At the societal level, creativity is essential for economic growth and social progress (Florida, 2004; Schumpeter, 1939). At the individual, team, and organization levels, it has also been argued that creativity is a key enabler and contributor to performance, entrepreneurship, growth, and competitiveness (Amabile, 1996; Oldham & Cummings, 1996; Shalley, 1991; Woodman, Sawyer, & Griffin, 1993; Zhou, 1998; Zhou & Shalley, 2008a). More important, this theoretical notion has started to receive encouraging, although at this stage still largely suggestive, support from empirical studies (Gilson, 2008).

In the past 10 years, there have been a number of comprehensive reviews concerned with creativity in organizations. Therefore, in this review, our goal is to categorize previous theorizing and research on creativity into three broad approaches that capture three types of psychological processes—motivational, cognitive, and affective—rather than to provide an exhaustive list of variables investigated to date and details of previous studies’ designs and findings. It is our hope that by organizing previous theory and research into these three broad categories that represent different aspects of psychological processes, we can assist researchers to delve deeper into an understanding of what factors promote or inhibit creativity, how they influence creativity, and, above all, why these effects occur. Toward this goal, we only review representative studies in each of the three conceptual categories and briefly mention some other studies so that interested readers can follow up on them if they wish. Selection criteria of studies included are (a) studies conducted in the workplace and (b) studies conducted in a controlled environment, such as behavioral laboratories, with the variables investigated having clear implications for creativity in the workplace. We refer interested readers to several comprehensive review articles, the majority of which have been published in the past few years: Anderson, De Dreu, and Nijstad (2004); Mumford and Gustafson (1988); Shalley, Zhou, and Oldham (2004); and Zhou and Shalley (2003), as well as a recently published volume devoted to covering theorizing and research on creativity in the workplace, *Handbook of Organizational Creativity* edited by Zhou and Shalley (2008b).

**BACKGROUND**

In this section, we present a commonly accepted definition of creativity and discuss its relationship with the concept of innovation. In addition, we briefly review the major research methods used in organizational behavior and organizational psychology for studying creativity.

**Creativity Defined**

*Creativity* refers to the production of new and useful ideas concerning products, services, processes, and procedures (e.g., Amabile, 1996; Oldham & Cummings, 1996; Shalley, 1991; Woodman et al., 1993; Zhou, 1998). With regard to workplace creativity, both novelty and usefulness are necessary.
conditions for something to be regarded as creative. If either one of them is absent, an idea, for example, would not be judged as creative. Therefore, an idea could be very unique and novel, but if it is not useful or feasible or does not have the potential to create value, it would not be considered creative. For example, if a NASA engineer working in the Mars program were to propose that in designing a spaceship that would be used to send astronauts to Mars, NASA should adapt the design of the spaceship used to send astronauts to the moon, it would be considered a useful idea. However, if the engineers were to propose that astronauts should be riding bicycles to Mars, this would not be considered a useful idea (although it is novel and unique), and indeed, it is a bizarre idea! In this regard, creativity research in organizational behavior and organizational psychology is different from the definition of creativity used by researchers in other fields.

Creativity can be exerted by individual employees or a team of employees working together. Employees holding virtually all kinds of jobs, in all functional areas and at all levels of the organization, have the potential to be creative at work (Amabile, 1996; Oldham & Cummings, 1996; Shalley, Gilson, & Blum, 2000, Woodman et al., 1993; Zhou, 1998), although there are individual differences in terms of the magnitude of their potential. Also, the level of creativity realized can vary from something that is novel yet somewhat incremental to what may already be known to exist to something that is a radically new and different idea, product, or process. A related concept is innovation. The primary difference between definitions of creativity and innovation is that whereas creativity emphasizes the production of new and useful ideas by individuals and teams, innovation emphasizes the implementation of new ideas or practices in a unit or throughout an organization. For example, the Six Sigma program was the result of creativity at Motorola because it was created there. However, it was an innovation at General Electric because the original idea or program was created elsewhere (i.e., at Motorola), but General Electric implemented it throughout the company. As such, innovation can involve ideas invented outside of the focal organization, whereas creativity must involve the employees of an organization. In this sense, organizations that can effectively promote and use their employees’ creativity are said to do a better job of fully leveraging their employees’ capabilities and possess greater competitive advantage.

