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## ABSTRACT

This paper examines the nature and evaluation of creative behavior, tracing the origins of creativity research and developing an interdisciplinary framework for such research. The first part of the paper is devoted to identifying the nature of some common misconceptions regarding the nature and evaluation of creative behaviors, and tracing their historical origins. It is argued that the currently accepted model for evaluating creative behavior, the Torrance Tests model, is misleading, culturally biased, and inhibitory of the very behavior that it attempts to measure. The second section focuses on an alternative approach toward the study of creative behavior that draws on research in developmental psychology, cognitive science, anthropology, behavioral science, and neurology. This approach, expressed most clearly in the work of T. M. Amabile, asserts that people will be most creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the specific task and not by external pressures. Creativity is best conceptualized not as a personality trait or a general ability but as a behavior resulting from particular constellations of personal characteristics, cognitive abilities, and social environments. Contains 135 references. (MDM)

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## The Evaluation of Creative Behaviors

by Mark Polland

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### The issue

Although the development of creative behaviors has rarely played more than a supporting role in the classroom, the study of creativity has played an increasingly important role in educational philosophies. This trend began with the work of Friedrich Froebel, developer of the first kindergarten in 1837, who advocated a system of education based on development through voluntary activity (Froebel, 1912). Froebel's educational philosophy is central to contemporary, developmentally based concepts of creativity, and his theories are thoroughly in agreement with the most current research in the field. Writers in the field of motivation research (Amabile, 1976, 1979, 1982a, 1982b, 1983; Brown, 1989; and Deci & Ryan, 1985), have reported findings which significantly conclude that "external constraints have detrimental effects on creative performance" (Amabile, 1983, p. 358).

Although Froebel's philosophy, now more than 150 years old, is alive and well among leading educational researchers, in the library and in the classroom, all too many misconceptions continue to persist.

The first section of this paper is devoted to identifying the nature of some common misconceptions regarding the nature and evaluation of creative behaviors, and tracing their historical origins. Arguing from philosophic, sociologic and pragmatic perspectives, I will endeavor to demonstrate that evaluations of creative behavior based on the Torrance Tests model (Guilford, 1950a, 1950b, 1967, 1968; Torrance, 1962, 1974, 1975), which remain prevalent to this day (Runco, 1993), are misleading, culturally biased and inhibitory of the very behavior that they purport to define.

Having established that a significant portion of creativity research originates in flawed or restrictive assumptions concerning the nature of creative behavior, the second section will focus on an alternative approach towards the study of creative behaviors suggested by a startling range of researchers from what are generally considered disparate and highly specialized fields: developmental psychology (Amabile, 1976, 1979, 1982a, 1982b, 1983; Brown, 1989; and Deci & Ryan, 1985; Hennessey & Amabile, 1988), cognitive science (Gardner, 1977, 1980, 1982, 1983, 1985, 1989, 1991; Penrose, 1989; Dennet, 1991; Kosslyn & Koenig, 1992), anthropology (Mead, 1928; Kneller, 1965), behavioral science (Harlow, 1950, 1953a, 1953b), and neurology (Diamond, 1988; Scheibel & Wechsler, 1990). Although this interdisciplinary approach may seem new, it does have historical antecedents in the work of Froebel (1912), as well as John Dewey (1934, 1938), Herbert Read (1944), and others (see Piaget, Hadamard, and Wallas). The

goal is to develop a framework for a more egalitarian concept of creativity, unlimited by cultural or intellectual prejudices.

### Guilford's contribution

Research on creativity gained increasing popularity beginning in the 1950's with the work of James Guilford, then president of the American Psychological Association, who incorporated creativity into his "Structure of Intellect" model of human cognitive ability (Guilford, 1950a, 1950b, 1967, 1968). Guilford's model was an important milestone which helped to broaden scientific conceptions about human intelligence (Gould, 1981) and to stimulate research in this important area. Specifically, it marked a major improvement over the Binet-Simon test of intelligence (Binet & Simon, 1911, 1916), which came to be known as the Stanford-Binet test after its revision by Lewis Terman, head of the Psychology Department at Stanford University (Terman, 1917; see also Terman, 1916, 1919, 1937).

The Stanford-Binet test, which quantified a person's cognitive ability into a single number, or quotient, became the standard measure for intelligence, especially in the United States (where it seems all assets are assessed numerically). It was Guilford's pioneering research into the nature of cognitive abilities that helped to ease the (suffocating) quantitative restrictions on human potential imposed by the widespread influence of the Stanford-Binet test. The

work of more recent writers such as Howard Gardner, who developed the Theory of Multiple Intelligences (Gardner, 1977, 1980, 1982, 1983, 1985, 1989, 1991), is the direct outgrowth of Guilford's earlier work.

