Could Steven Spielberg Manage the Yankees?: Creative Thinking in Different Domains

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Few genius-level creators have achieved such success in more than a single domain, but that may be because of the extensive time it takes to prepare for high-level performance in any domain. Some self-report and personality studies of more "garden-variety" creativity suggest domain general factors that influence creativity in all domains, while performance assessments of creativity in different domains generally find little or no evidence of such general factors. This discrepancy is explained by arguing that people's implicit conceptions of creativity may often contain content general creativity-relevant factors, the actual cognitive mechanisms underlying creative performance — with the likely exception of g — are domain specific.

Steven Spielberg is arguably the most successful filmmaker alive, having directed both popular hits (such as E. T. and Jurassic Park) and critical favorites (such as Schindler's List and Saving Private Ryan). Spielberg is a creative movie maker who has advanced the field by juggling a child's wondrous view of the world with special effects and technical wizardry. But could Spielberg have applied his creativity in film to another domain? If he were a chemist, would he have discovered a new element? Or if Steven Spielberg had fallen in love with baseball instead of the cinema, could his inventive mind have just as easily concocted unique strategies to manage the New York Yankees? The answer lies in whether creative thinking is general or domain specific.

Is there a pattern of abilities that people may possess in varying degrees that will lead them to exhibit higher levels of creativity in everything they do? These abilities might include many things: cognitive skills, personality traits, motivational patterns, thinking styles, or even certain kinds of knowledge. Is there perhaps something we might label c, analogous to the g of intelligence, that transcends domains and enhances the creativity of a person in all fields of endeavor? And does it make sense to call someone "creative," or should attributions of creativity always be qualified in some way (e.g., "a creative story-teller" or "a creative mathematician," but not "a

creative person")? In order to answer these questions, we must first explore what   we mean by creativity.

WHAT KINDS OF CREATIVITY CAN BEST HELPS US UNDERSTAND WHETHER CREATIVITY IS GENERAL OR DOMAIN SPECIFIC?

When asking whether creativity is general or domain specific, we must first specify what is meant by creativity. There is some consensus here, at least at the most basic level. After surveying a number of such definitions, Mayer (1999) concluded that most creativity theorists "endorse the idea that creativity involves the creation of an *original* and *useful* product" (p. 449), although this definition leaves important questions unanswered, such as how original or how useful a product must be in order to earn recog- nition as creative.

At the highest level of creativity, where there is no doubt that the products in question deserve such recognition, few have achieved eminence in more than one domain, and this seems at first blush like a strong argument for domain specificity. Indeed, when creativity researchers focus on this highest level of creativity, their arguments tend to have a domain specific flavor (Csikszentmihalyi, 1990; Kaufman, 2001; Simonton, 1994; Sternberg, Kaufman, & Pretz, 2001, 2002; Weisberg, 1999). Yet there are too many confounding variables that we must take into account when examining genius-level work. To attain greatness in any field, it takes approxi- mately ten years simply to reach the level of competence necessarily to make a contribution in a given domain (Hayes, 1989). Indeed, Steven Spielberg shot his first home movies (such as *Escape to Nowhere* and *Battle Squad*) around 1961, when he was 15 years old. His first significant movie, *Duel*, was released in 1971, when he was 25. *Jaws* was released four years later.

Spending ten-plus years in dedicated study or practice in several different domains is usually impossible (or at least unlikely), and therefore the apparent lack of creators who have reached the highest levels of creativity in two or more domains can tell us little about whether the creativity-relevant skills and traits that helped them succeed so brilliantly in one field could have been applied with similar success in other, unre- lated fields. There simply are not enough years in the human lifespan to allow a Spielberg, for example, to study film for ten years, go on to make significant contri- butions as a film-maker, and then undertake study of equal intensity in one or more totally unrelated domains.

To answer the question whether creativity is general or domain specific, therefore, we will need to consider more garden-variety creativity. It is at least theoretically pos- sible that a person could apply the same cognitive skills or personality traits in the service of creative performance in many diverse domains at a more "everyday" level, as opposed to performance at the quality level of a Spielberg (Kaufman & Baer, in press).