Research Setting, Design, and Measurement of Creativity

Researchers have primarily used laboratory experiments, quantitative field studies, and qualitative field studies to investigate creativity. Each of these is discussed in the following sections.

Laboratory research and creativity measurement.

One unique feature of experimental research on creativity is that the experimental tasks need to be complex and open ended rather than simple and algorithmic or with demonstrably right or wrong answers (Amabile, 1996; McGraw, 1978; Zhou & Shalley, 2003). Some examples of tasks that have been used in more than three laboratory studies that may have direct or indirect implications for creativity in the workplace include (a) Amabile's (1996) artistic, problem-solving, and verbal tasks; (b) Torrance's (1974) unusual uses task; and (c) problem-solving tasks specifically targeting commonly seen problems in the workplace, such as Shalley's (1991) memo task. Many studies using tasks in the first and last categories have followed Amabile's consensual assessment technique to evaluate the extent to which research participants' outputs are creative, whereas studies using tasks in the second category have used different criteria, which we discuss shortly.

Amabile and colleagues have used three types of tasks in their creativity research program: artistic tasks (e.g., making collages and paintings), problem-solving tasks (e.g., generating ideas for products), and verbal tasks (e.g., writing poems and stories; Amabile, 1996). These tasks had been used with schoolchildren, artists, college students, and MBA students. For example, Amabile (1979) conducted an experiment in which participants were asked to work on a collage task. The experimenter gave each participant a piece of cardboard, a bottle of glue, and colored papers and asked the participant to make collages. The creativity of the collages was then measured by following Amabile's (1979) consensual assessment technique, which is premised on an
operational definition of creativity—the extent to which an outcome resulting from working on a task is judged as creative by a panel of judges. The judges need to be capable of and appropriate for judging the particular task, and their ratings need to be reliable. More specifically, a panel of judges, who were artists familiar with making collages, independently rated the collages produced by the participants on several dimensions related to creativity, such as novelty of the idea, novelty of materials use, and complexity. A composite creativity score was then created by combining the normalized ratings on these dimensions, and an interjudge reliability index was calculated. Because the index showed satisfactory interjudge reliability (e.g., greater than .70), ratings by this panel of judges were averaged to create a creativity measure for each research participant.

In Torrance’s (1947) unusual uses task, research participants are asked to generate unusual uses for objects such as a brick, newspaper, tire, and hanger. Derived from the notion that divergent thinking and creativity are closely related (Guilford, 1956), researchers typically obtain a set of indicators to measure the participants’ creativity on the unusual uses task. These indicators are the same indicators used in ideation tasks and group brainstorming research (e.g., Paulus, 2008). They may include fluency (i.e., total number of nonredundant uses generated for the objects), flexibility (i.e., how many different categories of ideas are generated), elaboration (i.e., whether the ideas are well developed), and originality (i.e., the extent to which the ideas are unusual or statistically infrequent). Research participants’ responses are evaluated on all or a subset of these dimensions by a panel of judges. For each of these dimensions, the judges’ ratings are averaged if their reliability scores are satisfactory (e.g., greater than .70). Note that although this task allows for measures focusing on divergent thinking, verbal fluency is essential for demonstrating high levels of divergent thinking and creativity on this task. As such, this task implies that verbal fluency is a critical component of creativity, which is a rather narrow definition of creativity (Amabile, 1996). In addition, one might argue that the unusual uses task does not resemble the most commonly seen creativity in the workplace. Finally, although creativity is defined as

the generation of new and useful ideas, some of the earlier laboratory studies measured creativity in terms of verbal fluency (e.g., Torrance, 1974) and complexity (e.g., Amabile, 1979). The definition and operationalization of creativity need to be matched. We recommend that in designing future studies, researchers provide a clear rationale that justifies their measuring indicators of creativity other than those that closely reflect the definition of creativity (i.e., novelty, usefulness, and overall creativity).