While Guilford made substantial and lasting contributions to creativity research, his work has led to some profound misconceptions as well. Guilford characterized creativity primarily as a function of divergent thinking. According to the "creativity equals divergent thinking" equation, the primary features or component abilities of creative behaviors are fluency, flexibility, and originality. In the educational world, those abilities have come to stand as hallmarks, indisputably indicating the presence of creativity wherever they are found. I want to take exception with that position. Certainly there are connections between creative behaviors and divergent thinking abilities, as I hope to make clear throughout the course of this discussion. However, it is inaccurate to equate the two, or to measure one in the (mistaken) belief that it will reveal the other. Somehow, in the rush to quantify this elusive quality called creativity we devised a formula for calculating the incalculable, and in that process lost sight of the subtleties at stake.

Of course divergent thinking itself is not the problem; it is the essence of intellectual and political freedom, guaranteed in law by the first amendment to the Constitution. My point is that creativity and the exercise of intellectual freedom are not necessarily one and the same. Divergence is a measure of difference; measurable

difference is an integral aspect in the evaluation of creative behaviors, but it is hardly the defining feature.

The validity of measurements of fluency and flexibility are founded on the assumption that people who produce a greater number of ideas, or a wider variety of ideas, are more likely to produce better ideas. However, quality is not a function of quantity, and rampant brainstorming does not necessarily correspond to increases in creative behavior. In fact, the hypothesis that more equals better may have more to do with the pressures of academic and commercial/industrial competition than with educational development in the area of creativity.

Making students faster, bigger, and brighter does not necessarily make them behave in more creative ways. Most schools already look too much like factories. These assumptions squarely contradict more recent findings which indicate that creative people tend to explore a narrower range of directions with a greater degree of intensity (Gardner, 1982, 1983; Amabile, 1983; Hennessey & Amabile, 1988; and Brown, 1989).

There is no doubt that fluency and flexibility are valuable brainstorming techniques, and it is not inaccurate to think of them as integral aspects of the creative process, especially in the earlier stages such as insight and illumination (see Koestler, 1964; Kneller, 1965; Getzels & Csikszentmihalyi, 1976; Edwards, 1986; Goleman, Kaufman, & Ray, 1992a). However, it seems unlikely that simply the

production of the greatest number and/or variety of ideas would necessarily lead to "more," or "better" creative behavior. In fact, the time and energy required to generate quantitatively competitive results would seem to hamper if not preclude the capacity to produce substantial (concrete) results. Creative achievements require moving beyond those initial stages of illumination and incubation in order to reach fruition.

Jim Collins, a professor at Stanford University Graduate School of Business, has said,

We are trained to keep our options open. But if you spend your life keeping your options open that's all you're ever going to do. You can't get to the top of the mountain by keeping one foot on the ground (In Goleman, Kaufman, & Ray, 1992a, p. 42).

This author's suspicion is that even the earliest creative behaviors of children are guided by a sense of personal direction, a predilection of sorts, which, because it is their own, cannot help but to be revealing. Of course Albert Einstein's great Theory of Relativity was the result of his lifelong work devoted to the study of a problem he had first imagined as a teenager while working at a patent office in Switzerland (Einstein). And Mozart, well, Mozart was composing music that is recognizably his own by the age of six.

Defined by Guilford and others (Runco, 1993; Torrance, 1962, 1974, 1975) as the ability to generate "unusual but appropriate"

ideas (Guilford, 1950a, 1950b, 1967, 1968), the concept of originality is far more problematic with respect to its role in creativity than fluency or flexibility are, and deservedly occupies the vast majority of the following discussion. The significance of fluency and flexibility in creative behaviors may be open to debate, but at least they are easily quantified (in fact that may be the essence of their popularity). Originality, on the other hand, can be an esoteric and philosophical concept that is not easily adaptable to quantitative evaluation.

The components inherent in Guilford's conceptual model of divergent thinking have had profound influence on creativity research. This paper continues with an examination of the implications for theoretical models based on the divergent thinking hypothesis, and finally to explore more recent research, suggesting alternate approaches to the study and evaluation of creative behaviors.