HOW TO ASSESS CREATIVITY IN DIFFERENT DOMAINS

Research on everyday creativity can look at several different aspects of creativity, such as creative personalities, creative products, or creative processes, or it may start from different frames of analysis, such as considerations of whether creativity is a social or a personal phenomenon (Mayer, 1999). It is likely that by asking different questions, researchers will find different answers, as well as different, and possibly

conflicting, truths about creativity. The fact that creativity researchers are asking different questions and using different methods when they approach the issue of domain generality or specificity may indeed be at the heart of much of the dispute in this area. For example, Plucker (1998) noted that "performance assessments produce evidence of task specificity, and creativity checklists and other traditional assessments suggest that creativity is content general" (p. 180). A study by Runco (1987) exemplified this effect by using both self-report and performance-based assessments of creativity. The self-report scales, which focused on the quantity of creative activities in which subjects engaged in various domains, evidenced generality of creativity across domains, but the performance assessments, which focused on the quality of creative performances in different domains, pointed to domain specificity of creativity. Is this method effect pointing to a genuine difference, or merely to errors in measurement or interpretation in one method versus the other?

Performance assessments of creativity that have focused on the issue of domain specificity have typically looked at creative products produced by subjects in different domains, such as writing, art, or mathematics (e.g., Baer, 1991, 1993, 1994a, 1994b, 1996, 1998; Conti, Coon, & Amabile, 1996; Han, 2000; Runco, 1989). The rating method of choice is usually Amabile's (1982, 1996) consensual assessment technique. In this technique, raters, solicited for their experience in a domain, provide independent judgments about the creativity of a product. The judgments compare products against each other, rather than against an absolute ideal, and the products are judged in a random order. Other studies have used ratings by teachers (Besemer & O'Quin, 1986) or parents (Runco & Vega, 1990). Reliable and valid ratings have been obtained for a wide variety of products, such as collages (Amabile, Hennessey, & Grossman, 1986), haikus (Hennessey, 1994), musical compositions (Hickey, 2001), pictures written to captions (Sternberg & Lubart, 1995), and longer poems, stories, and personal narratives (Baer, 1993, 1994c; Baer, Kaufman, & Gentile, 2002).

Performance assessment studies that have asked subjects to create a variety of products in different domains have found either very small or nonexistent correlations among the creativity ratings of artifacts produced by the same subjects in different domains. For example, Baer (1991) asked eighth-grade subjects to complete four different kinds of tasks (poems, stories, mathematical equations, and mathematical word problems), resulting in six correlations of paired tasks. Half of the correlations were positive, half negative, with a mean r of .06, and when variance attributable to IQ was removed, the mean r dropped to -.05. With fourth-grade subjects, the mean r was .01, and with a study of adults using just two tasks, r was .08. Han (2000) and Baer (1994a) both found similarly small correlations when they looked at several artifacts of different kinds and in different domains that had been created by second-grade subjects.

In contrast, Conti, Coon, and Amabile (1996) presented evidence for Amabile's (1996) componental model of creativity, which has three components: domain-relevant skills, task motivation, and creativity-relevant skills. Creativity-relevant skills contribute across domains, and would theoretically include such abilities as cognitive style and divergent thinking abilities. While their evidence for the importance of task motivation and domain-relevant skills is convincing, their evidence for creative-relevant skills is not. Their correlations, for example, on domain general factors *across* domains are either small or negative, which is in marked contrast to the correlations they found among creativity ratings within domains. Despite their claim that their

data provides "some suggestive evidence of general creativity skills across quite different domains" (Conti, Coon, and Amabile, 1996, p. 388), this evidence is weak at best. They report a total of seven different tasks in two domains (four verbal tasks and three art tasks), and none of the resulting 12 cross-domain correlation coefficients is statistically significant.   Nine are positive, three are negative, with a mean r of .118. This translates to a little over 1% of variance accounted for by cross-domain, general creativity-relevant factors (as compared to more than 20% accounted for by domain specific factors among very similar verbal-domain tasks and more than 7% by domain specific factors among three different art-domain tasks).

