CHAPTER 2

Studying Creativity, Its Processes, and Its Antecedents

An Exploration of the Componential Theory of Creativity

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INTRODUCTION

We know what we know about creativity through research. To the extent that we understand the skills, personality styles, motivations, and conditions that are conducive or detrimental to creativity, or the processes through which it emerges, we have creativity researchers to thank. Yet this field of inquiry has not traditionally enjoyed the most stellar reputation. In the preface to his 1968 classic, *Creativity and Personal Freedom*, the psychologist, Frank Barron described the vilification of creativity research by the poet and social critic, Kenneth Rexroth. Rexroth, who had been a subject in one of Barron's early studies of creative writers, wrote an article called "The Vivisection of a Poet" for *The Nation*. According to Barron, Rexroth portrayed psychological research on creativity as not only useless but actually dangerous, because it had the power to potentially destroy the delicate phenomenon by excessive study and wrong-headed conclusions.

Creativity research has enjoyed only a slightly better reputation among the broader group of psychology scholars, management scholars,

and business leaders. Many who are unfamiliar with recent advances in the field assume that it has little broad relevance because it focuses only on the arts (and perhaps the sciences), has little validity because creativity is too ill defined, ephemeral, and "soft" to study rigorously, and provides little practical applicability because creativity cannot be influenced. But they are wrong.

In recent years, a number of first-rate scholars in psychology and in management have devised ingenious methods for studying creativity in a broad range of domains, including organizational behavior. Moreover, they have clearly demonstrated systematic influences on creativity—some of which are amenable to change within organizations. Certainly, the study of creativity presents enormous challenges. It is difficult to assess and, given its complexity, its causes are difficult to discover except in extremely well-controlled psychology experiments where only one variable is manipulated and where all subjects complete the same task in a single laboratory session. In organizational settings, where well-controlled experiments are either infeasible or highly artificial, the challenges are much greater. Not only can creativity be influenced by a broad array of contextual factors at multiple levels (from individual skills to team dynamics to organizational climate), but participants are working over long periods of time on very different projects whose outcomes vary on a number of dimensions. Given the complexity of creativity, very little research has examined this phenomenon in the context of real organizations. Along with other scholars, we are currently trying to fill that void by building on the assessment tools and research methodologies of previous experimental and nonexperimental research. This undertaking, in itself, requires considerable creativity.

In this chapter, we will describe the componential theory of creativity (Amabile, 1983, 1988, 1996), which is a comprehensive theory that includes a description of the creative process as well as a specification of influences on creativity within and outside the individual. We will then illustrate various approaches to meeting the challenges of organizational creativity research by describing methods that address each aspect of the theory. To facilitate the adoption of potentially powerful new methods by organizational researchers, we will describe methods from both the organizational and the psychological literatures. We will discuss the assessment of creativity, its antecedents, and its processes, as well as the major research designs for studying creativity. We hope that this chapter will be useful for scholars planning research on organizational creativity and for anyone trying to evaluate such research and its conclusions.

THE COMPONENTIAL THEORY OF CREATIVITY

In keeping with most scholars who study the phenomenon, we define creativity as a process resulting in a product; it is the production of a novel and appropriate response, product, or solution to an open-ended task. The response must be new, but it must also be appropriate to the task to be completed or the problem to be solved. In addition, the task must be open ended, rather than having a single, obvious solution. The componential theory of creativity (Amabile, 1983, 1988, 1996), a theory designed to be comprehensively useful for both psychological and organizational creativity research, describes the creative process and the various influences on the process and its outcomes. Its basic elements, and the creative process it describes, are similar in the aggregate to other theories of creativity in both psychology (Simonton, 1999; Sternberg & Lubart, 1990; Wallas, 1926) and organizational studies (Ford, 1996; Woodman, Sawyer, & Griffin, 1993), although with different emphases and somewhat different proposed mechanisms.

In the componential theory, the influences on creativity include three components within the individual problem-solver—domain-relevant skills, creativity-relevant processes, and intrinsic task motivation—and one component outside the individual—the work environment. Figure 2.1 presents a simplified depiction of the updated theory (Amabile, 1996). Domain-relevant skills include knowledge, expertise, technical skills, intelligence, and talent in the particular domain where the problem-solver is working—such as microbiology or marketing. Creativity-relevant processes (originally called creativity-relevant skills) include a cognitive style and personality characteristics that are conducive to independence, risk-taking, and taking new perspectives on problems, as well as a disciplined work style and skills in generating ideas. Intrinsic task motivation is the motivation to undertake a task or solve a problem because it is interesting, involving, personally challenging, or satisfying—rather than undertaking it out of the extrinsic motivation arising from contracted-for rewards, surveillance, competition, evaluation, or requirements to do something in a certain way. Research evidence supports the inclusion of each of these components in the model (see Amabile, 1996).

The outside component is the work environment or, more generally, the social environment. This includes all of the extrinsic motivators (such as expected external evaluation) that have been shown to undermine intrinsic motivation, as well as a number of other factors in the environment that can serve as obstacles or as stimulants to intrinsic motivation