## The Torrance Tests

E. Paul Torrance immortalized the process of evaluating creative abilities with a set of instruments he compiled which have come to be known as the Torrance Tests (Torrance, 1962, 1974, 1975). The Torrance Tests were based directly on Guilford's earlier model which categorized creative behaviors as a function of divergent thinking. Torrance, again, subdivided creative behaviors



into (Guilford's pre-established) component abilities of fluency, flexibility and originality.

The Torrance Tests and other related tests of divergent thinking do possess some positive attributes; at least they invite multiple responses. But beyond that they are misleading, culturally biased, and inhibitory of the very qualities they purport to assess.

A typical example of a Torrance Test is the Unusual Uses Task.

The Unusual Uses Task calls for interesting and unusual uses of common objects such as junk autos. To understand the kind of thinking that is involved the reader might spend two and one-half minutes trying to see how many unusual uses he can produce. At the end of the article is a list of the common, unoriginal responses that are scored zero for originality (Torrance, 1975, p. 126).

Did you think of any unusual uses? As I sit here writing I occasionally glance out the window where I look out at a sculpture I made called "The Road Runner," which was constructed out of a tire, an axle, an engine fan and a radiator hose. The sculpture is about that cartoon of the same name which I have always enjoyed; it is tall and skinny like the Road Runner in the cartoon, but the head has a long snout and big ears so it looks like the Coyote. It is really both characters wrapped up into one, and it is about me too because I grew up in the desert with real road runners, and I am a marathon runner, and I drive a lot, so the water runs deep. But when you get to the end of the directions, to the published list of *unoriginal*

responses, the very first entry is, "Art, abstract, modern sculpture, pop art."

Now, I have been humbled before, and I will be humbled again, and I can handle a little criticism. I know other people have used car parts in sculptures before me and I never claimed that it was particularly original for me to do it. The fact is that originality had nothing to do with my decision to use car parts whatsoever; but does that make my sculpture *unoriginal*? Or is it just *unoriginal* to make fallacious claims that you are going to make sculpture out of junk autos?

I want to know at exactly what point in time it became *unoriginal* to use junk autos in sculpture? Just the other day I was at the Los Angeles County Museum of Art, where I saw a number of sculptures that were constructed out of junk auto parts, and they did not seem particularly *unoriginal* to me. Picasso used car parts in some of his sculptures; was that *unoriginal*? And he used bicycle parts even before cars were around; was that *unoriginal* too, or are only car parts out? If Julio Gonzales--who taught Picasso how to weld--used car parts in his sculptures before Picasso, then was Gonzales the only one who was original? Or would that matter only if Picasso had seen Gonzales' work previous to creating his own? Artists are still using junk autos in their artworks, so does that mean it is only *unoriginal* for some of us to do it, but not others? "All animals are created equal, but some are more equal than others" (Orwell, 1946).

## The philosophical argument

If the medium itself is *unoriginal* because someone has already used it then how can painting, or poetry, or music continue to be original if they have already been used as well? If someone were to write a play in iambic pentameter it is not necessarily *unoriginal* simply because Shakespeare has already used it and there were playwrights who used it before him. It is the use of the medium that carries the expression of creativity, and not the medium itself. Even Shakespeare's plays were adaptations of stories that were already well known, and Picasso borrowed freely from Cezanne, as well as African tribal imagery. "The artist steals, the hack imitates" (Eliot, 1962)

To carry the argument one step further (and to return to a scientific example), Alfred Russell Wallace postulated a theory of natural selection independently of Darwin during precisely the same time period. In fact Wallace's paper "On the Tendency of Varieties to Depart Indefinitely from the Original Type," spurred Darwin to publish *On the Origin of Species by Means of Natural Selection*. Leibnitz and Newton derived calculus independently at the same point in history. From an internal point of view, that is from the point of view of the individual engaged in the behavior, it is impossible to distinguish between original and *unoriginal*. The territory is new and unfamiliar to the discoverers themselves. And

is that not the true test of originality anyway? It can only be evaluated with respect to an individual's personal background and development.

In a recent biography of Marcel Proust, Roger Shattuck said that "Marcel Proust invented nothing, but he altered everything," (Wolfe, 1992, p. 3). Invention is highly prized in our patent pending, technologically driven society. But, originality, especially in the arts is not limited by notions of progress, and market economy. Art does not make our lives any faster or easier, but it does add richness and depth that are incalculable in economic terms. Originality is the expression of an individual identity, a personal voice within a cultural and developmental matrix. It does not need to be new and improved--"fresher smelling!"

