CHAPTER 1

Creativity and the Labor of Love

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Every advance in the history of humankind has resulted from creativity, the production of new, appropriate ideas. Take the laser, which is a powerful, intensely focused beam of light. Lasers have become ubiquitous and crucial tools in our global society, with applications in everyday life ranging from printers and security systems to pointers and barcode scanners, as well as applications in medicine, dentistry, communications, industry, and nuclear fusion. The invention of lasers is generally traced to a paper outlining the basic principles of lasers in the December 1958 issue of *Physical Review* coauthored by Arthur Schawlow and Charles Towne ("Infrared and Optical Masers"), one of the accomplishments for which Schawlow received the 1981 Nobel Prize in Physics. Yet dozens of other scientists contributed to the knowledge required to develop the laser technologies of today. A different scientist, Theodore Maiman, built the first working laser in 1960, and another, Gordon Gould, was eventually awarded patent rights to the laser in 1988.

What Is Creativity (and Who Is Creative)?

Like many others in the field (e.g., Stein, 1975; Sternberg and Lubart, 1999), I define creativity as the production of ideas that are not only novel – different from previous ideas in some way – but also appropriate: useful, valuable, correct, or somehow fitting to the purpose that the individual creator intends. In physics, an idea cannot be considered creative unless it works, unless it can eventually be proven; for this reason, the "appropriate" aspect of creativity means "correct" in mathematics and science. But in other domains – the arts, for example – appropriateness is quite a different thing. There, work is generally considered creative if it is both novel and expressive of something, evoking a reaction (or range of reactions) in observers that the artist intended.

Unlike others in the field (e.g., Gardner, 1993; Gruber, 1982), I do not make the assumption that creativity is the sole province of geniuses – extraordinary people who receive wide recognition for having changed a field in some notable way. Like James Kaufman (Kaufman & Beghetto, 2009) and other scholars, I hold that levels of creativity exist within all domains of human activity – essentially, a continuum from the ordinary, everyday creativity such as the dentist (or parent) who figured out that children will be calmer during dental exams if they can wear fun sunglasses to protect their eyes from the bright light (often called "little c creativity"); through the moderate ("medium c") creativity of Maiman, who was able to build the first laser; to the breakthrough ("Big C") creativity of Schawlow, who articulated the scientific principles upon which all laser inventions were eventually built. Yet Schawlow, who won the Nobel Prize, never became as famous as his Nobel Prize–winning contemporary at Stanford University, the scientist Linus Pauling. Maiman was twice nominated for, but never received, the Nobel Prize, placing him lower than Schawlow on the "fame ladder." And, to my knowledge, no one has considered nominating the person who came up with the sunglass-dentistry idea for a Nobel Prize. Yet all of these people produced novel and appropriate ideas. All were creative.

The Labor of Love Aspect

In a 1982 interview, shortly after he accepted the Nobel Prize, Schawlow was asked what he thought made the difference between highly creative scientists and those who were notably less creative. The interviewer wondered if the secret lay with innate talent, intelligence, or training. Schawlow replied, "The labor of love aspect is important. The most successful scientists often are not the most talented. But they are the ones who are impelled by curiosity. They've got to know what the answer is" (Schawlow, 1982, p. 42). A few years earlier, I had become intrigued by the motivation that stems from curiosity, what Albert Einstein referred to as "the enjoyment of seeing and searching" (Einstein, 1949, p. 19). Edward Deci, Mark Lepper, and other psychological researchers called this *intrinsic motivation*: the drive to engage in a task because it is interesting, enjoyable, challenging, or satisfying in and of itself (e.g., Deci, 1971; Lepper, Greene, and Nisbett, 1973; White, 1959). Deci and Lepper had demonstrated what was, at the time, an astonishing phenomenon: when people (adults and children) do an activity that they were initially interested in, under conditions where they have been promised a reward for doing the activity, they become less

interested in doing it later on, when the reward is no longer available. In other words, intrinsic motivation can be undermined by extrinsic reward (reward offered by someone else); subsequent research by these and other psychologists showed that other extrinsic motivators (like expected evaluation) and extrinsic constraints (like deadlines) can have similar effects.