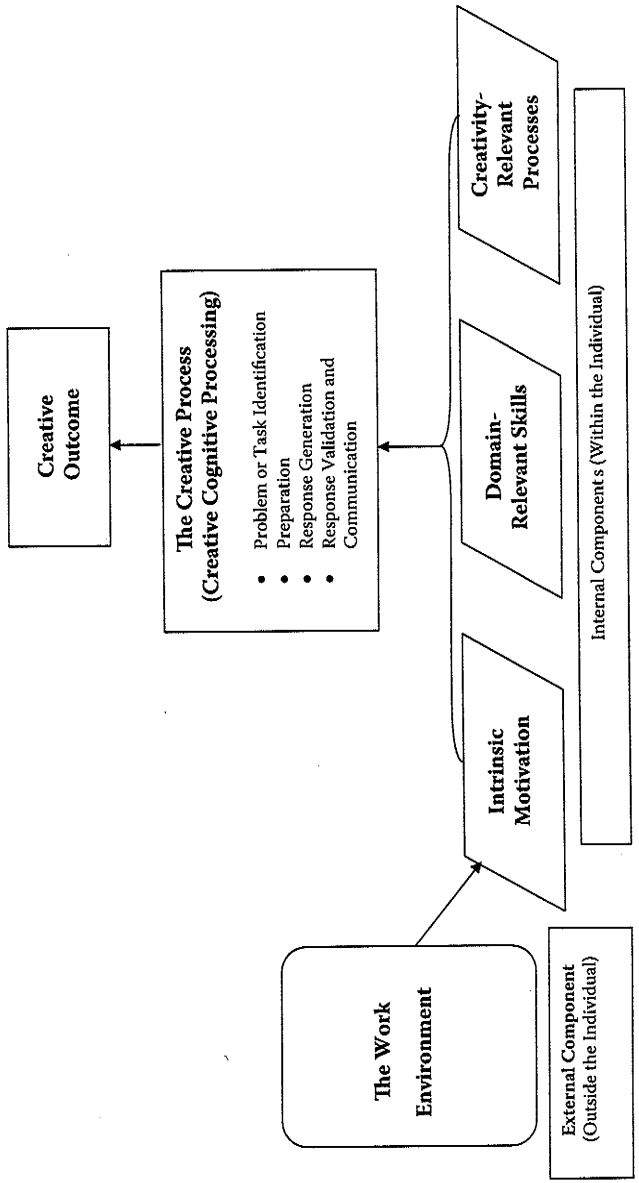

Figure 2.1 Simplified depiction of componential theory of creativity. Only major influences are depicted in the model.
Note: Adapted from *Creativity in Context* (p. 113), by Amabile, 1996, Boulder, CO: Westview Press.

and creativity. Research in organizational settings has revealed a number of work environment factors that can block creativity, such as an emphasis on the status quo, a conservative, low-risk attitude among top management, norms of harshly criticizing new ideas, political problems within the organization, and excessive time pressure (e.g., Amabile, Conti, Coon, Lazenby, & Herron, 1996; Kanter, 1988). Other factors can stimulate creativity, such as freedom in carrying out the work; a sense of positive challenge in the work; work teams that are collaborative, diversely skilled, and idea focused; supervisors who encourage the development of new ideas; top management that supports innovation through a clearly articulated creativity-encouraging vision and through appropriate recognition for creative work; mechanisms for developing new ideas; and norms of actively sharing ideas across the organization (e.g., Amabile et al., 1996; Kanter, 1988; West & Anderson, 1996).

The theory specifies that all components are necessary for creativity and that, generally, the higher the level of each of the components, the higher the ultimate level of creativity. In other words, creativity requires a confluence of all components; creativity should be highest when an intrinsically motivated person with high domain expertise and high skill in creative thinking works in an environment high in supports for creativity. As depicted in Figure 2.1, all four of these components should facilitate the creative process. The creative process is, essentially, creative cognitive processing of problems and tasks—that is, all of the cognitive processes that contribute to the production of creative works. Creative cognitive processing consists of several subprocesses: analyzing and articulating the exact nature of the problem to be solved, preparing to solve the problem by gathering information and improving any required skills, generating ideas for solving the problem, testing or validating the chosen solution, and communicating that solution to others. Although these processes may often follow this sequence, they can occur in any sequence and will often recur iteratively until a creative outcome has been attained.

For example, an employee might start by considering a particular customer need (problem identification) and immediately come up with an idea (response generation) followed by reading and talking with colleagues about existing work in the area (preparation). She might then present the idea to top management (communication). If top management accepts the new idea as something potentially novel and useful, the employee might then be asked to test the idea (validation). The testing process could involve a series of tests, followed each time by refinement

of the original idea and, perhaps, additional preparation through information gathering or even reformulation of the original problem identification. Once a final validated idea is accepted as novel and appropriate, then a creative outcome has been generated. However, if the idea is rejected, the employee must continue the process of refining the problem definition, preparing, generating, testing, and communicating ideas—or terminate the process. Ultimately, higher levels of each of the four components should lead to more effective creative cognitive processing, which, in turn, should lead to more creative outcomes. Those outcomes can be any observable product, performance, response, or idea, such as a poem, a new software program, a dance, a market research project, a new drug, a training course, a scientific experiment, or a completed consulting engagement.

The theory applies to any realm of human activity, with the basic components and processes and their mechanisms of influence remaining the same. The necessary intraindividual components should be the same in organizational contexts as in other contexts; in organizations, as elsewhere, people need domain expertise, creativity-oriented skills and processes, and intrinsic motivation for their work. Furthermore, creative activity can be affected by the work environment in any context—whether it is the environment of a school, a home, a studio, or a corporation. However, certain elements of the model are likely to be particularly distinctive in organizations. The work environment component in organizations contains features, such as team dynamics and top management behaviors, that are unlikely to be as important, or even present, in nonorganizational settings. In addition, outcomes are distinctive to each realm of human activity, as illustrated by our previous list that includes both poems and consulting engagements (which may, admittedly, be sheer poetry when they go well!). Even within organizations, the wide variety of activities makes for very different types of outcomes. In addition, it is possible that the creative process differs to some extent across realms of activity. In organizations, for example, the ways in which people identify problems or validate possible solutions are likely to be quite different from the ways in which those activities are carried out in the arts or in basic science laboratories. It is important to keep these distinctive features in mind when considering and evaluating methods for studying the components, the processes, and the outcomes in different domains.

As depicted in Figure 2.1, of the three intraindividual components, intrinsic motivation should be the most directly influenced by the work

environment. This influence is captured in the componential theory's intrinsic motivation principle of creativity: People will be most creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself—and not by extrinsic motivators. However, it is also important to note that the work environment undoubtedly has effects on domain-relevant skills (e.g., West & Anderson, 1996) and creativity-relevant processes, in addition to its effects on intrinsic motivation.

Recent research has suggested a modification of the intrinsic motivation principle. Although many extrinsic motivators in the work environment do appear to undermine intrinsic motivation and creativity, some may not. If rewards or other motivators are presented in a controlling fashion, leading people to feel that they are being bribed or dictated to—as is so often the case in organizations—the undermining effects are likely to occur. However, if rewards confirm people's competence (for example, by recognizing the value of their work), or enable them to become more deeply involved in work they are excited about doing (for example, by giving them more resources to do the work effectively), intrinsic motivation and creativity might not be undermined; in fact, they may be enhanced. This process is termed "motivational synergy" (Amabile, 1993). Thus, the theory suggests that, in addition to hiring people with domain-relevant expertise, creativity-relevant skills, and high intrinsic motivation for the work, managers should set up work environments that avoid control-oriented extrinsic motivators and instead focus on synergistic ones. Anything that supports the development of expertise, creativity-relevant skill, and intrinsic motivation should facilitate creativity.

