How Does Creativity Happen?

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Few things are more fascinating than human creativity, in all of its varieties and forms. Whether it's seen in little children or working adults, whether it's the highest levels of genius or the most mundane levels of creativity in our everyday lives, creativity poses intriguing questions. How does creativity happen? What motivates it? What kills it? How can we keep it alive? In fact, our fascination with the topic is so long-standing that one of us asserts that she has been intrigued by these creativity questions since childhood:

> I still study creativity to try to figure out something that happened in kindergarten. That's when I first heard the word creativity. My teacher had come to our home for the end-of-the-year conference with my mother. While eavesdropping, I heard Mrs. Bollier say, "I think Teresa shows a lot of potential for artistic creativity, and I hope that's something she really develops over the years." I remember feeling thrilled but, sadly, my pride was premature. I haven't done anything even vaguely artistic in the years since; I still draw the way I did in kindergarten. I'd really like to know why.
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> There are at least two obvious explanations. Mrs. Bollier might have been wrong; maybe I had no particular talent for artwork. I, however, prefer the alternative explanation: I did have the beginnings of artistic talent, but my later experiences with art squelched its development. In kindergarten, we had plenty of free access to art materials -- easels, paper, lots of paint, clay, and crayons -- and plenty of encouragement to experiment with them. The following year, I entered a strict, traditional parochial school where experience with art was limited to an hour every Friday afternoon when, I think, the nuns were too tired to do anything else with us.

> Week after week, we were given the same task. Each child would receive a small index-card-sized copy of one of the great masterworks in painting. In second grade, one week, we had Da Vinci's Adoration of the Magi. From third grade I remember Chagall's I and the Village. Rather than discussing these paintings and artists with us, our teachers instead told us to copy them. Given our limited skill development, and our limited materials (loose-leaf paper and a few broken crayons), "art" became an experience in frustration. I couldn't even get all those horses and angels to fit on the page! But, worse than that, we were strictly graded on our monstrosities. I felt my interest in artwork waning, and I no longer pestered my mother to let me draw and color when I was at home.
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> Only once in those school years did I hear the word creative. Inexplicably one day, our teacher told us to take out our art materials and do whatever we wanted. Eager as a prisoner set free, I began drawing a brightly colored abstract mosaic. Sister Carmelita, pacing the aisles, stopped by my desk, lowered her head, and said, "I think maybe we're being a little too creative!" (Amabile, 1990, pp. 61-62)

In this chapter, we will consider the questions of whether it is possible to be too creative, what it means to give people messages such as that, and what kind of effects such messages might have. Our research group has done a great deal of work over the past twenty years to look at social environments – educational environments and work environments – examining how they might impact motivational state and how, as a result, they might impact creativity. The theoretical foundation for this work is the componential model of creativity.

The Componential Model of Creativity

We define creativity in our research as a novel and appropriate response to an open-ended task. The task has to be open-ended, rather than straightforward, in order to allow room for creativity or flexibility. Given an open-ended task, a creative solution has to be novel -- different in some way -- and it also has to be fitting or appropriate to the problem or task. The novelty aspect, the openness to new possibilities, is the prime feature in all definitions of creativity. Even Albert Einstein once defined creativity as "combinatorial play," referring to the intellectual playfulness aspect of creativity, the putting things together in a new way.

In the theory of creativity that we have developed over the past two decades, there are three components that are necessary for creative performance: domain-relevant skills, creativity-relevant processes, and intrinsic task motivation. This model has been described in more detail elsewhere (Amabile, 1983a, 1983b, 1988a, 1988b, in press; Amabile, Phillips, & Collins, 1994), and we will describe it here only briefly.

Domain-Relevant Skills. Domain-relevant skills compose the individual's complete set of response possibilities from which a new response is to be synthesized and information against which the new response is to be judged. As Newell and Simon (1972) poetically described it, this set of response possibilities can be considered the problem solver's "network of possible wanderings" (p. 82). This component includes familiarity with and factual knowledge of the domain in question (for example, knowledge of chemistry): facts, principles, opinions about various questions in the domain, knowledge of paradigms, performance "scripts" (Schank & Abelson, 1977) for solving problems in the domain, and aesthetic criteria. In terms of promoting creativity, formal education is ordinarily most concerned with imputing this body of factual knowledge.