However, some researchers prefer to use problem-solving tasks that closely represent commonly seen creativity in organizations, such as solving management problems (e.g., Shalley, 1991) and designing new products (e.g., Pearsall, Ellis, & Evans, 2008). For example, Shalley (1991) designed a memo task in which a series of human resource management–related problems are presented. Research participants are asked to play the role of the human resource management director and produce creative solutions to those problems. Following Amabile’s (1996) consensus assessment technique, a panel of appropriate judges (e.g., graduate students who have had significant management experience) is asked to rate the extent to which each idea or solution generated by each research participant is creative. If the judges’ ratings are reliable (e.g., greater than .70), the ratings are averaged across memos and judges to create an overall measure of creativity.

Sometimes, in keeping with the definition of creativity, researchers also ask judges to rate the extent to which the judges’ ratings on participants’ solutions to Shalley’s (1991) memo problems are (a) useful and (b) novel. The researchers calculate interjudge reliability of the usefulness ratings and the novelty ratings, respectively. If the reliability scores are greater than .70, they then take the average ratings across memos and across judges to create an overall usefulness score and an overall novelty score. Finally, because by definition creativity needs to be both novel and useful, the researchers multiply the usefulness and the novelty scores to obtain a creativity measure. This approach was used in Zhou and Oldham (2001).

Instead of calculating interjudge reliabilities alone, researchers sometimes also use a more rigorous approach by calculating both interjudge reliability and interjudge agreement. This is because interjudge
reliability reflects the extent to which the judges' ratings are consistent or parallel, and interjudge agreement indicates the degree to which the judges assign the same ratings to the research participants' responses (cf. Zhou & Shalley, 2003). Calculating both indices may reveal a more comprehensive picture of the compatibility of the judges' ratings than calculating any one of these indices alone. An illustration of using this approach can be found in Zhou (1998).

Laboratory studies are commonly used when researchers investigate effects of contextual factors on creativity or effects of the interaction between contextual factors and individual differences. To illustrate the laboratory design, let us take a close look at a study conducted by Zhou (1998). To save space and highlight the main issues concerning the laboratory experimental design, we focus on one main hypothesis tested in Zhou's study rather than reviewing all hypotheses and results in their complexity and comprehensiveness. Using the motivational approach to creativity, Zhou hypothesized that feedback valence and feedback style would interact to affect creativity in such a way that individuals would exhibit the greatest creativity when they received positive feedback delivered in an informational style and would demonstrate the least creativity when they received negative feedback delivered in a controlling style. Feedback valence is defined as the positive or negative outcome resulting from a comparison between an individual's creative output and normative or situational criteria. Feedback style is defined as the manner in which feedback is delivered: informational or controlling.

In a laboratory experiment using a $2 \times 2$ factorial design, Zhou (1998) manipulated feedback valence at two levels (positive and negative) and feedback style also at two levels (informational and controlling). Research participants were randomly assigned to the four experimental conditions (positive feedback delivered in an informational style, positive feedback delivered in a controlling style, negative feedback delivered in an informational style, and negative feedback delivered in a controlling style). They worked on the aforementioned memo task designed by Shalley (1991). Using the consensual assessment technique developed by Amabile (1996), Zhou asked three judges to rate the extent to which the solutions generated by the participants to solve the problems presented in the memos were creative. The reliability of the judges' ratings was .71 (Jones, Johnson, Butler, & Main, 1983; Shroit & Fleiss, 1979; Tinsley & Weiss, 1975), indicating that the judges' ratings were consistent and parallel. The agreement of the judges' ratings was also satisfactory, $\chi^2(1, N = 210) = 14.33, p < .05$ (Lawlis & Lu, 1972; Tinsley & Weiss, 1975). Thus, the interjudge reliability and agreement results showed that it was appropriate to average the judges' ratings to create an overall measure of creativity. Results obtained from a regression analysis using creativity measured after the participants had received their feedback (the main manipulation) as the dependent variable, and independent variables including feedback valence and style, supported the main hypothesis, stated earlier ($\Delta R^2 = .01, p < .05$).