METHODS FOR ASSESSING THE ELEMENTS OF THE THEORY

In order to fully understand the phenomenon of creativity, it is important to adequately assess each creativity component, the creative process, and creative outcomes. Table 2.1 provides examples of methods that have been used to assess these various elements. It is not meant to be comprehensive, but rather illustrative of the major approaches that have been taken. (For a comprehensive review of creativity assessment methods, see Puccio & Murdock, 1999.) As indicated in the table, some of these methods have been used primarily in psychological studies of creativity, and others have been used primarily in organizational studies. Some were developed specifically for creativity research, and some were developed for more general research purposes. We have tried to sample

Table 2.1 Some Methods for Assessing the Elements of Creativity As Presented in the Componential Theory of Creativity

ELEMENT OF CREATIVITY	BASIC METHODS USED	EXAMPLES*
Domain-relevant skills	a) Intelligence tests	a) IQ tests; Scholastic Aptitude Tests (G, P)
	b) Skill/achievement tests	b) Academic examinations (G, P/O)
	c) Education level reports/experience level reports	c) The Biographical Inventory: Creativity (Schaefer, 1969) (G, C)
		d) Reports of tenure within a field or an organization (G, P/O)
Creativity-relevant processes	a) Creative-thinking ability tests (fluency, flexibility, originality, and/or elaboration)	a) Torrance Tests of Creative Thinking (Torrance, 1966) (C, P)
		a) Remote Associates Test (Mednick & Mednick, 1966) (C, P/O)
		a) Unusual Uses Test (Guilford, 1967) (C, P/O)
	b) Cognitive style assessments	b) Kirton Adaption-Innovation Inventory (KAI) (Kirton, 1976) (C, P/O)
	c) Personality inventories	b) Jabri, 1991 (G, P)
	d) Creative thinking strategies	c) Creative Personality Scale (Gough, 1979) of the Adjective Check List (Gough & Heilbrun, 1983) (C, P)
		c) Barron-Welsh Art Scale (Welsh & Barron, 1963) (C, P)
		c) Myers-Briggs Type Indicator (Myers, 1962) (G, O)
		c) NEO Personality Inventory (Costa & McCrae, 1985) (G, P)
		d) Creativity Styles Questionnaire (Kumar, Kemmler, & Holman, 1997) (C, P)
		d) Creative self-efficacy (Tierney & Farmer, 2002) (P, O)
Intrinsic versus extrinsic motivation	a) Trait motivation (stable individual differences)	a) Work Preference Inventory (Amabile et al., 1994) (G, P/O)
	b) State motivation (motivation toward a particular task at a particular point in time)	b) Amabile, 1979 (G, P)
Work environment/ social environment	a) Work environment questionnaires	a) KEYS: Assessing the Climate for Creativity (Amabile, 1995) (C, O)
	b) Biographical questionnaires and interviews	b) The Biographical Inventory: Creativity (Schaefer, 1969) (C, P)
The creative process (creative cognitive processing)	a) Protocol analysis (analysis of problem-solving statements or behaviors)	a) Ericsson & Simon, 1993; Getzels & Csikszentmihalyi, 1976; Ruscio, Whitney, & Amabile, 1998 (G, P)
	b) Specific reports of thinking or idea generation	b) Amabile et al., 2005 (C, O)
Creative outcome	a) Judge ratings (by experts, supervisors, or peers) of specific products or a person's body of work	a) Consensual Assessment Technique (Amabile, 1982; Shalley, 1991, 1995; Zhou, 1998) (C, P/O)
		a) Getzels & Csikszentmihalyi, 1976; MacKinnon, 1962; Sobel & Rothenberg, 1980 (C, P)
		a) Gilson & Shalley, 2004; Madjar, Oldham, & Pratt, 2002; Oldham & Cummings, 1996; Zhou & George, 2001 (C, O)
		a) McDermid, 1965 (C, P/O)
		a) O'Quin & Besemer, 1989 (C, P)
	b) Counts of products meeting a creativity standard (such as patents)	b) Simonton, 1997 (C, P)
		b) Andrews, 1979 (G, O)
	c) Mentions in compendia of creative individuals	c) Galton, 1870; Simonton, 1975 (C, P)
	d) Originality of the product, defined as statistical infrequency	d) Simonton, 1980 (C, P)
	e) Awards and honors for creativity	e) Feist, 1993; Simonton, 1992 (C, P)
	f) Specific creative achievements	f) The Lifetime Creativity Scales (Richards, Kinney, Lunde, Benet, & Merzel, 1988)
		f) The Creative Achievement Scale (Ludwig, 1992) (C, P)

* The letter before each item in the "Examples" column matches the example to the specific approach with the same letter in the "Basic Methods Used" column of the same row. "G" or "C" signifies whether the method is used in general research or is specific to creativity research. "P" or "O" signifies whether the method is used primarily in psychological (P) or in organizational (O) research; "P/O" signifies that it is used in both.

from each of these types, including a few illustrative studies as examples of each method.

Of all the approaches to studying creativity that are listed in Table 2.1, the most commonly used approach in contemporary research on organizational creativity is the assessment of creative *outcomes* by *judge ratings*. Other contemporary studies rely on one or more of several methodologies listed in Table 2.1, including frequency counts of ideas generated (a modification of methods developed by Guilford [1967] and Torrance [1966] to assess creativity-relevant processes rather than outcomes), patent data, and qualitative accounts of creativity. Most creativity studies done in organizational settings assess creativity at the group or individual level, although some have examined the company or industry level (e.g., Taylor & Greve, 2006).

Judge ratings of creativity generally take one of two forms in contemporary organizational research: supervisor ratings, or ratings by multiple experts using the consensual assessment technique (CAT) (Amabile, 1982). Reliance on supervisor ratings draws on a decades-long tradition in the organizational literature of using such assessments to obtain quantitative measures of an employee's performance. More recently, researchers have applied this approach to assessments of creativity (e.g., Oldham & Cummings, 1996). Often, ratings are made by a single rater—the employee's direct supervisor.

The CAT, originally developed for psychological studies of creativity, is now widely used in organizational studies as well. The CAT is similar to the supervisor-based approach in its reliance on expert subjective assessment, but differs in its use of a consensus among multiple experts. The basic philosophy behind the consensual assessment technique is that, although creativity is difficult for people to define and very difficult to measure objectively in most domains, people who are familiar with a domain can recognize creativity when they see it, and their independent judgments generally agree as to the level of creativity in a given set of products. In essence, this sort of subjective assessment is what people rely on in the real world—although usually in a less rigorous manner.