Jorge Luis Borges wrote a short story titled "Pierre Menard, Author of the *Quixote*" (Borges, 1962) about a contemporary author who re-writes selections from Cervantes' *Don Quixote*--without any alterations whatsoever--and creates entirely new meanings simply by changing the historical and cultural milieu in which the same words were composed. This is mirrored in the visual arts by painters like Sherry Levine and Mike Bidloe who paint mediocre but recognizable copies of well known paintings in order to re-examine historical icons in the light of contemporary theories. If you have difficulty imagining the significance that such a statement could have, then consider for a moment what it would mean today for someone to exclaim "All men are created equal," in comparison to

what those same words meant in 1776 for the framers of the Declaration of Independence, who understood that they were only talking about white male land owners. ("The *good* people of the states of Massachusetts, New Hampshire...")

Throughout this century artists have visited the issue of originality time and again. In 1914, Marcel Duchamp submitted an ordinary urinal, placed on its side and signed "R. Mutt," to the Armory Show in New York, arguably the most important art exhibition of this century. The sculpture was accepted, but it was placed behind a screen, hidden from plain view. Was his sculpture *unoriginal* because he did not manufacture it? Could it be original even though it is a common object that was made in a factory for an entirely different purpose? Now, *replicas* of that piece are proudly displayed in a number of museums throughout the world (not to mention lavatories, where they were first shown albeit in a different orientation and context). Who made the replicas in the museum and why are they original? Much more recently Jeff Koons sold an ordinary vacuum cleaner that he had signed (with his own name) for over a hundred thousand dollars. At least the vacuum was new.

Are museums *unoriginal* for showing any work that has previously been seen in other museums?

## The sociological perspective

The whole line of logic is faulty. If someone has never been exposed to contemporary European and American art they may not know that it is not unusual to use junk autos in artwork. Even if it is well known that they have been used before, why should it be *unoriginal* because some artists have already done it. I have already tried to establish that it is not a limiting constraint on artists to this day. The reason that sculptures--works of art, products of creative behavior--can still utilize junk autos, bronze, clay, or any other media whatsoever is that the medium is only a vehicle for the expression. There is no question that every medium poses certain sets of possibilities as well as constraints on the expression (Whorf, 1956; McLuhan, 1967), but in a successful work of art the content transcends the specific media, or else a sculpture would never have been created and an old car could never be more than a pile of junk--and the "Winged Victory" a broken piece of rock.

And yet responses to the Torrance type tests are evaluated according to this unacknowledged criteria of assumed background knowledge, specifically with respect to currently popular European and American sculpture. (Where else but in America where the abuse of the combustion engine is so great would we incorporate automobiles into our most prominent cultural landmarks--even our National Parks! Indeed, is the collective worship of the automobile not the impetus behind the question itself?)

I agree that using car parts in a sculpture is not necessarily original in and of itself, but we need to recognize that it is not intrinsically *unoriginal* either, as the Unusual Uses Task and other related tests suggest.

### The pragmatic approach

The second *unoriginal* response is, "Autos, make one from several." When it comes to actually putting together a functional car out of junk autos I cannot imagine that it is not a creative process. We are not talking about salvaging a tire or replacing a rear view mirror; we are talking about picking through a heap of wreckage and putting together something that runs! I would be impressed if someone could make a lawnmower out of that. I am still proud to be able to change the oil in my own car. Aside from belittling the automotive profession, not to mention the rubbish collection business--the life blood of the working artists!--the Torrance Tests call for responses to questions for which they already have too many answers. The other *unoriginal* responses were:

Repair to sell; Scrap iron, metal, etc.; Spare parts, for use on other cars; Tires, recap and sell; Swing, tires used for; Chairs; Educational uses, rebuild to learn, give to teenagers to learn about cars; Demonstration, warning for drivers; Tension reducer, smash with hammer; Demolition derby (Torrance, 1974, p. 132-33).

The fact is that it is not original or creative to say any of these things, but that does not mean it is not creative to carry them out. There is an auto body repair shop in Pasadena that puts the most seriously mangled remains of a car from the previous weekend out on the sidewalk for everyone driving by to see. I think it is an effective way to remind people of the dangers involved in driving. They have certainly made a lasting impact on me.

Is that not a creative solution to a contemporary problem? Was it only creative the first time they did it? If some other shop did it before them was it still creative, or was it only creative if they did not know about the other shop? Does it stop being creative after they find out about the other shop? How many people have to know about it before it stops being creative?