The nature of the domain-relevant information and the manner in which it is stored can

also make an important difference in creative production. Knowledge organized according to general principles is of greater utility than specific, narrowly applicable collections of facts. Likewise, performance information organized according to heuristic approaches to problems rather than blind response algorithms should be more likely to contribute to high levels of creativity. In general, an increase in domain-relevant skills can only lead to an increase in creativity, provided that the domain-relevant information is organized properly. There is a high correlation between creativity and proficiency in the more routine domain-relevant intellectual tasks (Newell, Simon, & Shaw, 1962). Thus, according to this componential perspective, the popular notion that a great deal of knowledge in a given domain can be detrimental to creativity is incorrect.

Creativity-Relevant Processes. The second component is the one with which creativity researchers have traditionally been concerned. This component includes a cognitive style characterized by a facility in understanding complexities and an ability to break set during problem solving. Several specific aspects of cognitive style, including a number of distinct abilities, appear to be relevant to creative performance. Individuals who can break perceptual set (Boring, 1950; Katona, 1940), avoid "functional fixedness" (Duncker, 1945), abandon an old set of unsuccessful problem-solving strategies in order to explore new cognitive pathways (Newell et. al., 1962), and occasionally break out of well-used performance "scripts" rather than proceeding through them uncritically (Langer, 1978; Langer & Imber, 1979) are able to solve problems creatively. Keeping response options open as long as possible (Getzels & Csikszentmihalyi, 1976), suspending judgment as when "brainstorming" (Osborn, 1963), using "wide" categories to see relations between apparently diverse bits of information (Cropley, 1967), and accurately remembering larger amounts of detailed information (Campbell, 1960)

leads to more creative works and responses.

The creativity-relevant processes component involves a work style characterized by an ability to concentrate effort for long periods of time (Campbell, 1960; Hogarth, 1980), a sense about when to leave a stubborn problem for a while (Simon, 1966), and a generally high energy level. Creativity-relevant processes depend on personality characteristics related to self-discipline, ability to delay gratification, perseverance in the face of frustration, independence, and an absence of conformity in thinking or dependence on social approval (Feldman, 1980; Golann, 1963; Hogarth, 1980; Stein, 1974). Creativity-relevant processes also include implicit or explicit knowledge of creativity heuristics. These are simply rules of thumb for generating ideas -- for example, “When all else fails, try something counterintuitive” (Newell et. al., 1962). Creativity heuristics are best considered as methods of approaching a problem that are most likely to lead to set-breaking and novel ideas rather than as strict rules that are applied by rote. Creativity-relevant processes can be influenced by training or experience in generating ideas, and they operate at the most general level; they can influence performance in any content domain. Just as with the domain-relevant skills component, we assume some innate aspect to many of these elements, but also an environmentally determined aspect that can be developed and in fact does need to be developed.

Intrinsic Task Motivation. In some ways, this component is the most important in creative performance. Although domain-relevant skills and creativity-relevant processes are obviously quite important, a skilled individual can fail to produce creative works or responses without intrinsic task motivation – the drive to do something because it is inherently interesting, enjoyable, or challenging. Unfortunately, the motivational role in creativity is often overlooked. In fact, when individuals are hired for jobs, employers spend much more time and attention on

their domain-relevant skills (what they have learned to do, what kind of education they have, how they have performed on various tests and tasks), pay relatively little attention to creativity-relevant processes, and seldom pay any attention to their intrinsic motivation.

Intrinsic motivation is something that is revealed frequently in journals, letters, and autobiographies of well-known, highly-creative people. A good example is the cellist Pablo Casals, who in his autobiography includes a passage where he describes the first time that he heard the cello played: “I never heard such a beautiful sound before. A radiance filled me. I said, ‘Father, that is the most wonderful instrument I have ever heard. That is what I want to play,’” (Kahn, 1970, p. 35). This passion pervades his autobiography and certainly seems to have pervaded his career of more than eighty years of playing the cello, continually becoming better at it, composing music for it, and staying in love with it all those years..