The CAT is based on four key assumptions: First, that creativity exists on a continuum from the lowest "garden variety" levels to the highest genius levels; second, that people who are familiar with a domain (i.e., experts) can make reasonable judgments about the relative creativity of different works in that domain; third, that consensual assessment by multiple experts familiar with the domain is preferable to assessment by single individuals, to correct for the possible idiosyncrasies of any one rater; and, fourth, that having judges make comparative ratings of a number of works or individuals is preferable to having them rate only single works or individuals to achieve calibration along the creativity continuum. The CAT involves having judges who are familiar with the domain in which the work was done (generally, experts, supervisors, or peers) make scale-rated creativity assessments of several products or bodies of work done by different individuals in that domain. Generally, the judges are asked to use their own subjective definitions of what is creative in the domain, and to rate the products relative to one another (rather than relative to some absolute standard).

Ideally, in order to establish the reliability of the CAT measure, assessments are obtained from several judges working independently (all of whom have access to the same information about the products or bodies of work). If the judges' ratings agree at an acceptable level, then consensual assessment has been established; the mean of their ratings is taken as the measure of creativity for each product. Although single-expert ratings, in the form of supervisor ratings, have been shown to correlate significantly with some objective measures such as invention disclosures (Scott & Bruce, 1994; Tierney, Farmer, & Graen, 1999), we believe that it is preferable to use multiple expert raters (if available) to improve the reliability of the assessments.

Despite its widespread use in organizational and psychological research on creativity, the CAT has its own limitations. Many of these limitations are shared by other techniques relying on subjective assessments, such as single-supervisor ratings of individuals. First, like creativity judgment in the real world, the value of any subjective assessment technique is questionable at the highest levels of creativity in any domain. The history of art, science, and the humanities is replete with stories of path-breaking work that was soundly rejected by contemporary members of the field, only to later be celebrated as genius-level creativity. We argue that no method, including the CAT, can provide accurate measures of creativity at these levels. The reason is that, although this kind of creativity may lie along a continuum from lower levels, there are undoubtedly huge gaps in the distribution between more ordinary creativity and these flashes of genius, rendering comparison difficult. Occasionally, highly creative work creates a new domain, by combining two or more previously unconnected lines of thought. Thus, there exist no true experts at the time that the work is first produced. Accurate assessments of the true novelty and value of the work often require a long passage of time and considerable evolution of the relevant fields until enough people gain

the necessary expertise to make accurate judgments. Moreover, because they are socially based, consensual judgments even at lower levels of creativity are subject to social bias—the political and personal forces that can lead observers to shade their judgments positively or negatively. Thus, subjective-assessment techniques are most useful at the more common levels of creativity most often seen in organizations and elsewhere. Moreover, when assessments are made by judges who know the people who produced the work, the potential for bias always exists. Therefore, these assessments must be interpreted cautiously. Nonetheless, because the true novelty and value of work ultimately depend on social judgment, we believe that observer assessments of creativity are an indispensable part of the researcher's repertoire.

It is interesting to note that, although subjective ratings by external judges are used extensively in both psychological and organizational creativity research, self-ratings are virtually absent from the empirical literature. The common wisdom among creativity researchers is that self-ratings are suspect because they are likely subject to several forms of bias. Moreover, appropriate consensual assessment requires judges to rate the products or bodies of work of several people relative to one another. Self-ratings may lack this comparison base. In addition, the ratings of several external judges are generally used in creativity studies in order to obtain more stable estimates. Obviously, each self-rated product would be rated by just a single judge. Despite these causes of concern, however, it would be useful for future research to investigate the utility of self-ratings, because individuals do have access to information about certain aspects of their own work that no one else has. For example, researchers could attempt to obtain comparative self-ratings in order to examine possible sources of bias in these ratings and to determine the correspondence between self-ratings and ratings by external judges. [A meta-analysis in the organizational literature has revealed an overall correlation of about 0.30 between self-ratings and ratings by others on a variety of dimensions not focused on creativity (Harris & Schaubroeck, 1988).]

Some theorists have proposed that creativity assessment is not just a way of identifying when creativity has happened, but rather is a crucial element of the overall process by which creativity happens. For example, Csikszentmihalyi (1999) argues that the assessment of a person's products or body of work is a part of a "creativity system." The system includes the individual who produces novel responses, the domain (or organized body of knowledge) that transmits information to the individual trying to work in that arena, and the field (the experts or gatekeepers in the

domain) who judge whether the individual's work is worthy of inclusion in the domain. In this systems perspective, creativity does not exist without this acceptance by the field. This view gives prominence to the validation stage of the creative process (see Figure 2.1), highlighting the importance of cycling back through communication to and validation by *external* sources following individual validation of one's own ideas.

Clearly, whether they see it as an integral part of the creative process or not, contemporary organizational researchers view the assessment of outcomes—work products and bodies of work—by external judges as essential to the empirical study of organizational creativity. We agree wholeheartedly.

METHODS FOR STUDYING CREATIVITY

In the previous section, we surveyed ways in which researchers can assess each of the elements of creativity—the necessary components within and outside the individual, creative cognitive processing, and the outcomes that result from that processing. There is a variety of methodologies for studying just how these components and processes result in creative outcomes. In other words, there are a variety of ways in which these basic assessment tools can be combined for investigating what causes creativity, what relates to it, and the mechanisms by which it occurs. In this section, we will give a brief overview of some of the major methodologies in creativity research, with illustrations from our own and others' research. [For good overviews of some methods for studying creativity, also see the chapters in the "Methods for Studying Creativity" section of the *Handbook of Creativity* (Sternberg, 1999).]

RESEARCH METHODS AND CRITERIA FOR SELECTING THEM

Table 2.2 outlines some of the major methods in psychological and organizational studies of creativity along with examples from the literature and notes on some of the prominent strengths and drawbacks of each method. The methods at the beginning of the table afford researchers greater levels of control over observations, while those toward the end of the table afford greater ecological validity—that is, closeness to the actual phenomenon as it unfolds in an individual's life or in an organization. We have tried to make it clear, from the examples that we have chosen, that each of the major categories of methods has been used in both psychological and organizational studies.