Reading Einstein's autobiographical description of how his love and exploration of science had been dampened by the "coercion and sense of duty" (p. 19) that he experienced as a schoolboy, and finding similar stories in the autobiographies, diaries, and letters of other highly creative people, I wondered if an intrinsic (versus extrinsic) motivational state could have an effect not only on subsequent interest but also on current creativity. For this reason, I set out to develop a social psychology of creativity, an understanding of the effects of factors in the social environment, such as promised reward and expected evaluation, on an individual's ability to produce creative work on a particular activity at a particular point in time. I began by designing a series of simple controlled experiments, in which some participants would be randomly assigned to do a creativity task under an extrinsic constraint or extrinsic motivator, while others would do the same task under identical conditions – but without the extrinsic constraint or motivator.

Measuring Creativity

First, however, I had to find a good way to measure the creativity of the work that participants in my experiments would produce. At the time (the mid-1970s), creativity was assessed in most psychological studies through standardized creativity tests (e.g., Torrance, 1966) that were designed to identify gifted and talented children and adults. However, my experiments required creativity measures that would be relatively unaffected by the sort of large individual differences that the creativity tests had been designed to reveal. Instead, these studies required measures that would be relatively insensitive to traitlike skill differences in a population of ordinary children or adults but, instead, could reveal temporary fluctuations in creativity arising from different motivational states. For this reason, I developed a new measure, which I dubbed the *consensual assessment technique* (CAT) *for creativity* (Amabile, 1982a).

In the CAT, a small number of people (usually, three to eight) familiar with a domain give their own independent assessments of the level of creativity of each of a set of products in that domain that were made by participants in a study. The tasks used in my experimental studies did not

require any degree of special skill beyond the level that ordinary people would be expected to have. For example, I might have the people participating in a study all create paper collages out of a standard set of materials, such as white poster board, a container of glue, and colorful pieces of paper, bits of yarn, and fabric scraps. Regardless of their experimental condition (say, expected evaluation versus no evaluation expected), all participants would receive an identical set of materials and would be given the same amount of time. After the experiment concluded, artists or people familiar with collage art would be recruited to make the assessments of creativity. Working independently, and without knowing that different collages had been produced under different experimental conditions, they would each view the collages in a different random order. Then, working under instructions to rate the collages relative to one another on creativity, using their own subjective definition of creativity in that domain (so that their ratings would not simply reflect the experimenter's view of creativity), these judges would rate each collage on a Likert scale, for example, a 1–7 or 0–40 scale.

The assumption underlying the CAT is that, although even experts might have difficulty articulating the qualities that lead them to rate one collage as more creative than another (and they do; see Amabile, 1982a, 1983a), they can nonetheless identify different levels of creativity in the products, and moreover, they can generally agree with other experts. To the extent that they do agree, these ratings can be considered valid measures of creativity. In fact, across a wide range of products, including collages, poems, stories, and small structures, judges using the CAT generally give ratings that show good interjudge agreement (Amabile, 1982a, 1983a, 1983b, 1996; Amabile and Mueller, 2008). As a result, judge ratings can be averaged to form an overall measure of creativity for each product.

Experiments on How the Immediate Social Environment Affects Creativity

The first of my studies, done as a field experiment, was quite simple (Amabile, 1982b). (It was the first study I conducted, but not the first published.) I invited a number of children living in an apartment complex to one of two "art parties" in the community center; the invitations were given out randomly. In the both of these parties, the children received name tags that each had a unique number, enjoyed some snacks, and played a few art-oriented games. Then, as the final "game," they were given the collage activity. Each child received an identical set of colorful origami papers in a variety of sizes and shapes (each set arranged identically), a standard-size

piece of white poster board, and a container of glue. They were all asked to use the materials to make a "silly" collage.