We believe that studies using performance assessment provide little solid evidence for general creativity-relevant factors (including skills, traits, knowledge, cognitive styles, work habits, etc.). On the other hand, studies of creative personalities using creativity checklists and other traditional assessments often suggest a content general factor (e.g., Hocevar, 1976, 1979; Plucker, 1999). How might these seemingly contradictory results be understood?

One of the most commonly used tools in creative personality research is the self-report questionnaire, and studies using such personality checklists have tended toward a much more general perspective than analyses of creative products (Plucker, 1998). This may be because they are simply assessing different things. Self-report studies look at ways that people understand their own creativity (and probably that of others), and their "folk" theories of creativity are likely to color their self assessments. As such, self assessments offer a window into the ways that people conceptualize creativity.

We recently asked 117 college students in an educational psychology course to rate their creativity in nine areas — science, interpersonal relationships, writing, art, interpersonal communication, solving personal problems, mathematics, crafts, and bodily/physical movement — and their creativity in general (Kaufman & Baer, 2002). A factor analysis of their responses for the nine domains yielded three factors: a factor related to expressing emotions and communication that included creativity in communication, interpersonal relationships, solving personal problems, and writing; a "hands on" creativity factor that included creativity in art, crafts, and bodily/physical movement; and a creativity in math and science factor. Self-ratings of creativity in general had positive correlations with all domain self-ratings, ranging from .03 for math and .24 for science to .55 for crafts and .62 for art. The correlation of self-ratings of creativity in general with factor 2 ("hands on" creativity) was .67; with factor 1 (expressing emotions and communication), the correlation with creativity in general was .38; and with factor 3 (math and science), .02.

What these students seemed to be reporting is that their notion of what it means to be creative is closely associated with being creative in arts and crafts, slightly less associated with being creative in communication, and very little related to being creative in math or science. Would the results be the same if we asked a group of science fair participants the same questions? Might they connect creativity in general with creativity in math and science far more than these subjects? It seems likely that they would.

Our subjects appeared already to have an implicit and readily accessible category or definition of "general creativity" — they had no trouble understanding our question, "How creative would you say you are in general?" — and their responses to the nine domain questions tell us a great deal about their conception of what it *means* to

be creative in general. Indeed, Sternberg's (1985) study to identify the layperson's implicit definition of creativity found eight components that regularly surfaced, and these components were quite different – ranging from having a drive for accomplishment to verbal ability to aesthetic taste.

Other studies have found that different groups define creativity in general, as well as different kinds of creativity, somewhat differently. For example, Runco (1990) asked artists and non-artists to nominate characteristics they associated with artistic, scientific, and everyday creativity and found that each group came to some consensus in their attributions of traits associated with each kind of creativity, but that there were both great disparity in the adjectives they chose for each of the three kinds of creativity and fairly great disparity between the lists generated by artists and non-artists. Gluck, Ernst, and Unger (2002) found that even among successful creators in a single domain (art), those working in different media had different conceptions and personal definitions of creativity — definitions that they shared with other artists in the same media, but not with artists working in different media (e.g., painters v. graphic designers).

People appear to have ideas about what traits and skills are associated with creativity in general and creativity in different domains, and they share these conceptions with others with similar backgrounds, but the fact that different groups of people have different ideas about which traits and skills go with which kinds of creativity should lead us to wonder what validity these conceptions might have.

Feist (1999) reported that "certain personality traits consistently covary with creativity, yet there are some domain specificities" (p. 289). He reported some differences in the traits of creative artists and creative scientists — that is, there were traits lists for artists and scientists that had no overlap (e.g., creative scientists tend to be conscientious, and creative artists tend to have a more affective orientation) — but he also found that creative people in both art and science shared some traits: they tend to be "open to new experiences, less conventional and less conscientious, more self-confident, self-accepting, driven, ambitious, dominant, hostile, and impulsive" (p. 290). His lists, like those of Runco (1990), suggest both domain specific traits and domain general traits.