In characterizing the methods in Table 2.2, we focused on the major methodological questions that any organizational researcher should

Table 2.2 Some Methods for Investigating Influences on, Correlates of, and Processes of Creativity

METHODS & DESCRIPTION	EXAMPLES*	MOST USEFUL FOR	LEAST USEFUL FOR
Experiments: One or more independent variables are manipulated under controlled conditions, and effects on creativity are assessed using inferential statistics. Other measures, usually assessed by questionnaires, may be analyzed as moderators or mediators.	• Amabile, 1979 (P) • Amabile, 1985 (P) • Choi & Thompson, 2005 (P/O) • Hennessey, 1989 (P) • Paulus & Yang, 2000 (P/O) • Shalley & Perry-Smith, 2001 (P/O) • Zhou, 1998 (P/O) • Goncalo & Staw, 2006 (P/O)	• Determining causal influences on creativity (hypothesis testing)	• Adequately capturing the complexities of organizational creativity • Discovering new influences on creativity and new relationships between creativity and other variables (hypothesis generation) • Studying the creative process • Suggesting how the creative process might unfold over time
Single-time correlational studies: Two or more variables are assessed quantitatively, often through questionnaires (but sometimes through observations or archives), and statistical relationships are tested.	• Amabile, Conti, Coon, Lazenby, & Herron, 1996 (O) • Ford & Gioia, 2000 (O) • Oldham & Cummings, 1996 (O) • Perry-Smith, 2006 (O) • Ruscio, Whitney, & Amabile, 1998 (P) • Scott & Bruce, 1994 (O) • Shin & Zhou, 2003 (O) • Zhou, 2003 (P/O)	• Determining the relationships between creativity and other factors (hypothesis testing) • Hinting at possible causal influences on creativity	• Discovering new influences on creativity and new relationships between creativity and other variables (hypothesis generation) • Studying the creative process • Suggesting how the creative process might unfold over time • Determining causal influences
Longitudinal correlational studies: Two or more variables are assessed quantitatively, often through questionnaires or historical records, at different points in time. Statistical analyses examine the extent to which variables at one point in time predict variables at a later point in time, and/or the extent to which variables change over time.	• Amabile & Conti, 1999 (O) • Simonton, 1977 (P) • West & Anderson, 1996 (P/O)	• Determining the relationships between creativity and other factors (hypothesis testing) • More directly suggesting possible causal influences on creativity • Suggesting how the creative process might unfold over time	• Discovering new influences on creativity and new relationships between creativity and other variables (hypothesis generation)
Small-sample longitudinal case studies: Using case study interviews, ethnographic observations over time, or historical records, information is obtained on one or a few individuals, groups, or organizations. Records are examined for patterns that point toward possible influences on, correlates of, and/or processes of creativity.	• Gruber, 1981 (P) • Hargadon & Bechky, 2006 (O) • Sutton & Hargadon, 1996 (O) • Wallace & Gruber, 1989 (P)	• Discovering new influences on creativity and new relationships between creativity and other variables (hypothesis generation) • Studying the creative process over time • Capturing the complexities of organizational creativity • Suggesting possible causal influences on creativity	• Determining causal relationships between creativity and other factors (hypothesis testing) • Generalizing to other individuals, groups, or organizations (due to the small number of data sources).
Large-sample hybrid method: Real-time longitudinal data collected on large, representative samples of individuals and/or groups. Data include longitudinal experience-sampling reports of specific events, questionnaires, creativity assessments over time, interviews, and observations. Multiple levels of analysis used to analyze quantitative and qualitative data.	• Amabile, 2003 (P/O) • Amabile, Barsade, Mueller, & Staw, 2005 (P/O) • Amabile, Hadley, & Kramer, 2002 (O) • Amabile, Schatzel, Moneta, & Kramer, 2004 (P/O) • Kurtzberg, 2005 (P/O) • Kurtzberg & Mueller, in press (P/O) • Mueller, 2002 (P)	• Discovering new influences on creativity and new relationships between creativity and other variables (hypothesis generation) • Studying the creative process over time • Capturing the complexities of organizational creativity • Determining likely causal influences on creativity • Generalizing to other individuals, groups, or organizations • Illuminating the role of specific types of events, within particular organizational contexts	• Testing causal relationships

* "P" or "O" signifies whether the study was published in or aimed at the psychological (P) or the organizational (O) literature or both (P/O).

consider: Will the method make it possible to determine causal influences on creativity? Can hypotheses about relationships between creativity and other constructs be tested? Might interesting new hypotheses about causes and relationships be generated? Will the method be likely to provide insight into how the creative process operates? Will it allow a glimpse into the complexities of organizational creativity; that is, will it have good ecological validity? Will it allow the researcher to generalize results to other individuals, groups, or organizations?

But there are many other issues to be considered in choosing a methodology to study creativity. One important issue concerns the researcher's ability to understand the perceptions and thoughts of individuals involved in creative work. Here, no simple ordering of the methods in Table 2.2 is possible. Interestingly, experiments can often be quite useful as a means for assessing people's thoughts and perceptions in real time as they are doing (or have just finished) a creativity task. Case studies may also be quite effective in getting at psychological states, but only if they include interviews along with observations and/or archival data collection. Another important issue concerns the possibility for bias in the data. Researcher bias, the tendency for the results to be influenced by the researcher's expectations or mere presence, is likely to be low in well-controlled experiments, in well-constructed surveys, and in archival data sources (which can be used for single-time correlational studies, longitudinal correlational studies, or case studies). Respondent (or subject) bias, the tendency for the results to be influenced by what respondents think is expected or by how they wish to appear to the researcher, is likely to be low in well-controlled experiments and archival data sources; however, it may be a problem in surveys. Both forms of bias can be a serious problem in observational and interview methods, which are most common in case studies.

Clearly, each methodology has its strengths and its drawbacks, forcing researchers to make tradeoffs. Generally, these tradeoffs can be made by considering the nature of the research question(s), the methods that others have used to address those questions (suggesting gaps that might be filled), the methodological strengths of the researcher (and the desire to expand those strengths), the availability of research participants and data of various kinds, and the desired publication outlet or audience for the research. Ultimately, our understanding of creativity will be best served by a number of careful researchers addressing important questions using a variety of methods—and by good theory building and theory testing that attempts to integrate and make sense of the findings.

We will illustrate the major types of methods for studying creativity by describing studies relevant to a seemingly simple question: What effect, if any, does evaluation have on creativity? Most of the studies that we will describe come from our own program of research (carried out with many collaborators over the past 30 years). Because we have not used case studies as a research tool, that example comes from another pair of researchers. Note that only the first example, the experiment, was designed solely to examine evaluation and creativity.