These responses were scored *unoriginal* because they were the most frequently received, but I want to know where all these artists and mechanics are when we need them, when it is time for them to dispose of their own cars, and all the rest of their trash. How come these great ideas are so common that they are scored *unoriginal* on the Torrance Tests and yet we have such serious problems with waste management? It does not make much sense, and the Torrance Tests do not seem to help. Every constructive use seems to be eliminated because they are the most frequent responses, but where are all these activists when it comes time to recycle? Waste management is rapidly reaching a global crisis and yet every constructive strategy for managing the junk autos has scored zero on



the Torrance Test and received the title: *unoriginal*. Aren't these the values we want to promote in our society?

I came up with one practical use that was not excluded by the list; it was artificial reefs, but to be honest I must confess that I have heard or read about it somewhere before; is it original if the judges have not heard of it? My guess is that if the judges were not already familiar with the answer, it would score zero, unless it just so happened to correspond with their own personal agendas.

And isn't that the bottom line in this test? The Torrance Tests are looking for answers that, however uncommon, are squarely in line with the judges own sentiments. There is no acceptance of the possibility that the respondents could be addressing issues that are uniquely their own, or from an entirely different perspective from those of the judges. The judgment of appropriateness, only loosely described by Torrance, establishes a criterion that is difficult, if not impossible to quantify objectively. How can we assume that the judges assessment of appropriateness is guided by the same criteria used by the respondents to conceive of their answers, or that their scope of familiarity is one and the same? Even between respondents the range of personal experience can vary so dramatically that it is virtually impossible, if not outright meaningless to compare creative abilities indiscriminately in such a way.

If my test scores are going to be evaluated according to specific criteria then I want to know what those criteria are. I am going to

give different responses to the Unusual Uses Task depending on whether I am asked to think of unusual and/or appropriate responses; and I want to know whose determination of unusual and appropriate I am expected to address. In the words of the great American educator John Dewey,

Every critic, like every artist, has a bias, a predilection, that is bound up with the very existence of individuality. It is his task to convert it into an organ of sensitive perception and of intelligent insight, and to do so without surrendering the instinctive preferences from which are derived direction and sincerity (Quoted in Eisner, 1991, p. 85).

The "inappropriate" problem persists

At a recent lecture by Mark Runco, editor of the *Journal of Creativity Research*, I was somewhat shocked to hear that the methods he was using to evaluate creative abilities are variations on these same tests that have been used now for nearly 40 years (Runco, 1993). At least the instructions were specific enough to direct the respondents to attempt to generate ideas that no one else in their group would come up with, but they still neglected to mention those responses were *unoriginal* and would be scored zero.

One of the tasks called for a list of things that are square and the other asked for a list of things that move on wheels. Both tasks used criteria of appropriateness which, according to the results reported, were illogical and unsatisfactorily detailed in the directions.

I fail to recall many the responses to the list of squares that were scored zero because they were the most frequently occurring (one may have been dice), but I remember specifically that, with regard to "appropriateness," 35mm slides did score because they were "always" square, and doors did not score because "they weren't really square" (Runco, 1993).

It all hinges on your definition of a square. I recall the definition as an equilateral parallelogram, where the four interior angles are each 90 degrees. (Actually, with those conditions, if only one interior angle is 90 degrees, the rest necessarily are.) The sides of the outside perimeter of a slide mount are equilateral, but the corners are rounded so they are in fact not 90 degree angles, they are obtuse parabolas; and the inside perimeter, which is the boundary of the photographic image, is rectangular, and that is the shape you see when it is projected. A square is a special case of a rectangle, an equilateral rectangle, but a square and a rectangle are not always the same. The length of a door is not usually equal on all sides like a square, but they can be, and they do (usually) have four right angles.

To further befuddle the situation I would point out that farms and city blocks can have equal dimensions on all four sides but the sum of the measures of the interior angles of a square inscribed on a sphere is not the same as for a square on a two dimensional plane (making this a question that only works on paper). And how do cubes, and pyramids with square bases fit into their square

equation? ("People" was one of my favorite responses, but that did not score either.)

It reminds me of one of the questions I hated most on the Scholastic Aptitude Test, another (less than) memorable measure of cognitive ability. The question started with a picture of an equilateral triangle with the words under it in capital letters, "NOTE: FIGURES NOT DRAWN TO SCALE;" and below that it said "The sum of the measures of the interior angles of an equal lateral triangle," followed by a list of the only alternative choices they allowed; "(a) 90, (b) 270, (c) 180, (d) 360. (e) none of the above." Now I knew which answer they wanted and eventually I was cowed into submission because I knew that if I answered differently it would only serve to lower my score, impeding my college applications, and my small protest would go unnoticed, as was my indignation. It is just that I resented, and I still resent not being allowed to express my own development, my own understanding of the question. The test I took that day, the test we have all taken at one point or another, was more about our knowledge of the expectations imposed on us by the test itself than it was about our knowledge of the questions asked.