We believe there is reason to question the domain general traits found by Feist (1999) and others and to ask how truly general are these traits, but first we want to summarize what we believe we can say with confidence based on creative personality research: *People have beliefs about what it means to be creative in general, and what it means to be creative in different domains.* Whatever their validity, implicit beliefs about creativity are important (Runco, 1990; Sternberg, 1985). They are real and they matter, both because they are part of who we are and because they influence the ways we think about creativity and about the creative behavior (or not so creative behavior) of ourselves and other people.

Is the fact that these theories matter the same as saying that they are correct, and that implicit theories of creativity present true pictures of the structure of creativity, as it exists and functions operationally? Or course not. What people believe about natural phenomena affects their thinking and behavior, but misconceptions do not change the truth of what was actually happening. If everyone believed that eating three servings of cardboard every day would cure cancer, it would not make it so. People's beliefs about creativity are interesting, and they matter, but unless they jibe with other evidence regarding content generality — such as studies based on performance as-

sessments of creativity — they should not be taken as evidence for it (Kaufman & Baer, in press).

HOW DOMAIN SPECIFIC SKILLS AND TRAITS MAY SOMETIMES APPEAR TO BE DOMAIN GENERAL

Creative processes are presumably what creative people use to produce creative products (Finke, Ward, & Smith, 1992; Guilford, 1967; Torrance, 1988). As such, they could be thought of go-betweens between the creative people who possess and use the processes and the creative products that result from their use. From the creative person perspective, they constitute the skills or traits that make people creative (and thus are part of the definition of creative people); looked at from the perspective of creative products, one infers their existence from the products that they are instrumental in or associated with creating. The psychometric tradition has worked hard to isolate these skills, but in the final analysis, if one is to validate claims regarding creative processes, one must associate creative processes in some way with either creative products or with creative people (e.g., Plucker, 1998, 1999; Runco, 1986, 1990; Torrance, 1990). For this reason, studies of creative processes necessarily overlap studies of either creative persons or creative products.

Some ways one might describe a creative person may be more general in nature, such as saying that Steven Spielberg is an intelligent man. Others are more domain specific: Spielberg has extensive knowledge about filmmaking. Many other skills or traits associated with creativity might appear on the surface to be domain general (e.g., divergent thinking ability, task motivation, openness to experience, tolerance of ambiguity), but may actually be domain specific.

Let's start with intelligence. The question of the relationship between intelligence and creativity has been a contentious one in psychology (see, e.g., Barron & Harrington, 1981; Getzels & Jackson, 1962; Wallach & Kogan, 1965), but most psychologists agree that there is some relationship, whether it is a case of (a) two partially overlapping sets of abilities that share some common ground, (b) two sets of abilities that are distinct only in the sense of one being a subset of the other, or (c) a single set of abilities that have come to be known by different terms (Sternberg & O'Hara, 2000). We agree that intelligence, however conceptualized, has some relationship with creativity, and that intelligence has domain general properties. In fact, one piece of evidence for this comes from some of the performance assessment studies cited above, in which the already low correlations of creativity ratings across domains decreased still further when variance attributable to intelligence test scores was removed (Baer, 1991, 1993). However, to the extent that these two constructs overlap one another, we leave those shared abilities to those who study and assess intelligence and the disputes within that field regarding specificity and generality. We are interested in the area in which the two concepts do *not* overlap, the part of creativity that is independent of intelligence and has effects in *addition* to those attributable to intelligence.