As is seen later in this chapter, our review of the three approaches to creativity research (motivational, cognitive, and affective) suggests that laboratory studies have been used in much of the earlier (e.g., before 2000) research guided by the motivational approach. Although laboratory studies continue to be conducted, studies have more recently been conducted in field settings using correlational design. In addition, laboratory studies have been used in many studies influenced by the cognitive approach. Finally, although studies using the affective approach have used both experimental and correlational designs, it is interesting to note that with two exceptions (i.e., Amabile, Barsade, Mueller, & Staw, 2005; Madjar, Oldham, & Pratt, 2002), most studies demonstrating positive affect's relationship to creativity were conducted in the laboratory, whereas most of the studies showing facilitative effects of negative affect or joint effects of positive and negative affect (with the exception of Fong, 2006) have been conducted in field settings.

Certainly, whether one should use an experimental design in the behavioral laboratory, a correlational or a longitudinal design in organizations depends on the priorities and focus of the research, and it is a trade-off between being able to manipulate the variables in a clean fashion and establish causality and considerations of external validity (Zhou & Shalley,
2003). As a field of inquiry in organizational behavior and organizational psychology, the creativity research field is still young, with many interesting questions to be answered and much knowledge to be discovered (Shalley & Zhou, 2008). Consequently, we believe that a variety of research designs and methods, including experimental studies in the lab, field correlational or longitudinal studies, and even field experimental studies are all valuable.

**Quantitative field studies.** An increasing number of studies have been conducted in work organizations. These field studies have tended to be cross-sectional, correlational studies in that they typically use the survey method to collect data from employees and in some cases also supervisors. Creativity is usually the dependent variable in these field studies. It is typically measured by asking the focal employees' supervisors to fill out a survey that contains a creativity scale. To illustrate a typical quantitative field study design, let us take a close look at a study conducted by Oldham and Cummings (1996). Because our purpose here is to illustrate the field study design, instead of reviewing the full detail of the investigation we again focus on one of their main hypotheses. Using the motivational approach to creativity research, Oldham and Cummings (1996) hypothesized that creative personalities, job complexity, and supervision would interact such that when employees have more creative personalities, hold complex jobs, and receive supportive and noncontrolling supervision, they would exhibit the highest levels of creativity. The researchers asked employees to fill out questionnaires measuring their creative personalities, the complexity of their jobs, and their supervisors' support and control. These employees' supervisors filled out separate questionnaires in which they rated their employees' creativity. Regression results lent support to the hypothesis stated earlier ($\Delta R^2 = .05, p < .05$).

In field studies, the most commonly used scales for measuring creativity include Oldham and Cummings's (1996) 3-item scale (all items are listed in the Appendix in Oldham & Cummings, 1996); Scott and Bruce's (1994) 6-item scale (the entire scale is listed in the Appendix in Scott & Bruce, 1994); Tierney, Farmer, and Graen's (1999) 9-item scale (all items are listed in the Appendix in Tierney et al., 1999); and Zhou and George's (2001) 13-item scale (all items are listed in the Appendix in Zhou & George, 2001). These scales have usually shown satisfactory validity and reliability. For example, Oldham and Cummings reported a Cronbach's alpha of .90 on their scale, Scott and Bruce reported that the Cronbach's alpha for their scale was .89, Tierney et al. obtained a Cronbach's alpha of .95 for their scale, and Zhou and George obtained a Cronbach's alpha of .96 on their scale. Nonetheless, focused studies on scale development and comparison among the scales have been rare (Zhou & Shalley, 2003). When research samples are drawn from scientists and engineers working in the research and development function in organizations and when such data are available, archival data (e.g., number of patents obtained) have also been collected from participating companies' records. Similar to studies on other behaviors or behavioral outcomes in organizations, the variance ($R^2$) in creativity explained by many creativity studies has ranged from the low to mid-teens and in general has not exceeded .20.