Example 1: An Experiment

The laboratory experiment examining the effects of expected evaluation on creativity (Amabile, 1979) used college students as subjects. In individual sessions, each subject was given an identical set of art materials and asked to use those materials to make a paper collage. Some of the subjects were randomly assigned to evaluation expectation conditions, where they were told that expert artists would be making a detailed evaluation of their collages, "noting the good points and criticizing the weaknesses." They were also told, "And since we know that our subjects are interested in how they are evaluated, we will send you a copy of each judge's evaluation of your design in about two weeks." Other subjects were assigned to nonevaluation conditions, where they were told that the focus of the study was not the collage itself but the effect of the collage-making activity on their subsequent mood; this was done to negate any assumptions they might have made about their collages being evaluated. After the study was completed, the consensual assessment technique was used to provide outcome data. Expert judges independently rated the creativity of the collages, without knowing the experimental condition or identity of the subjects who made the collages. The results clearly showed a negative effect of expected evaluation on creativity, with generally parallel effects on subjects' intrinsic motivation. (The only exception was a special evaluation condition where subjects were told exactly what to do in their collages to get a good evaluation from the judges. However, because these subjects were essentially given an algorithm for making a "creative collage," their task was no longer truly open-ended—one of the requirements of the basic definition of true creativity.) Although the essential finding of a negative effect of expected evaluation on creativity has been replicated by other researchers (e.g., Hennessey, 1989), some studies have found that certain types of evaluation can, under certain conditions, support creativity (e.g., Shalley, 1995; Shalley & Perry-Smith, 2001).

Example 2: A Single-Time Correlational Study

Although the results of the evaluation experiment were clear, they cannot be used to predict the extent to which expected evaluation might affect creativity in organizations. Is there, in fact, a measurable relationship between expected evaluation and creativity in organizations? If so, is it indeed a negative relationship? Or, might any connection between the experimental results and organizational work be negated by the obvious differences between real organizational behavior and a laboratory experiment on college students doing an essentially meaningless task for an unknown experimenter? To examine the effects of expected evaluation, as well as many other aspects of the work environment, we conducted a single-time correlational study in a large high-technology organization (Amabile et al., 1996). The primary data collection instrument was the KEYS questionnaire (Amabile, 1995), which assesses employee perceptions of several different aspects of the work environment as well as overall creativity in the work. We asked middle-level R&D managers in the company to nominate the most creative and least creative projects with which they had been associated over the previous three years. We then asked them to complete KEYS twice, once describing the work environment of the most creative project and once describing the work environment of the least creative project. The creativity nominations were later validated by higher-level managers in the company, who were unaware of which projects had previously been nominated as high or low in creativity for our study. The work environment descriptions on KEYS were also validated by asking other people on the most creative and least creative projects to fill out KEYS just once to describe the work environment surrounding their projects. These project team members did not know that their projects had been identified as particularly high or low on creativity.

We found that the high-creativity projects scored significantly higher than the low-creativity projects on several KEYS scales. Of particular interest here is the Organizational Encouragement scale, which includes several items concerning evaluation: "Performance evaluation in this organization is fair;" "Ideas are judged fairly in this organization;" "Failure is acceptable in this organization, if the effort on the project was good;" and "People in this organization can express unusual ideas without the fear of being called stupid." In addition, the low-creativity projects scored significantly higher than the high-creativity projects on the Organizational Impediments KEYS scale. That scale also included items on evaluation: "People are quite concerned about negative criticism of their work in this organization;" "People are too critical of new ideas in this organization;" and "Destructive criticism is a problem in this organization." Although, obviously, the form and meaning of evaluation in this correlational study were quite different from the form and meaning of the evaluation manipulation in the experiment, the overall result seems to be the same: Expecting critical evaluation from external sources is associated with lower creativity.

Example 3: A Longitudinal Correlational Study

Once we knew that evaluation did indeed seem to play a role in creativity in a real organization, we set out to discover something about the mechanisms by which the evaluative environment in an organization might change over time and whether there would be commensurate changes in creativity. A dramatic change in a high-technology organization we had studied earlier allowed us to begin this discovery process with a longitudinal correlational study (Amabile & Conti, 1999). As part of that earlier study, we had done a broad KEYS assessment of the current work environment across the firm. Several months after we had completed that data collection, the organization announced a major downsizing of the workforce. It seemed likely that such a major organizational event might lead to shifts in the work environment—including the evaluative environment—and, as a consequence, shifts in creativity itself.

We reentered the organization and administered KEYS at three additional points in time; we also conducted interviews with a subset of the people who completed the KEYS questionnaire. We discovered that, like several other aspects of the work environment, Organizational Encouragement declined significantly during the downsizing (relative to the predownsizing baseline). Although it recovered somewhat when the downsizing ended, it was still marginally lower than baseline even five months after the end of the downsizing. Moreover, Organizational Impediments increased significantly during the downsizing; by the time the downsizing ended, however, they had returned to baseline. Our statistical analyses revealed that the impact of downsizing on declines in perceived creativity was completely mediated by the changes in the work environment, including the evaluative environment as assessed by items on the KEYS instrument. Thus, although this study's design did not allow for definitive conclusions about causality, it allowed us to move one step beyond the single-time correlational study. Here, the longitudinal design allowed us to glimpse possible causes of changes in organizational creativity over time, including changes in the evaluative environment.

Example 4: A Case Study

We, ourselves, have not done case study research designed to examine evaluation processes in organizations and their possible relationship to creativity. The closest case study that we have found was published by Sutton and Hargadon (1996). These researchers did an ethnographic study of brainstorming sessions in a major and highly successful industrial design firm (IDEO), closely observing a large number of such sessions over a fairly long period of time. This study is relevant to questions about evaluation in a broad sense, because one of the chief characteristics of brainstorming is the guideline to suspend judgment during idea generation, avoiding all evaluation of ideas until later (Osborn, 1957). The study is relevant to questions about creativity in a broad sense as well; the motivating research question was, "How does IDEO innovate routinely?" The study, which did not examine a specific connection between evaluation and creativity, did reveal that brainstorming served a number of useful organizational functions. We believe that, in general, case studies can be a useful starting point for research programs on little-studied, little-understood phenomena—including particular questions about creativity in organizations.

Before turning to the fifth methodology and its example, we consider some of the challenges facing research on creativity in organizations.

CHALLENGES OF ORGANIZATIONAL CREATIVITY RESEARCH AND SOME WAYS TO MEET THEM

On the basis of our own research experience, and our reading of the literature, we have come to favor hybrid methodologies for studying creativity. These are methods that use a variety of approaches to examine people's thoughts, feelings, reactions, and performance, in the context of a given work environment and a given set of individual skills and styles. We believe that such methodologies are the best way to begin to understand the complex phenomenon of organizational creativity. We also believe that it is time to pay more attention to the specific ways in which work environments support or impede creativity, something that only a few researchers (e.g., Scott & Bruce, 1994) have attempted to do. In essence, it is time to illuminate the particular events and patterns of events that might lead to differential levels of creativity in organizations. Clearly, this is an immensely complex task. Although psychological and organizational theories can help us identify possible influences, careful and creative exploration will be required to discover previously unsuspected forces impacting organizational creativity. To truly understand the complexities of creativity in organizations, it will be necessary to combine the advantages of rigorous quantitative methods (such as measures from survey instruments) with the power of the rich and detailed (if messy) information that can be gained from carefully collected and analyzed qualitative data.