Another good example comes from a very different field. The Nobel Prize-winning physicist Arthur Schawlow was asked what he felt made the difference between very creative scientists and less creative scientists. He said, “The labor of love aspect is important. The successful scientists often are not the most talented, but the ones who are just impelled by curiosity -- they’ve got to know what the answer is” (Schawlow, 1982). Curiosity is an important element of intrinsic motivation.

Interestingly, the word “love” showed up in an interview conducted several years ago with the novelist John Irving. When asked about his writing process and about his motivation for writing, he said that it is not at all unusual for him to spend twelve to fourteen hours a day at his typewriter, that he gets very intensely involved in pouring over the details of character development and plot development. He described the process as one that feels very, very difficult. When asked what keeps him motivated to such an intense degree, he replied, “The

unspoken factor is love. The reason that I can work so hard at my writing is that it's not work to me," (Amabile, 1989a, p. 56). He went on to say that, although so much effort was involved, he simply could not imagine himself doing anything else.

Defining Intrinsic and Extrinsic Task Motivation. We define intrinsic motivation as the motivation to do something for its own sake. At its highest levels, intrinsic motivation becomes the kind of passion revealed in Casals, a high degree of involvement and personal challenge in the work and a sense of deep satisfaction in doing something well. By contrast, extrinsic motivation is the motivation to do something for some external goal. That external goal becomes the person's primary focus in undertaking the task.

We summarize our research on motivation and its impact on creativity by what we call the intrinsic motivation principle of creativity: People will be most creative where they feel motivated primarily by the interest, enjoyment, satisfaction, and personal challenge of the work itself and not by external pressures. People are most creative when they are primarily intrinsically motivated rather than primarily extrinsically motivated.

One line of evidence in support of this principle comes from first-person accounts. We have studied a great many autobiographies, personal journals, letters, biographies, and interviews of widely recognized creative individuals in a variety of fields. These include writers T. S. Eliot, Anne Sexton, Sylvia Plath, Thomas Wolfe, Fyodor Dostoyevski, D. H. Lawrence, Joyce Carol Oates, Charles Dickens, Gertrude Stein, George Eliot, Isaac Asimov, and John Irving; scientists Albert Einstein, Marie Curie, and James Watson; musicians/composers W. A. Mozart and Pablo Casals; artists Pablo Picasso and Ansel Adams; social scientist Margaret Mead; and filmmaker Woody Allen. Richly complex as they are, these sources strongly suggest the validity of the intrinsic motivation principle in two ways. First -- as observed above -- these individuals express

high levels of intrinsic motivation for doing their work. In addition, these creative individuals report numerous incidents in which their intrinsic motivation and creativity were undermined by salient extrinsic constraints.

The second and most important source of evidence on the intrinsic motivation principle is the laboratory experiment. We have used a simple paradigm in most of this research: subjects work on an interesting creativity task either in the presence or in the absence of a specific extrinsic constraint. Subsequently, their products are rated on creativity by several independent experts. We have carried out such experiments with a wide range of independent variables (extrinsic constraints), subject groups ranging in age from preschool children to working adults, and variety of artistic, verbal, and problem-solving creativity tasks. Though they are not without their complexities, our results reveal consistent patterns in strong support of the intrinsic motivation principle. Essentially, these twenty years of experimental research have revealed six reliable methods for destroying creativity.

Methods for Killing Creativity

Evaluation. People will tend to be less creative when they are focusing primarily on how their work is going to be evaluated. Both expected evaluation (Amabile, 1979; Amabile, Goldfarb, & Brackfield, 1990; Hennessey, 1989) and actual prior positive evaluation (Berglas, Amabile, & Handel, 1979) have detrimental effects on creativity.

Surveillance. Surveillance is highly related to evaluation and probably operates because of evaluation. People will be less creative if they feel that there is someone watching them while they work (Amabile, Goldfarb, & Brackfield, 1990).

