.82
Can write, draw, compose music	1.82
Has good taste	1.80
Uses the materials around him or her and makes something unique out of them	1.58
Is in harmony with the materials or processes of expression	1.40
Is imaginative	1.24

Table 1A.1 (continued)

Scaling solutions	Weight
Negative polarity: Decisional skill and flexibility	
Follows his or her gut feelings in making decisions after weighing the pros and cons	−1.94
Has ability in change directions and use another procedure	−1.13
Dimension 3	
Positive polarity: Perspicacity	
Questions societal norms, truisms, assumptions	1.48
Is perceptive	1.32
Is willing to take a stand	1.21
Negative polarity: Drive for accomplishment and recognition	
Is motivated by goals	−1.89
Likes to be complimented on his or her work	−1.73
Is energetic	−1.73
Has a sense of humor	−1.48
Dimension 4	
Positive polarity: Inquisitiveness	
Is inquisitive at an early age	1.21
Is inquisitive	1.19
Negative polarity: Intuition	
Has intuition	−1.04

Note: Stress (Formula 1) = .08, $R^2 = .93$.

Source: From Sternberg, R. J. (1985). Implicit theories of intelligence, creativity, and wisdom. *Journal of Personality and Social Psychology*, 49(3), 607–627, Table 4. Used with permission of the American Psychological Association (APA).