The only difference between the two art parties lay in the instructions given by the experimenter (the "host" of the party) before the collage activity. At the first party, the experimenter told the children that, after the collage activity and before they went home, there would be a raffle for three prizes, and that everybody had the same chance to win one of the prizes. The experimenter then showed them the prizes – three quite attractive toys – and a fishbowl that had slips of paper inside, each with a number corresponding to a number on a child's name tag. Thus, the children at the first party believed that there was no connection between the collage activity (or any of the art activities) and the end-of-party raffle; this was the control condition. In the second party, the experimenter told the children that, at the conclusion of the collage activity, she and her two helpers (two other adults) would judge the collages and award a first prize to the best, a second prize to the next best, and a third prize to the third best. Thus, the children at the second party believed that they were competing for rewards and made their collages under that belief. This was the experimental condition, where the manipulation consisted of three extrinsic motivators combined into one: competition, expected evaluation, and reward. (In this party, like the first one, the prizes were eventually raffled off, so as not to undermine the confidence of any children. The experimenter told the partygoers that the collages were all so good that the adults simply couldn't decide on the best three.)

Subsequently, the CAT was used to produce creativity scores. The collages were arranged gallery-style on the walls of a conference room, and local artists were recruited to come in, individually, to rate the collages on creativity – using their own subjective definitions of creativity. The ratings showed a high degree of reliability (0.77 for the seven artist-judges), and so they were averaged to produce a mean creativity score for each collage. Analysis of these scores revealed that the children in the competitive reward condition had produced collages that were rated significantly lower in creativity. This study provided support for the *intrinsic motivation hypothesis of creativity*: people will be more creative when they are motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself – and not by extrinsic motivators or constraints.

A series of experiments in the 1970s, 1980s, and 1990s, by myself, my students and colleagues, and others, demonstrated that creativity can be undermined in both children and adults by a number of extrinsic motivators and constraints: expected evaluation (Amabile, 1979; Hennessey, 1989),

expected reward for doing the activity (Amabile, Goldfarb, and Brackfield, 1990; Amabile, Hennessey, and Grossman, 1986; Hennessey, 1989), surveillance while working (Amabile, Goldfarb, and Brackfield, 1990), competition (Amabile, 1982b), and constrained choice in materials to use (Amabile and Gitomer, 1984). In many of these studies, measures of intrinsic motivation correlated highly with measures of creativity. Moreover, quite direct evidence of motivational state as the mechanism emerged from a study that didn't actually introduce a specific extrinsic constraint or motivator (Amabile, 1985). In this experiment, simply focusing on extrinsic reasons for being a writer (like getting rich and becoming famous) versus intrinsic reasons (like enjoying playing with words and getting pleasure out of something good you have written) led to lower levels of creativity in creative writers (Amabile, 1985). Given this strong empirical support, I eventually began referring to the *intrinsic motivation principle of creativity*. I consider this to be the main discovery of my creativity research.

Nonexperimental Studies of the Social Environment and Creativity

Despite the utility of well-controlled experiments for pinpointing the causal effects of particular factors in the social environment on intrinsic motivation and creativity, there are clear limitations to experimental studies. The social-environmental manipulations, such as being told that your experimental session is being watched through a one-way mirror, are often quite artificial. The tasks, such as making a collage or writing a haiku poem, are much shorter than the potentially creative activities that most people do in everyday life. Most importantly, perhaps, the participants in these experiments have little invested in the activities they do in the laboratory. After a while, I became enormously curious about whether the social factors I had chosen to manipulate in the laboratory bore any correspondence to factors that influence the creativity of people who are trying to produce novel, appropriate solutions to problems every day in their work. To answer this question, I found it necessary to move out of the laboratory and beyond the experimental method.

Before I describe my own nonexperimental research, I want to highlight some very different, and highly influential, nonexperimental research on the social psychology of creativity that Dean K. Simonton began publishing around the same time (in the mid-1970s). Although we have since become friends, he and I did not know each other at that time and, indeed, were initially unaware of each other's work. In painstaking archival research

of widely recognized creative individuals using historiometric methods, Simonton published a series of important papers on larger socio-cultural-political influences on creativity, such as the presence of competitors in one's field in the same generation (1977a); social reinforcements (1977a); role-model availability (1975, 1977b); formal education (1976); father's status (1976); political fragmentation (1975); imperial instability (1975); political instability (1975); war (1975, 1976, 1977a); internal political disturbances (1977a); and cultural persecution (1975). If we were photographers, Simonton and I could have been said to use lenses of quite different focal lengths. While his snapshots of the social psychology of creativity were wide, panoramic views of broad influences on the output of historical luminaries, mine were close-ups of ordinary people producing modestly creative work that would likely never become well known. His subjects, who were known by reputation to thousands, even millions, of others, were long dead. Mine, who would be known by few outside their own personal circles, were quite alive – and willing to talk to me.