Reward. The research does not suggest hat people don’t like to get rewarded for their work, but it does suggest that, if people are focused primarily on tangible reward, they will be

less creative than if they are not so focused on the reward (Amabile, Hennessey, & Grossman, 1986; Hennessey, 1985). Whereas this "contracted-for" reward is detrimental to creativity, "bonus" reward (not contracted for) has a positive effect on creativity (Amabile, Hennessey, & Grossman, 1986). Thus, it often requires a balancing act to reward people in a way that will stimulate their creativity.

Competition. People who feel that they are in a win-lose competition with other people will tend to be less creative than people who are not in a competition (Amabile, 1982a, 1987).

Restricted Choice. People who feel that their choice is restricted will tend to be less creative than people who have some choice in how they are going to carry out a task (Amabile & Gitomer, 1984; Hennessey, 1989).

Extrinsic Motivational Orientation. People who are focused on the extrinsic reasons for engaging in an activity tend to be less creative than those focused on intrinsic reasons (Amabile, 1985).

The Creative Process

Having established some of the social conditions that can impact creativity, our research in the last few years has been directed at questions regarding how creativity happens. What is the process? If it is the case that an intrinsic motivational orientation is conducive to producing creative outcomes, then how does motivation affect the way in which a person engages in a task?

The Maze Metaphor. We have developed a metaphor for the way in which motivational orientation might influence creativity. The metaphor is a maze with several exits; performing a task is represented as attempting to find a way out of the maze. The task can be done by rote, using familiar algorithms, and resulting in an uncreative solution. In the maze metaphor, the individual can take the straight, well-worn, familiar pathway out of the maze. This is the route

most likely to be taken by extrinsically motivated individuals (those motivated primarily by factors outside of the task itself, outside of the maze). Because they view the task as merely a means to an end, their attention has been narrowed to doing the minimum necessary to meet the extrinsic constraint (see Kruglanski, Stein, & Riter, 1977). However, finding a creative solution requires exploration through the maze, a more heuristic approach to the task. Individuals will only be likely to take this more creative approach if they are initially intrinsically interested in the activity itself and if their social environment does not demand a narrowing of behavior into the familiar algorithm.

This metaphor leads to several specific predictions about differences in task processing depending on levels of intrinsic motivation, leading ultimately to the more creative outcomes under high intrinsic motivation. Compared with extrinsically motivated individuals, intrinsically motivated individuals should generate and examine a larger number of ideas and possibilities while engaged in the task; make associations and juxtapositions that are more unusual; spend a longer period of time on the activity; become more deeply involved cognitively in the activity; depart more frequently from familiar algorithms for task engagement; and produce more creative end products.

Empirical Evidence Supporting the Maze Metaphor. Some previous studies with various cognitive tasks offer suggestive evidence in support of the maze metaphor (e.g., Kruglanski, Stein, & Riter, 1977; McGraw & Fiala, 1982; Pittman, Emery, & Boggiano, 1982), and we have conducted a study in three task domains to examine these predictions directly (Ruscio, Whitney, & Amabile, 1995). One hundred fifty-one undergraduate students completed a motivational measure assessing stable intrinsic motivational orientation (Amabile, 1989b) and were then videotaped while engaging in tasks in three different domains: problem-solving (building a

structure according to guidelines and using a set of household materials), art (collage-making), and writing (constructing an American Haiku). Subjects were also instructed to "think aloud" while performing these tasks. Judged creativity scores on the structures, collages, and poems made by the subjects, obtained with high reliability in accordance with the consensual assessment technique (Amabile, 1982b), constituted the primary dependent measures of the study.

In an attempt to capture the type and frequency of observable behaviors that subjects engaged in, a videotape coding scheme was developed for the structure and collage tasks. (The videotapes of poem-writing did not contain enough behavioral information to warrant the development of a coding scheme). In addition, verbalizations were coded in all three tasks (Ericsson & Simon, 1984). All coding was conducted in an exploratory manner, including any behaviors and verbalizations that might conceivably relate to intrinsic motivation or creativity. Initial lists of coding measures was compiled from the suggestions of a large research group whose members watched and listened to several tapes. The coding schemes were then developed through an iterative process, in which the coders refined their initial coding categories, tried them out, and then refined them repeatedly until a set of behavioral measures and verbalizations was obtained that could be identified with high reliability.