The other test Runco described, the list of things that move on wheels, was scored in an equally ambiguous way. It is easy to remember the responses that were too common because we see them everyday; cars, skateboards, roller skates, bikes... But are we supposed to understand that the list includes unicycles, tricycles, and

roller blades? To what extent, and with whose logic are we expected to carry their directions? I thought that "clocks" was a very creative answer, but it was eliminated as *inappropriate* on the grounds that the judges defined movement to be from one position in space to another, so that the clock would have to move to a different place in the room. I still have trouble wrapping my mind around their logic. Conveyor belts and airport luggage carousels were eliminated based on the same criteria, and tanks were eliminated also because they use treads, not "wheels." But what causes the treads to move? (It appears that the primary criteria for defining movement is that the wheels are produced by a major tire manufacturer.)

### The developmental approach

I want to take a different tack now and shift the focus from an examination of the problems inherent with evaluations of creative behaviors based on the divergent thinking model to an exploration of alternate possibilities for the study of creative behaviors. David Feldman has written that,

(T)he traditional trait concept of creativity has certain inherent conceptual limitations that may be fruitfully overcome by taking a cognitive-developmental or Piagetian process view (Feldman, 1974, p. 47).

The developmental approach, suggested by Feldman, depends on an entirely subjective analysis of creative behaviors. Margaret

Mead has carried this line of thought to its logical conclusion when she wrote:

(T)o the extent that a person makes, invents, thinks of something that is new to him, he may be said to have performed a creative act. From this point of view the child who rediscovers in the twentieth century that the sum of the square of the hypotenuse of a right angled triangle equals the sum of the squares of the other two sides is performing as creative an act as did Archimedes [sic], although the implications of the discovery for cultural tradition is zero, since this proposition is already a part of geometry (Quoted in Kneller, 1965, p. 67).

By forming a conceptual separation between creative behaviors and implications for cultural tradition, Mead helps to liberate the concept of creativity from its dependence on originality. I do not intend to debate the relative virtues of originality. Certainly originality has its place; but it is important to distinguish evaluations of creativity from collective, or popular opinions as to the relative significance of a person or behavior. The Torrance type tests are biased towards people who share in the majority opinion because if you are not part of that majority the directions instruct you to complete an entirely different test--but it is scored according to their same answer key.

If the products of creative behaviors have to be original in the most obvious, objective sense of the word, then, by definition, only a handful of individuals are capable of such feats. On the contrary, the

intention: here is to argue that all people behave in ways that are creative, and unique, to themselves. Originality is not a contest.

### Towards a better theory

Although traditional approaches to the study of creativity are still prevalent, during recent years some researchers have developed provocative theories concerning the characteristics of creative behavior, theories that carry important implications for future research. Among the most significant of these new developments are the work of Howard Gardner and of Teresa Amabile who describe creativity as the result of an individual's interests and attributes, and not, in the words of Gardner, as "some perverse polymorphous substance that can be oozed out in any direction," (In Goleman, Kaufman, & Ray, 1992a, p. 26-27; see also Amabile, 1976, 1979, 1982a, 1982b, 1983; Brown, 1989; and Gardner, 1977, 1980, 1982, 1983, 1985, 1989, 1991).

Gardner has developed what he calls the Theory of Multiple Intelligences (Gardner, 1982, 1983) which identifies seven distinct areas of human intelligence: linguistic, logical/mathematical, spatial, musical, bodily/kinesthetic, interpersonal, and intrapersonal. Although they are sometimes helpful references, the specific set of domains that Gardner has identified are the least significant aspect of his concept--in fact they are the most problematic. He writes that creativity, like intelligence cannot be necessarily transferred from

one domain to another, thus he maintains that "Einstein was an average violin player, and (Gardner) doubt(s) that Mozart would have made even a mediocre physicist," (In Goleman, Kaufman, & Ray, 1992b). I feel obliged to point out here that Ansel Adams, the great photographer, was also a concert quality pianist, nevertheless, Gardner's point is well taken, and he is not alone in his argument.

Robert Brown has reported similar findings in support of Gardner's position, although he does not himself identify specific cognitive domains.