One of the emergent issues in field research on creativity is whether measures of research participants' own personal assessment of engaging in creative activities would add value to creativity research. Some researchers have argued that the answer is affirmative because creativity is a process (Drazin, Glynn, & Kazanjian, 1999) and the focal individuals themselves are the first to be aware of their engagement in creative activities, whereas others such as supervisors and coworkers are likely to only notice and observe the individuals' creativity at later stages, when creative outcomes have been produced. As such, to fully understand the creative process, we also need to document how individuals assess and report their own creativity (Hocevar, 1981; Hocevar & Bachelor, 1989). Toward this end, several recent studies asked the focal employees to report their own creativity at work (Carmeli & Schaubroeck, 2007; Kark & Carmeli, 2008; Shalley, Gilson, & Blum, 2009; Zhou, Shin, & Cannella, 2008).

Compared with experimental studies conducted in the lab, field studies conducted in work organizations with actual employee samples have the potential to be
more generalizable and have greater external validity. However, studies conducted in field settings are by no means necessarily superior to experimental studies conducted in the lab. For example, because of constraints related to access, feasibility, and resources, most field studies have been cross-sectional. Usually, employees are invited to fill out questionnaires that contain measures of independent variables, and around the same time their supervisors are invited to fill out different questionnaires that contain ratings of their employees’ creativity (see Zhou & Shalley, 2003, for more detailed descriptions of field study design commonly used in research on creativity). Because of this cross-sectional design, many field studies cannot unequivocally determine direction of causality. For these reasons, researchers have recognized the need to conduct more longitudinal studies and field experiments. However, as Zhou and Shalley (2003) discussed, these more rigorous designs have been rare (see Amabile & Conti, 1999, and Amabile et al., 2005, for exceptions) because of resources and accessibility constraints.

Qualitative field studies. Although the vast majority of field studies documented in the literature have been quantitative studies, there have also been a few qualitative field studies, including studies conducted by Hargadon and Sutton (1997) and Hargadon and Bechky (2006). To illustrate, let us take a close look at a qualitative field study conducted at a design firm and reported in Hargadon and Sutton (1997). On the basis of their on-site observations, interviews, and archival data, these researchers developed a grounded theoretical model in which they described and explained how the design firm used its networks and organizational memory to design creative products. Taking advantage of its network positions resulting from serving clients in 40 industries and its organizational memory systems and routines, the firm acted as a technology broker by learning and transferring technology and knowledge from one place to another place where such technology or knowledge was considered novel and useful and by recombining known technology, knowledge, and materials in new and useful ways.

Because the creativity research field is relatively young (Shalley & Zhou, 2008) and because well-executed qualitative studies could generate frame-breaking and testable insights (Eisenhardt, 1989), more qualitative studies should be conducted to complement quantitative studies.

Note that in the laboratory experiments and quantitative field studies we have reviewed, the measurement of creativity is consistent with the definition of creativity as an outcome, not as individual differences or individuals’ potential to be creative. For researchers who wish to study creativity as individuals’ potential rather than as actual outcome or behavioral responses, there are several self-report scales for measuring the potential to be creative. For example, Gough (1979) developed the Creative Personality Scale, in which he used a set of adjectives to differentiate creative from noncreative personalities.

As another example, the Openness to Experience factor in the five-factor personality model (Costa & McCrae, 1992) may also be used to measure individuals’ creative potential. (See Vol. 2, chap. 5, this handbook.) We want to caution, however, that results concerning the correlations between each of the five factors (i.e., Openness to Experience, Conscientiousness, Agreeableness, Neuroticism, and Extraversion) in the five-factor personality model and creativity have been mixed. On one hand, in studies comparing artists with nonartists or scientists with nonscientists, among the five broad personality factors (not just one or two of their subcomponents), Openness to Experience was the factor that was most consistently related to creativity (Feist, 1998, 1999). Individuals high on Openness to Experience are those who are broad minded, curious, and untraditional. They are thought to be more flexible in absorbing information, combining new and unrelated ideas, and having a higher need to seek new experiences and perspectives. On the other hand, in studies on everyday employees (e.g., not artists or scientists) in work organizations, Openness to Experience was not directly related to creativity (e.g., George & Zhou, 2001). Interestingly, Feist (1998) showed that when comparing artists with nonartists, artists showed lower levels of conscientiousness than nonartists. In contrast, when comparing scientists with nonscientists, scientists showed higher levels of conscientiousness than nonscientists. In addition, compared with nonscientists,
scientists had higher confidence, which is a subcomponent of Extraversion.