As suggested by theory and previous research, intrinsic motivation predicted creativity in each domain. The reliably assessed process measures that were most strongly related to creativity were combined into process scales based on factor analysis. Although the results differed in some details across the three tasks, one important factor did consistently emerge. Consistent with the maze metaphor, <u>involvement in the task</u> -- as assessed through behaviors and verbalizations -- significantly predicted creativity in each task domain. This process factor

consisted of behaviorally-assessed high levels of involvement, set-breaking, fast pace, and playfulness, and verbalizations characterized by high levels of exploration, enjoyment, and concentration. In fact, not only did involvement in the task predict creativity, but it also mediated a significant portion of intrinsic motivation's impact on creativity. This strongly supports the maze metaphor of the creative process, and provides the first empirical assessment of the specific behaviors that intrinsically-motivated individuals exhibit during their creative task engagement.

Several other process factors also predicted creativity in particular domains. In the structure-building task, individuals who exhibited uncertainty by repeatedly "backtracking" or who revealed a narrow focus by talking primarily about the task and the materials built structures judged to be less creative than those who backtracked less frequently and did not restrict their focus. In the collage-making activity, those who demonstrated assuredness through high confidence, fast pace, and little difficulty in their work; who identified many concepts through the frequent use of analogies, "Aha!" statements, and transitions; and who maintained a wide focus as evidenced by talking primarily about either task-related goals or topics irrelevant to the task, made collages judged as more creative than those who were less assured, identified fewer concepts, and did not maintain as wide a focus. Although none of these process factors mediated a significant proportion of intrinsic motivation's impact on creativity, it may well have been the case that they mediated the influence of domain-relevant skills or creativity-relevant processes; unfortunately, our study did not contain measures of these components of the model. Regardless, these process factors not only predict creativity, but they, too, fit well with the predictions derived from the maze metaphor.

Stages of the Creative Process. The componential model of creativity also hypothesizes distinct stages in this creative process. The model resembles previous theories of creativity in the

specification of the stages of problem presentation, preparation, response generation, and response validation (e.g., Hogarth, 1980; Nystrom, 1979; Wallas, 1926). This model is more detailed than previous ones, however, in its inclusion of the impact of each of the three components of creativity at each stage in the process.

The initial step in this sequence is the presentation of the task or the problem. An externally posed problem is less likely to be intrinsically interesting than an internally generated one. In the second stage, preparation, domain-relevant skills are critical, providing a set of possibilities to explore. The novelty of the product or response is determined in the third stage, response generation. Both creativity-relevant processes and task motivation play important roles as the individual generates response possibilities by searching through the available pathways and exploring features of the environment that are relevant to the task at hand. The fourth stage, response validation, again involves domain-relevant skills as the individual tests possibilities for correctness or appropriateness of responses.

Another study that we conducted using the structure-building task provides a first step in evaluating the stages of the model (Whitney, Ruscio, Amabile, & Castle, 1995). Subjects were introduced to the structure-building task and then randomly assigned to one of three conditions designating their pre-task activity: planning by looking at the task materials (but not touching them); playing with the task materials; or control (no pre-task activity). This manipulation allowed subjects varying amounts of time for the early stages of the creative process, before they actually began to build. Those in the planning condition were exposed to the first three stages: problem presentation, preparation, and response generation. Those in the play condition were exposed to the response validation stage in addition to the first three. Those in the control condition were exposed only to problem presentation. Structures in both of the experimental

conditions were rated as significantly more creative than those in the control condition, pointing to the value of an increased opportunity for response generation and validation.