It appears that creativity is much more domain-specific than intelligence and likely to consist of a number of processes. Although it may consist of essentially the same set of steps across domains, individuals highly creative in one area will not likely be in others (Brown, 1989, p. 29).

Note that, like Guilford, Brown does identify similarities in creative behavior across domains, but he is specifically referring to stages of creative behavior, such as insight, saturation, incubation, illumination, and verification, which are widely recognized in the literature (Koestler, 1964; Kneller, 1965; Getzels & Csikszentmihalyi, 1976; Edwards, 1986; Goleman, Kaufman, & Ray, 1992a), and not to generalized abilities as in the fluency, flexibility, originality construction. Nevertheless, it is difficult to imagine the ways in which the processes of insight, incubation, et al. would differ in what would ostensibly be a designated "non-creative" behavior. With the



exception of instinctual and involuntary responses, are any behaviors exempt from these processes?

Amabile's research has led to the development of what she calls the *intrinsic motivation principle of creativity*, which strongly supports the findings of Gardner, Brown, and others (see Csikszentmihalyi, 1978; Lowenfeld & Brittain, 1987). Put quite succinctly in her own words, Amabile's theory is that,

People will be the most creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself--not by external pressures (Hennessey & Amabile, 1988, p. 11).

Although the scope of Amabile's work is more directly associated with motivational issues, specifically with respect to the arts, her findings echo Gardner's position on the "multiple" (to use his word), or domain specific nature of creative behavior,

(C)reativity is best conceptualized not as a personality trait or a general ability but as a behavior resulting from particular constellations of personal characteristics, cognitive abilities, and social environments (Amabile, 1983, p. 358).

Amabile concludes that "extrinsic constraints will, by impairing intrinsic motivation, have detrimental effects on creative performance" (Amabile, 1983, p. 365). Brown summarizes the extent of Amabile's conclusions,

(a) for both children and adults, external evaluation lowers creative productivity on verbal and artistic tasks; (b) external rewards generally decrease creative productivity; (c) choice in whether or how to engage in a particular activity increases creativity; and (d) expressed interest in an activity is positively related to creative performance (Brown, 1989, p. 28).

As a consequence of these conclusions, Brown reports that,

(Amabile) has adopted the "over justification principle" from attribution theories, which states basically that external constraints on an individual's involvement in a task are inversely related to intrinsic motivation (Brown, 1989, p. 27).

In contrast to the model developed by Guilford and Torrance where creative behavior is categorized by divergent thinking, Amabile's theory, correlating creative behavior with intrinsic motivation, has several major advantages. First of all, Amabile's findings clearly prescribe that the external constraints imposed by external evaluation will inhibit, or "inversely relate" to creative production. If Amabile is correct, and the evidence is in her favor, then the Torrance Tests are a self-defeating exercise. Furthermore, Amabile's theory is not limited by pre-established criteria, such as the judgment of appropriateness, that may or may not have any relevance to the particular behavior for the individual involved. Amabile suggests an entirely subjective approach that does not compromise the individual nature of human development. And lastly, her theory approaches the concept of creativity in a way that

contradicts neither historical examples nor personal experience in the way that traditional theories have.

## Conclusions

Although traditional theories persist, a growing body of research into creative behaviors is gaining much deserved attention and carries important implications for educational reform. I have argued against traditional strategies for the evaluation of creative behaviors from philosophical, sociological, and practical points of view, but my primary purpose is to suggest promising new directions that will recognize the diverse range of abilities that constitute creative behaviors. I want to defend the remarkable creative capabilities of children, and of all people, that are so easy to overlook because they are not readily quantifiable.

Instead of beginning with criteria based on hypothetical assumptions regarding the nature and component structure of creative behaviors, I would prefer to start with the premise that all people, all children, have creative abilities. The goal then is not to make generalizations about what types of behaviors are more or less creative than others, but to cultivate our sensitivity to the unique nature of each person's particular expressions, whatever forms they take. Children's creativity is an expression of their own developmental progress. Creative behaviors need to be evaluated with respect to each person's individual development and identity.

I would argue that a child's first words are a creative achievements for that child. The first time a child points to a cat and says "kitty," it is an indication that a new connection has been made. A cognitive connection within the neural network of the brain. The act itself is of little consequence (except for the parents); the importance is in the cerebral growth that has occurred, new growth that was not there before.

Communicating in new ways is creative, but its significance is only for the individual unless the system of communication itself is changed. The ordinary use of language is not very creative to the rest of us who are already proficient. But, for beginners it is an indication that connections are forming and development is taking place. If ordinary development were not a creative process, then all of us would be exactly alike.