In addition, we believe that it is time for organizational creativity researchers to take on two particular challenges: the multilevel nature of organizational phenomena, and temporal issues. Compared to creativity in the visual and literary arts, which often takes the form of a single individual working on one particular product at a time, creativity in organizations is generally a multiperson, multitask affair. Within organizations, several levels of analysis must be considered: events involve individuals, individuals generally work in teams or groups, teams are embedded within companies, and companies are embedded within industries; creative outcomes can be assessed at any of these levels. Factors at each of these levels—from particular events on particular days, to industry dynamics—can affect the creativity of outcomes. Thus, multilevel designs and analyses are required. Such analyses require large samples.

Moreover, creative ideas and products often evolve over long periods of time in organizations, and influences on creativity might only reveal themselves through a temporal lens. Studying creative processes and influences over time is the only way, ultimately, to examine the dynamic evolution of creativity, as well as possible reciprocal influences among the elements outlined in the componential theory. All of this, of course, complicates the researcher's task immensely. Perhaps for this reason, few studies of organizational creativity attempt to examine multiple levels simultaneously, and very few look at creative work and its potential influences over time.

Example 5: The Large-Sample Hybrid Method of the Work Diaries Study

We took on these methodological challenges by creating a large-sample hybrid method for our Work Diaries Research Program (also called the T.E.A.M. Study, for Team Events And Motivation Study). In this research program, we examined creativity in situ, as it unfolded in different organizational contexts over long periods of time. We attempted to "trap creativity in the wild," observing it on the days that it happened, and then explaining its appearance by looking at the events, patterns of events, and work environment influences that surrounded and preceded it. The central data from this research program consisted of daily reports from 238 individual participants working in 26 project teams in

7 companies within 3 industries. Top management within each of the companies had identified each of these projects as requiring creativity for successful completion. Using a modification of the Experience Sampling Methodology (Csikszentmihalyi & Larson, 1987), we studied each of these teams daily over the entire course of their projects (or a discrete project phase). On average, teams were in the study for 19 weeks. Every work day, each individual member of each participating team received and privately completed an e-mailed Daily Questionnaire that included a number of quantitative items such as the number of hours they had spent on the project that day, the number of team members they had worked with, and Likert Scale ratings of their work environment perceptions, work motivation, work creativity and progress, affect, and assessments of the team's work that day. With a response rate of 75%, we collected nearly 12,000 Daily Questionnaires. Our data collection covered several calendar years.

Information on the events unfolding in the work of these individuals, teams, and organizations came through a narrative Event Description section at the end of each Daily Questionnaire. There, participants were asked to "Briefly describe one event that occurred today," with instructions to write a concise, specific account of any event that stood out in their mind from the day. They were encouraged to report any events that were in any way relevant to the project, their own work or feelings about the project, or their team's work or feelings about the project. They were told that these events could be drawn from private cognitive events, interpersonal events, task or project events, events occurring within the organization, or even events involving individuals or institutions outside the organization. Our aim was to obtain broad, representative samples of everything that might influence or give evidence of creativity in the work of our participants. The purpose was to enable both hypothesis testing and exploratory hypothesis generation about a broad range of antecedents, consequences, and processes of creativity—including evaluation.

The Work Diaries Study included assessments of each element of the componential theory of creativity (see Table 2.1). For this reason, in addition to the Daily Questionnaires, we also used longer questionnaire instruments to obtain single-time or periodic measures of the work environment, creativity and other aspects of performance, characteristics and skills of the individual participants, and characteristics of the team and the project. Domain-relevant skills were assessed by simple items on a biographical questionnaire concerning participants' education and experience levels. Two aspects of creativity-relevant processes were

measured: cognitive style by the Kirton Adaption-Innovation Inventory (KAI) (Kirton, 1976), and personality by the NEO (Costa & McCrae, 1985). We assessed intrinsic and extrinsic motivation both as a stable trait, using the Work Preference Inventory (WPI) (Amabile, Hill, Hennessey, & Tighe, 1994) and as a daily state, using Likert Scale items on the Daily Questionnaire. Work-environment perceptions were assessed daily with Likert Scale items on the Daily Questionnaire, but more detailed assessments were obtained from the validated KEYS instrument (Amabile, 1995) administered three times during the study. Other aspects of the work environment, stemming from characteristics of the team and the project, were assessed with periodic questionnaires completed by the team leaders and team members.

As a measure of creative cognitive processing, we used coder-identified segments from the daily Event Descriptions. Our coding scheme defined creative thought as any of the following: (a) a discovery, insight, or idea; (b) the act of searching for a discovery, insight, or idea; (c) solving a problem in a nonrote way; or (d) the act of searching for a problem solution in a nonrote way. Trained coders, who were not familiar with the research participants or companies, were able to reliably identify instances of creative thought in the Event Descriptions. (See Amabile et al., 2005 and Amabile, Mueller, & Archambault, 2003a, 2003b for details on the coding methodologies used in the Work Diaries Research Program.) Thus, for each daily Event Description from each individual, we had a frequency count of the individual's creative thought instances reported that day—a quasi-behavioral measure of creative thinking.

We obtained measures of creative outcomes primarily through the standard consensual assessment technique: monthly peer ratings of each individual's creativity, and monthly expert ratings of each project's creativity. Importantly, the peer ratings correlated significantly with the quasi-behavioral frequency counts of creative thought instances identified in the individuals' diary narratives. In addition, at the end of their projects, the team members gave a final, overall assessment of the creativity of the project. Finally, we obtained daily and monthly self-ratings of creativity.

Despite all of these quantitative measures, some of the richest and most illuminating data come from qualitative sources. Shortly after completing data collection on each of the 26 teams, we wrote a detailed research case study recording basic background information on and our own impressions of the company, the team, the project, the individual team members, the team dynamics, and the major events that seemed

to impact the team during the project. Information for these cases came from many sources, including the four in-person meetings we had with each team, meetings we had with company executives, the private meetings we had with team leaders and some team members, and the frequent telephone calls and e-mails between us and the participants. Perhaps most importantly, we have read and re-read the narrative Event Descriptions to identify events, influences, and dynamics that might be particularly important for understanding creative work in organizations. Our ultimate aim is to present a picture of creativity (and other aspects of organizational life) painted with both our statistical analyses and the human stories told in our participants' own words.