Revision of the Intrinsic Motivation Principle of Creativity

Based on accumulated evidence regarding the role of motivation and specific behaviors in creative performance, we have developed a biological metaphor for the impact of motivational orientation. If the six creativity killers outlined above are conceptualized as poisons, toxins, or germs, then there are two ways to help protect people from them. One is to sanitize the environment, to try to create school, home, and work environments in such a way that evaluation, surveillance, competition, and strong tangible rewards are not the primary concern. Although this might be a good idea in the abstract, it is probably unrealistic and even undesirable to try to establish environments entirely free of these influences. The second possibility is to immunize people, as with various diseases. This is the approach that we have taken in our research.

In one study we had fourth and fifth grade children watch videotapes of two children talking about their school work (Hennessey, Amabile, & Martinage, 1989). The children on the videotapes were actors, working from a prepared script. In the intrinsic motivation training condition, the children in these tapes talked about their work in highly intrinsically motivated ways. In answers to questions from an adult interviewer, they talked about mind tricks that they used to distance themselves from things like grades, praise, and competitive situations. For example, these children were asked questions such as, “Don’t you think about grades? When you work, you seem very excited about learning things in school, but what about getting good grades; don’t you think about that?” They responded by acknowledging extrinsic factors without letting them have prominence:

> Well, sure I think about grades. I do want to get good marks, I know that that's important -- but it's never the most important thing for me when I am doing my schoolwork. What's most important is that I'm learning all of this neat stuff, and that I am excited about what I am learning and that is what's really important to me.

A control group of children watched videotapes of the same two children talking about their favorite foods, favorite seasons of the year, and other topics having nothing to do with motivation. All children returned a few days later, filled out a questionnaire of intrinsic and extrinsic motivation for learning in the classroom, and then participated in a "creativity-killing" experiment. One half of the children were in a contracted-for reward condition, and the other half of the children were in a no reward condition.

Questionnaire results indicated that the trained group was significantly higher than the control group on intrinsic motivation toward learning in the classroom. Within the control group, those who were offered reward were less creative than those who were not offered the reward, the usual finding. In the training group, however, those who were offered reward made products that were rated significantly higher on creativity than those made by the non-reward children. It appears that in this condition, extrinsic motivation had an additive effect with intrinsic motivation, rather than the usual undermining effect. These children were effectively immunized against the negative effects of extrinsic motivation.

This immunization study also indicates that extrinsic motivation may not always exert a negative influence on creativity, as does a more recent study with professional artists (Amabile, Phillips, & Collins, 1993). As predicted from earlier research, creativity was found to be higher for non-commissioned works than for commissioned works, presumably because non-

commissioned works were more intrinsically motivated and commissioned works were more extrinsically motivated. However, some surprising findings about extrinsic motivation emerged. Within the commissioned works, there was actually a positive correlation between creativity and the extent to which the artist reported viewing the commission as enabling (in the sense of enabling him or her to do something really exciting). Likewise, there was a positive correlation between creativity and the extent to which the commission was perceived as informational. Creativity was negatively correlated with the degree to which the artists felt controlled by the commissions. Extrinsic motivation seems to have played a more complex role than we had previously believed to be the case.

In light of these studies that reveal the complexity of extrinsic motivation, the intrinsic motivation principle of creativity has been revised: intrinsic motivation is conducive to creativity; controlling extrinsic motivation is detrimental to creativity, but informational or enabling extrinsic motivation can be conducive, particularly if initial levels of intrinsic motivation are high. This was certainly the case for the artist population that was studied. Extrinsic motivators are now believed to be capable of serving intrinsic motivational purposes (Amabile, 1993). These synergistic extrinsic motivators can support competence if they are informational or support task involvement, and if they allow an individual to do something really exciting without undermining self-determination or feelings of control over the work.

Keeping Creativity Alive

Although much of our older research on creativity was devoted to examining the "creativity killers" described earlier, more recent research suggests three ways to keep creativity alive. The first is to make learning self-directed and self-challenging. Students need to be encouraged to feel responsible for their own learning. To the extent that students can challenge

themselves, and to the extent that they are afforded the flexibility to do that, they will become more creative.