In his book *Consciousness Explained*, Daniel Dennet argues that the mind is no more (nor less!) than the sum total of the connections in our biological brain (Dennet, 1993). This supports a growing body of research in the cognitive and neurological sciences that explains mental activity and states of mind strictly in terms of neurobiological functions (Diamond, 1988; Penrose, 1989; Scheibel & Wechsler, 1990; Kosslyn & Koenig, 1992).

Marion Diamond at the University of California, Berkeley has found through careful examination of brain tissue (including a piece

of Einstein's brain) that the number of microscopic neural connecting pathways, called dendrites, positively relate to higher cognitive abilities (Diamond, 1988). Because dendrites, the connections between neurons or neural synapses, are continuously grown in the brain, Diamond's research suggests the possibility of a connection between creative behavior and neurological growth or development. It seems likely, in light of such research to at least entertain the concept that creative behavior may in fact have a neurological component.

Certain pre-established neural pathways may pre-exist in the genetic code of the brain, but those pathways are, by definition, instinctual and involuntary: not the types of behaviors we would be likely to regard as creative--in and of themselves. Certainly we have a predisposition to learning language, but only through the benefit of direct exposure. Without that direct exposure nothing develops, demonstrating that learning is an interactive process. The term creativity should not be reserved for the narrow band of experience beyond the range of experience for most ordinary people: *Learning itself is a creative process.*

Although children's behavior (in most cases) carries little historical significance, it still provides important signs for the caretakers in a child's life. Expressions of creative behaviors are the indications that the child's cognitive development is progressing. It is the responsibility of parents and teachers alike to recognize which behaviors are significant to an individual child's developmental

progress. Creative expressions document children's change, growth, and individuality. Anything children do to express a new aspect of their development should be considered creative. Something that might seem to have little importance to an adult might still be a significant factor in the development of a particular child.

Haensly and Reynolds have written that,

(I)ntelligence appears to be a "given," a characteristic organisms exhibit in varying degrees permitting them to adapt to their environment. Creativity, on the other hand, often is viewed as an appendage, an ancillary characteristic permitting humans to pursue roads not usually traveled. Creative endeavor has been viewed as an alternate pathway itself, one not necessarily basic to survival or adaptation. ...We propose that such an approach has been incorrect and counter-productive in that it limits our understanding of how individuals function mentally (Haensly & Reynolds, 1989, p. 111).

If we begin with the assumption that creativity is not a highly specialized and extremely rare talent, but an ability that all people possess, like thinking, and talking, and walking, then we are far more likely to look for and encourage that type of behavior both in ourselves and the people around us. "The artist is not a special kind of person; every person is a special kind of artist" (Schopenhaur, 1962). Of course these abilities require practice and exercise; and if the muscles are not used they will atrophy like any others. But that is just the point: creativity requires sensitivity, nurture, and stimulation in order to flourish.

Victor Lowenfeld, taking the argument to a behavioral extreme, wrote that,

Every child is born creative. The urge to explore, to investigate, to discover, is not limited to human behavior, but is experienced by the whole animal kingdom. There have been numerous studies of rats showing that, given a chance, a rat will investigate an unknown maze, explore a new box, or go down a pathway that has been altered in some way (Lowenfeld & Brittain, 1987, p. 76-77).

Lowenfeld supports his argument by citing the famous primate studies by Harry Harlow, demonstrating that,

(M)onkeys can and do learn to solve mechanical puzzles when no motivation is provided other than the presence of the puzzle; monkeys will look through a window, put sticks together, explore a new trinket, all motivated by curiosity alone. Harlow says the monkey is actually a very incurious, non manipulative animal as compared to man [sic.], and the only justification for using monkeys in these experiments is that we have more monkeys available for research than children (Paraphrased by Lowenfeld & Brittain, 1987, p. 77).

(Judging from the nature of some of Harlow's other experiments, I am relieved that was the case.)

## Summary

Writers from such disparate and sometimes highly specialized fields as developmental psychology, cognitive science, neurology, anthropology and behavioral science are moving towards a consensual theory regarding the nature of creative behavior. In spite of the fact that out dated misconceptions continue to play a role in creativity research, especially with respect to evaluations of creativity, a growing body of evidence from the disciplines cited is contributing to a cross-disciplinary approach towards a developmental theory of creativity, as described by Amabile, Gardner, and others. This newer theoretical philosophy, which has its roots in the educational system developed by Froebel, is not limited by the constraints imposed by more traditional theories. We can only hope this trend will continue.

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