I began my foray into real-world creativity with a series of interviews with R&D scientists at a number of companies, in collaboration with Stanley Gryskiewicz at the Center for Creative Leadership (Amabile and Gryskiewicz, 1987). Using a critical incident technique for data collection, we asked these scientists to describe in detail two significant events from their work experience: one that exemplified a high level of creativity and one that exemplified a low level of creativity. Our first finding was a general one, concerning the content of the stories. Despite common wisdom that high-level performance is all about the people, these interviewees talked in much greater detail about the social environments – the work environments – surrounding these events than about the talents and personal characteristics of the individuals involved. In a broad sense, this pattern validates the importance of the social psychology of creativity.

Some of the specific aspects of the work environment that emerged as differentiators between the highly creative and the less creative events echoed the independent variables that my colleagues and I (or other researchers) had manipulated in experimental studies. But others had not been examined experimentally and, indeed, would likely be very difficult to study in a controlled experiment. In order to investigate systematically the extent to which the work environment factors identified in the interviews did, indeed, play a role in the level of creativity produced by R&D projects, I developed a survey instrument called KEYS® to capture employees' self-perceptions of their work environment and used it in a validation study within a large high-tech firm (Amabile, Conti, Coon, Lazenby, and

Herron, 1996). KEYS® has two work environment dimensions, one called *stimulants to creativity* (comprising six scales) and one called *obstacles to creativity* (comprising two scales).

In phase 1 of this study, my colleagues and I asked a group of mid-level R&D managers in this firm to independently nominate the highest-creativity project and the lowest-creativity project with which they had been involved over the past three years, from among all projects where creativity was both possible and desirable. We then asked them to complete two KEYS® surveys, one describing the work environment of the high-creativity project and the other describing the work environment of the low-creativity project. Not surprisingly, the survey results showed significant differences on all eight dimensions of the work environment. The high-creativity projects were rated significantly higher on the six stimulants to creativity, and the low-creativity projects were rated significantly higher on the two obstacles to creativity. In phase 2, we used a modified version of the CAT to obtain independent assessments of the creativity of the projects that had been nominated in phase 1. For this, we asked a group of scientific and technical experts in the firm, who had not been involved in phase 1, to rate the creativity of the outcome of each of the nominated projects (skipping those with which they were unfamiliar).

For phase 3, we selected only those projects that had been reliably rated by the phase 2 experts as high or low in creativity. We then asked every person who had been a member of those project teams (unless they had participated in phase 1) to complete a KEYS® survey about the work environment of that particular project – and only that project. They had no idea that the project had been rated as high or low on creativity. Our aim was to see if the people who had worked on the projects that were later rated as highly creative perceived the work environments of their projects differently from the people who had work on the projects later rated as low in creativity – in the same directions as participants in phase 1. They did. In both phase 1 and phase 3, the high-creativity projects were rated significantly higher on several work environment stimulants to creativity:

- Freedom: Autonomy (or a low level of constraint) in deciding what work to do or how to do it; a sense of control over one's work.
- Challenging work: A sense of having to work hard on challenging and important projects.
- Sufficient resources: Access to appropriate resources, including funds, materials, facilities, and information. (Note: Although there was a

significant difference on this dimension in phase 1, there was none in phase 3.)

- Work group supports: A diversely skilled work group in which people communicate well, are open to new ideas, constructively challenge each other's work, trust and help each other, and feel committed to the work they are doing.
- Supervisory encouragement: A supervisor who serves as a good work model, sets goals appropriately, supports the work group, values individual contributions, and shows confidence in the work group.
- Organizational encouragement: An organizational culture that encourages creativity through the fair, constructive judgment of ideas, reward and recognition for creative work, mechanisms for developing new ideas, an active flow of ideas, and a shared vision of what the organization is trying to do.