We have already conducted a number of studies on the Work Diaries data. Here, we will briefly describe two. Because, in reading the Event Description narratives, we were struck by the frequency and intensity of emotion expressed, we decided to try identifying the events that made the difference between the best days—those of the highest positive affect, and the worst days—those of the highest negative affect. This study revealed that evaluation and feedback were among the most prominent differentiators (Amabile, 2003). Receiving positive recognition or feedback frequently induced joy, and receiving criticism or negative feedback frequently induced anger, fear, or sadness.

It was clear that work evaluation—including seemingly minor, informal comments—evokes affect in organizations. The question remained, however, as to whether and how affect might relate to creativity in organizations. We investigated this question in a subsequent study, using multilevel statistical models to analyze three measures of affect (daily self-ratings on Daily Questionnaire scales, coder-rated mood in the diary narratives, and coder-rated discrete emotions in the diary narratives), the measure of coder-identified creative thought, and the peer ratings of creativity (Amabile et al., 2005). Overall positive mood on a given day (as well as the specific emotion of joy) was positively related to creative thought that day; anger, fear, and sadness were negatively related. The relationship was a simple linear one. Moreover, positive affect on a given day predicted creativity the next day and (to some extent) the day after that, even controlling for affect on the subsequent days. Also, self-rated daily positive mood over a given month was positively related to peer-rated creativity that month. Thus, the study provided strongly suggestive evidence that positive affect, which can be influenced by evaluation, is an antecedent of creativity in organizations. It also suggests that the creativity-relevant cognitive processes set in motion by positive affect can

incubate over time to yield a creative response. Finally, detailed qualitative analysis of the diary narratives reporting creative thought events revealed that affect is also a consequence of creativity. By far, the emotion most frequently evoked by solving a problem or coming up with an idea was joy.

Figure 2.2 summarizes these findings as an elaboration of part of the componential theory of creativity. The elaboration goes beyond earlier presentations of the theory in three ways. First, it includes affect and the events in the daily work environment that can induce affect. Second, it proposes a new indirect link in the theory: how the work environment can influence creativity-relevant processes, which, in turn, influence creative responses. Third, it proposes a feedback loop from creativity back to affect.

Not surprisingly, the data collection and analysis effort in our hybrid-method research program was enormously labor intensive, expensive, and time consuming, requiring the collaboration of several academic researchers and industry practitioners. (See Amabile, Patterson, Mueller, Wojcik, Odomirok, Marsh, & Kramer, 2001 for a description and analysis of the early stage of this collaboration.) Nonetheless, we believe that the effort resulted in a rich, unique database that has yielded important insights into organizational creativity (and other organizational processes), and still has more to yield over the next several years. Also, we believe that future studies by other researchers, using other hybrid methods, could do much to provide the additional elaborations and corrections to existing theory that will be necessary to truly advance our field.

CONCLUSION

In describing our Work Diaries Study, we are not suggesting that all organizational creativity researchers must take a similarly comprehensive approach. On the contrary, we would warn that such undertakings require enormous commitments of resources, time, and energy. We are suggesting, though, that researchers expand their thinking about the methods they might use in their research by considering methods that might traditionally be considered the province of another discipline or subspecialty. For example, although experiments and psychometric instruments (such as personality or cognitive style questionnaires) have been favorite tools of psychological researchers for decades, a few organizational scholars have begun making good use of them to understand causal influences on creativity (through experiments) or the role of individual-difference factors (through psychometric tools). In addition, we are recommending

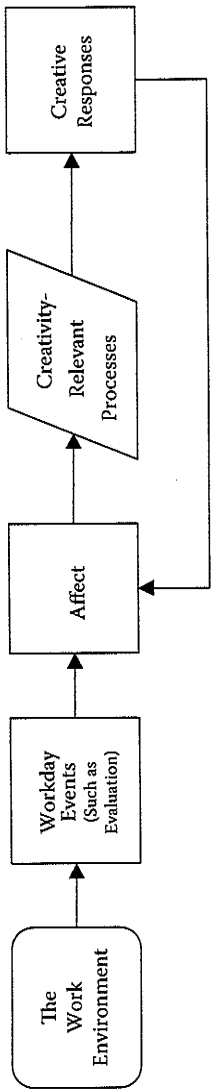

Figure 2.2 Affect: A recent elaboration of part of the componential theory of creativity. Note. Based on "Affect and Creativity at Work," by Amabile et al., 2005, *Administrative Science Quarterly, 50*, p. 392.

that organizational scholars begin to adopt multilevel methods to enable them to truly understand creativity in context, and longitudinal methods to enable them to discover how organizational influences on creativity play out over time. To the extent possible, it will also be important to expand our methods to allow simultaneous exploration of the various elements of creativity specified in the componential theory, and how they might interact dynamically to form a creativity system.

Ultimately, it is important to combine a variety of methodological approaches—not necessarily in the same study, as we have done with the Work Diaries Research Program, but at least sequentially. The principle of triangulation is no less applicable to organizational studies than it is to the natural sciences. It is only by taking different methodological viewing angles on a particular research question that we can overcome the blind spots of any one method and capitalize on the focal lens of each. As results from different methods converge, we will become more confident in painting a comprehensive, detailed picture of creativity in organizations—how it happens, what influences it, what its consequences are, and how we might get more of it. These insights will be useful not only to scholars interested in creativity, but to scholars and practitioners concerned with the broader issues of individual, group, and organizational performance. We cannot pretend to understand excellence in organizations or the people who work within them unless we understand how they invent, explore, and create things that have never existed before.

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CHAPTER 3

"Organizing" Creativity Research Through Historical Analysis of Foundational Administrative Science Texts

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INTRODUCTION

Evolutionary models have a prominent history in theorizing related to creativity and social change. Donald Campbell (1960, 1965) is generally credited as the first to apply Darwinian concepts related to variation, selection, and retention (VSR) processes to better understand complex dynamic interactions among established knowledge, social convention, and new ideas. Many prominent psychologists such as Simonton (2000), Csikszentmihalyi (1988), and Gardner (1993) have advocated this approach to understanding creativity, and Campbellian reasoning has had a substantial impact on theories of stability and change in the administrative sciences (Baum & McKelvey, 1999). Weick (1969, 1979) elaborated Campbell's ideas to create a general model of organizing that relies on describing interlocking enactment (variation), selection, and retention processes. Others have applied Campbell's and Weick's ideas more specifically to creativity in organizations (e.g., Ford, 1996; Staw, 1990).

One of the most important features of VSR models is the assertion that variations emerge from elements of previously retained solutions. Analogous to the process of combining elements of existing strands of previously selected DNA to create new offspring, the development of