The second method for keeping creativity alive is to make extrinsic goals secondary to intrinsic rewards. Extrinsic motivators should be operating in service of intrinsic motives, and not undermining them. An example is an interesting case from the mid-1980s of an eleven-year-old boy, Jason Brown, who wrote a play called "Tender Places." He entered this play into a contest for children aged twelve through eighteen after just having turned twelve, and won first prize. The play was produced off Broadway and then later as a television drama. Jason's mother had brought a newspaper announcement of this play-writing competition to the breakfast table one day. He thought the idea sounded exciting, and so he wrote the play and submitted it. What's curious is that he wrote this highly creative play for a competition, a situation that is often detrimental to creativity. He says that he was excited about the possibility of winning the contest, but he wasn't thinking about winning when he actually made the decision to write the play:

> I thought, "Well, this will be the first thing I've ever written in my life; that will be neat." The contest and money left my mind, probably because I'm content. I'm not worried about anything extra. (Amabile, 1989a, p. 97)
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> When asked if writing the play seemed like work or like play, Jason answered:
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> It was both. It was work because I had to work at it in order to meet the deadline; otherwise, I wouldn't have done it. But it was play because it was totally my own decision to do it or not. (Amabile, 1989a, p. 97)

This is a clear demonstration of an extrinsic goal (the competition) serving both an enabling and an informational role. Jason's own intrinsic interest and curiosity combined

synergistically with the extrinsic, competitive situation to produce a creative drama.

The third way to keep creativity alive is to find the creativity intersection. This refers to the area where an individual's domain-relevant skills, creativity-relevant processes, and intrinsic task motivation overlap. By concentrating on the activities for which they have exceptional skills, that engage their creative thinking, and that they enjoy the most, people are most likely to be productive, creative, and happy.

The creativity intersection is particularly important for gifted and talented children. In part because they excel in so many areas, it is often difficult for them to decide where to focus their efforts and attention. Finding their strongest intrinsic interests is the key to helping them achieve their highest levels of creative potential. This can be done by exposing them to many different activities and subjects, by giving them the flexibility and autonomy to choose their own directions. In addition to the development of domain-relevant skills and the mastering of content areas at an accelerated rate, exploration and playfulness should be encouraged in these children to help them discover their own strongest intrinsic interests. Everybody should be allowed to be "a little too creative."

Conclusion

It is not uncommon to hear gifted children say that they find their classroom experiences deadening. This is one of the most often-cited reasons for the development of special education programs for gifted and talented children. Educators and educational researchers have made great strides over the past few years in devising and testing new approaches to gifted education, resulting in programs that are stimulating, challenging, highly educational, and fun. Methods have been developed for helping gifted children excel and accelerate at paces that no one would have imagined possible just a few years ago. We would urge educators to imagine the

implementation of such methods and such programs in all classrooms, everywhere. There is abundant evidence that many children of all ability levels, not just gifted children, feel deadened by their classroom experiences. It is likely that the methods that work so effectively for children of superior ability would be equally effective for children at all levels.

Certainly, only a very few will ever attain the ultimate levels of proficiency that the truly gifted reach. But it is not unreasonable to expect that the increments might be just as great and, perhaps most importantly, the change in attitudes toward learning and toward school would be just as dramatic. Researchers and practitioners in gifted education now possess a great knowledge base. Rather than de facto restricting the application of that knowledge to children of superior talents, they would do well to consider sharing it with all teachers, all students, through broad implementation programs in public schools. This sort of intellectual outreach would quite likely yield significant societal benefit.

Finally, just as creativity depends importantly on skills and special talents that must be developed in individuals, it also depends very importantly on the social environment, on the context in which those individuals find themselves. Even gifted children, and maybe especially gifted children, are strongly influenced by the constraints, inducements, and social supports that they find in their environment. If we would help them achieve their highest levels of potential -- including not just brilliant technical performance but also the highest levels of creativity – it is going to be extremely important to carefully craft the environments in which they learn and in which they work. If we can find ways of nurturing the motivation for creativity, that motivation that Einstein so poetically called “the enjoyment of seeing and searching,” then we are going to go a very long way toward keeping creativity alive in our most creative children.

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