In contrast, the low-creativity projects were rated significantly higher on work environment obstacles to creativity:

- Organizational impediments: An organizational culture that impedes creativity through internal political problems, harsh evaluation of new ideas, destructive internal competition, an avoidance of risk, and an overemphasis on the status quo.
- Workload pressure: Extreme time pressures, unrealistic expectations for productivity, and distractions from creative work. (Note: Although there was a significant difference on this dimension in phase 1, there was none in phase 3.)

Notice that, although several of the factors identified in the organizational impediments dimension (or the opposite of the organizational stimulant "freedom") are similar to those we had studied experimentally – such as evaluation, competition, and constrained autonomy – one factor identified in the organizational encouragement dimension is surprising in light of the experimental findings: reward. Organizational environments where people know that creative work is recognized and rewarded are more conducive to creative outputs than those that have no such rewards. As we delved deeper into these findings, and considered them in light of some surprising experimental findings (Amabile, Hennessey, and Grossman, 1986; Hennessey, Amabile, and Martinage, 1989; Hennessey and Zbikowski, 1993), we developed the concept of *motivational synergy* (Amabile, 1993). When people start out with high levels of intrinsic motivation to do an

activity, rewards for doing the activity that are presented in a way that supports their feelings of competence or allows them to become more deeply involved in the activity will not undermine intrinsic motivation and creativity. Rather, those rewards will act as synergistic extrinsic motivators, combining in a positive way with intrinsic motivation, and supporting creativity.

The Diary Study

Although the findings of the KEYS® survey study revealed new elements of the social environment that can have important influences on creativity, it didn't tell us much about how people actually experience those work environments, day by day, while they are trying to be creative in their work. To put it bluntly, they revealed little about the *psychology* of the social psychology of creativity. In order to delve deeply into people's everyday psychological experience of doing creative work inside organizations, my collaborators and I carried out a multiyear study that involved collecting daily electronic diaries from 238 professionals as they were working on twenty-six important innovation projects inside seven different companies in three different industries.

Our aim was to get detailed information, in real time, about events unfolding in the work environment and the ways in which those events influence people's psychological experience – their perceptions of the work environment, their motivation, and their emotions. And, using separate measures of our participants' work, we wanted to see if psychological experience predicted creativity and other important dimensions of performance. Because we emailed the diary form to each participant each day of the project they were doing, we ended up with a treasure trove of data: nearly 12,000 individual diary entries. Each entry had Likert-scale ratings of the person's perceptions, motivation, and emotions that day, as well as a detailed description of one event that stood out in the person's mind from the work day. (Participants had not been told of our particular interest in creativity.) For measures of creativity, we analyzed the event descriptions for reports of coming up with a new idea or solving a complex problem. We also obtained measures of creativity and other dimensions of performance from our participants' supervisors and close colleagues.

The results of the diary study were consistent with, but went well beyond, the results from prior experimental and nonexperimental studies. The first major discovery was that psychological experience does predict creativity. In one set of analyses, we found that positive emotion on a given

day not only predicted creative thinking on that day but also predicted creative thinking the next day (Amabile, Barsade, Mueller, and Staw, 2005). In another study, we found that perceptions of leader support in the work environment predicted creativity (Amabile, Schatzel, Moneta, and Kramer, 2004). And, in keeping with earlier studies, we found that intrinsic motivation predicted creativity (Amabile and Kramer, 2011).

The second discovery of the diary study arose from the very microscopic view that the daily diaries afforded of the events unfolding in the work environment and the participants' psychological experience. We made this discovery by systematically categorizing and looking for patterns in all events reported on the days that participants reported their most positive psychological experiences – the most positive emotions and perceptions of the work environment, and the strongest intrinsic motivation. Of all the events that occurred on those "best days," the single most prominent, by far, was simply making progress in meaningful work. As long as people found meaning in the work – that is, as long as they felt it contributed to something that they valued – any sense of forward movement in the work could lead to notably more positive emotions and perceptions, and stronger intrinsic motivation, than they experienced on days without a progress event. We call this *the progress principle*, and we found that it applies even to seemingly trivial progress, or *small wins* (Amabile and Kramer, 2011). In fact, in general, 28 percent of seemingly small events can have a strong impact on people's emotions the day they happen.