Our question then is whether or not there are some general-purpose creative-thinking skills (or traits) that we might call c, analogous to g in being applicable to virtually all creativity-relevant tasks, but distinct from g: some general creativity-relevant factor that accounts for differences in creativity across domains above and beyond whatever contribution g makes. The evidence presented above about performance assessments of creativity across domains suggests that there is little room for such a

factor of general creativity-relevant skills or traits, and yet there are some skills and traits that seem to come up again and again as important factors contributing to creativity, such as divergent thinking ability, tolerance of ambiguity, and risk taking (Plucker & Renzulli, 1999), openness to new experiences, unconventionality, self-confidence, self-acceptance, and ambitiousness (Feist, 1999), and motivation and thinking styles (Sternberg & Lubart, 1995). How can we make sense of this?

It is possible that a skill or trait that appears to be general may in fact be domain or even task specific. Using motivation as an example, Amabile (1982, 1996) has demonstrated quite convincingly that intrinsic motivation is associated with creativity in every domain in which researchers have assessed its effects. But even in Amabile's model, which includes general, all-purpose creativity-relevant skills, "task motivation operates at the most specific level" (Amabile, 1996, p. 79) — more specific even than the domain-specific skills her theory posits, and nothing at all like a domain general skill. "In terms of impact on creativity, motivation may be very specific to particular tasks within domains" (Amabile, 1996, pp. 79-80).

A skill or trait can be very general in the sense that we understand it as a single thing and yet it may operate on a very domain (or even task) specific level. Just as someone may have a great deal of intrinsic motivation when it comes to writing mathematical equations but none at all when it comes to writing sonnets (or vice versa), so it may be with other seemingly domain-transcending skills and traits. Baer (1993) proposed a task specific theory of divergent thinking, going a step beyond Runco's (1990) suggestion that ideational thinking be thought of as domain specific along the lines of Gardner's (1983) intelligences. He demonstrated that it was po- ssible to tea-ch such narrowly applicable divergent thinking skills so as to increase creativity on one task but not on other tasks, even different tasks (writing poetry and writing stories) in the same verbal domain (Baer, 1996). In the same way, self-confidence, ambition, openness to experiences, etc., may be domain specific skills that are conve-nient to think of as the same on one level for the sake of convenience and because they are quite similar. Yet on the level of cognitive operations, these super-ficially si-milar skills and traits may be totally unlike one another. Spielberg is certain more self-confident and open to risks when making movies then he would be arranging a baseball line-up.

DOES IT MAKE SENSE TO REFER TO SOME PEOPLE AS "CREATIVE"?

Referring to people as "creative" may still be appropriate in many contexts, even if creativity is domain specific. Even if creativity across domains were randomly distri-buted among people, some people would nonetheless be more creative than others by virtue of being creative in more relevant domains, and therefore more creative than others who were creative in fewer domains. Similarly, within a given contextual meaning of "creative" — the definition of which may vary greatly across different groups, as say between a group of novelists and a group of mathematicians — some people may show more of the skills and traits and behaviors thought in that group to demonstrate creativity. For example, producing a beautifully written description of a person might be associated with creativity in one group, while proposing a new theo-rem might be associated with creativity in another. Anyone who can creatively engage in the activities that matter to a group will be appropriately deemed a creative person by the members of that group, but this does not in any way suggest that these creative

people will be viewed as creative in other contexts where different implicit definitions of creativity are operational.

Unlike *g*, however, the existence of which is supported by a considerable body of evidence, the evidence for *c*, and thus for any content general creativity-relevant skills or traits, is weak. It may make sense in many contexts to refer to people as creative, and there are many ideas shared by many diverse groups of people about what it means to be creative. As noted above, there are also many skills and traits that contribute to creative performance in many domains that it makes sense to group together under single labels, such as divergent thinking ability, openness to new ideas, or willingness to take risks. But that is not the same as saying there exist actual creativity-enhancing cognitive skills or personality traits that operate in the same ways across all, or even most, domains. Could Spielberg manage the Yankees? We admit that it is certainly possible that he could apply his genius to line-up switches instead of camera angles, or dealing with a player's agent instead of zooming in a close-up on a shark. Yet the answer appears to be no. Just as Joe Torre should probably restrict his camera activity to birthday parties, Spielberg should probably only enter Yankee Stadium as a fan.

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