Some researchers have looked at individuals' preferred problem-solving style as a predictor of how creative they would be (e.g., Jabri, 1991; Kirton, 1976, 1994). For example, Kirton's (1976) adaption–innovation theory posited that individuals have a preferred style of problem solving. He proposed a bipolar continuum of cognitive styles with adaptors and innovators located at opposite ends. Adaptors prefer to problem solve using known procedures and paradigms, whereas innovators prefer to take risks and violate traditional ways of doing things to develop unique solutions. As such, this scale provides a measure of individuals' problem-solving behaviors that are considered more or less creative, with the assumption that those who are more creative will be more likely to contribute to innovations.

Cross-level research design. In a recent discussion on future directions of research on creativity in the workplace, Zhou and Shalley (2008b) suggested that cross-level research is one of the most promising future research directions. For example, integrating previous theories and research concerning achievement orientation, trait activation, and team learning, Hirst, van Knippenberg, and Zhou (2009) developed and tested a cross-level model theorizing how and why (a) individual differences in goal orientation affected individuals' creativity and (b) goal orientation at the individual level of analysis and team learning behavior at the team level of analysis interacted to affect individuals' creativity. Their results showed (a) learning goal orientation was positively related to creativity; (b) learning goal orientation interacted with team learning behavior so that when team learning behavior was high, learning goal had a cubic relation with creativity in such a way that learning orientation had a stronger, positive relation with creativity at moderate levels than at lower or higher levels; and (c) approach goal orientation interacted with team learning behavior so that when team learning behavior was high, approach goal was positively related to creativity. The full cross-level interaction model explained 10% of the variance in creativity.

In sum, researchers have used laboratory studies, quantitative field studies, and qualitative field studies to investigate creativity, with each method having its strengths and weaknesses (see Zhou & Shalley, 2003, for a fuller discussion on this issue). As is the case for most research topics in organizational behavior and organizational psychology, the use of multiple methods would be beneficial. We now turn to a review of previous theorizing and empirical findings concerning creativity in the workplace by organizing creativity research into three broad approaches that represent three general types of psychological processes: motivational, cognitive, and affective approaches.

MOTIVATIONAL APPROACH

Amabile's (1996) componential theory of creativity highlights the role of motivation in enhancing or reducing individuals' creativity. (See also Vol. 3, chap. 3, this handbook.) According to this theory, for individuals to exhibit high levels of creativity, three components must be present: (a) The individuals should possess domain-relevant knowledge and skills; (b) they need to have creativity-relevant skills and strategies (these are a more narrow set of skills than is discussed later in this chapter under creative cognition); and (c) they need to be intrinsically motivated to work on the task. The third component, intrinsic motivation, is defined as the type of motivation resulting from individuals' interest and involvement in, curiosity about, satisfaction with, or positive challenge from the task itself (Amabile, 1996). Intrinsic motivation is said to be essential for creativity because without it, no matter how much knowledge or skills one possesses in a given field and no matter how skillful one is in thinking outside of the box and coming up with creative ideas, if one is not intrinsically motivated by the task, one simply will not engage and persist in creative activities. Thus, the componential theory sets the stage for investigating employee creativity taking a motivational approach, emphasizing the value of intrinsic motivation.