Unfortunately, there is a downside to the progress principle: Of all the events that occurred on people's "worst days" (in terms of their psychological experience), the single most prominent, by far, was having a setback in the work – the opposite of progress. And the negative effect of setback events on psychological experience was three to four times stronger than the positive effect of progress events. This last finding fits well with a broader phenomenon in psychology and related fields that, when it comes to psychological reactions to a wide variety of events, "bad is stronger than good" (Baumeister, Bratslavsky, Finkenauer, and Vohs, 2001).

The Dynamic Componential Model of Creativity

Without theoretical models that attempt to make sense of them, a body of empirical research findings on a given topic – even a large body of findings – remains just that. The findings have limited utility for igniting further research or guiding how people behave in the world. Recently, my colleague Michael Pratt and I developed a theory that builds on my

prior theoretical models of creativity (Amabile, 1983a, 1983b, 1988, 1996) but incorporates more recent findings, including those that I have just described and research by many others in the field (Amabile and Pratt, 2016). This *dynamic componential model of creativity and innovation in organizations* is *componential* because it includes the four components that are essential for an individual (or a team of individuals working closely together) to produce creative work on any given task. Three of these components are internal to the individual: (1) skills in the task domain (knowledge and technical skill in the area in which the individual is working); (2) creativity-relevant processes (personality characteristics, ways of thinking, and ways of working that are conducive to producing novel ideas); and (3) task motivation (intrinsic and synergistic extrinsic motivation for the particular task). The fourth component is external to the individual: the social environment in which the individual is working; in organizations, this is the work environment within which the individual is located. The model is focused specifically on creativity *in organizations* because that is the primary environment in which I have focused my work over the past thirty years. It is a model of *creativity and innovation* because innovation is the implementation of creative ideas within an organization. And it is *dynamic* because it describes the ways in which psychological experience and creative performance influence each other through a series of feedback loops – and how both can be influenced by the social environment.

According to this model, all three internal components are necessary for creativity, and the external environment must be at least somewhat conducive. The model also specifies that the three internal components are differentially important at different stages of the creative process. Intrinsic motivation is particularly important as people are embarking on a creative task because intrinsic motivation leads to deeper engagement in the task; the more deeply people think about the problem, the more likely they are to undertake it with an open, flexible mindset. As people move along in the creative process, preparing to come up with ideas by gathering information about the problem, skills in the task domain are important, and synergistic extrinsic motivation can help people persevere in learning whatever new skills and knowledge they may need. At the next stage, actually generating ideas, high levels of creativity-relevant processes and intrinsic motivation can lead to broader exploration and, as a result, more ideas and a higher level of novelty in those ideas. Finally, when the time comes to select, validate, and communicate ideas, skills in the task domain and synergistic extrinsic motivation again become important – primarily, by ensuring that the selected idea is not only novel but also appropriate.

In organizations, managers at all levels, from the CEO down to an individual's immediate supervisor, exert a strong influence on the work environment; coworkers also play a role. To the extent that managers set challenging goals in meaningful work; grant as much autonomy as possible in meeting the goals; provide sufficient resources and time; recognize, reward, and foster open communication about new ideas; and view failure as a learning opportunity, the people who work for those managers will make creative progress in their work. To the extent that people make creative progress in their work, and to the extent that they receive support and encouragement from managers and coworkers, their psychological states will be more positive, further fostering creativity. Virtuous cycles can ensue. Unfortunately, to the extent that work environments are unconducive to creativity, and supports for people and their work progress are lacking, creativity is likely to suffer. Vicious cycles can emerge.

A Concluding Thought on the Power of Creativity

I started this chapter by saying that all human progress depends on creativity, and I stand by that claim. Yet it's also true that creativity is responsible for much evil in the history of humanity. Like the laser envisioned all those years ago by Arthur Schawlow, creativity can be powerful, and can be pointed in harmful directions as well as beneficial ones. We must realize that creativity, defined as producing novel ideas appropriate toward some goal, is amoral. The goal can just as easily be evil as good. It is only by combining creative capacities, strong passions, and conducive environments with equally strong moral values that we will be able to harness the power of creativity for the good of humanity and not its destruction.

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