Among the three approaches used to investigate workplace creativity, the motivational approach has attracted the most research attention in organizational behavior and has resulted in an impressive body of knowledge (Shalley et al., 2004; Zhou & Shalley, 2003). Most studies that have taken a
A motivational approach to an understanding of creativity did not directly examine the relation between motivation and creativity (but see Shalley & Perry-Smith, 2001, and Shin & Zhou, 2003, for exceptions). Instead, they relied on the motivational approach to identify contextual factors that were theorized to either boost or restrict intrinsic motivation, which, in turn, facilitates or inhibits creativity. Cognitive evaluation theory is especially useful here.

According to cognitive evaluation theory (Deci & Ryan, 1980, 1985), whether a contextual factor boosts or diminishes individuals’ intrinsic motivation depends on whether this factor is informational or controlling. On one hand, when a contextual factor is informational, individuals are likely to feel competent and self-determining, and consequently their intrinsic motivation is likely to be high. On the other hand, when a contextual factor is controlling, individuals are likely to perceive that they are being pressured or constrained by external forces rather than being self-determining. Consequently, their intrinsic motivation is likely to be low. Thus, essentially, a motivational approach to creativity posits that contextual factors that are informational will enhance creativity, and contextual factors that are controlling will restrict creativity.

In addition to examining effects of contextual factors on creativity, some previous studies that took a motivational approach have also taken an interactional approach to an understanding of creativity by investigating effects of interactions between contextual factors and personal factors on creativity. One of the most comprehensive conceptual works that has articulated the interactional approach to creativity is by Woodman et al. (1993).

Woodman et al. (1993) argued that both contextual factors and individual differences factors affect employees’ creativity. They emphasized that instead of treating contextual factors and individual differences factors separately, to fully understand and predict creativity in the workplace researchers need to focus on the interactions between the two factors. The individual differences factors they reviewed include cognitive abilities or style identified by Carrol (1985, as cited in Woodman et al., 1993), such as associative fluency and figural fluency; personality traits identified by Barron and Harrington (1981), such as broad interests, attraction to complexity, and high energy; intrinsic motivation as emphasized by Amabile (1996); knowledge such as domain-relevant knowledge theorized by Amabile (1996); and positive or negative effects of previous experiences discussed by B. S. Stein (1989). For consistency with the literature and clarity of presentation, we follow previous work (e.g., Shalley et al., 2004) and use the term personal factors to represent characteristics and attributes of individual employees—including their dispositions (e.g., personality traits), abilities (e.g., cognitive abilities), and knowledge—and the term contextual factors to represent situational factors (e.g., leadership and management practices, relationship with supervisors, relationship with coworkers) that are present in individual employees’ work environment.

**Contextual Factors and Creativity**

Guided by the previously reviewed motivational approach to creativity, and often taking an interactional approach, researchers have investigated relations between various contextual factors and creativity, as well as effects of interactions between these contextual factors and personal factors on creativity. In the paragraphs to follow, we review some representative studies. The three scales mentioned earlier in this chapter, the Oldham and Cummings (1996) scale, the Tierney et al. (1999) scale, and the Zhou and George (2001) scale, are the most widely used scales for measuring creativity in research concerning contextual factors and creativity. Of importance, the studies regarding contextual factors and creativity mentioned in this section are concerned with creativity, not routine performance. This fact is evident in the theoretical arguments made in these studies—indeed, independent variables were chosen, and the relations among these variables were hypothesized on the basis of creativity theories. Indeed, empirical evidence has suggested that these independent variables differentially affected creativity and routine performance. For example, Oldham and Cummings (1996) demonstrated that the main and interactive effects of their independent variables (creativity-relevant personal characteristics, job complexity, noncontrolling supervision, supportive supervision) were different for their creativity measures and for their measure of routine performance.
Leadership or supervisory behaviors. One of the most salient contextual factors influencing employees’ creativity is leadership or behaviors exhibited by the employees’ supervisors (Amabile & Conti, 1999; Amabile, Conti, Coon, Lazenby, & Herron, 1996; Amabile & Gryskiewicz, 1989; Amabile, Schatzel, Moneta, & Kramer, 2004; Andrews & Farris, 1967; Frese, Teng, & Wijnjen, 1999; George & Zhou, 2001; Oldham & Cummings, 1996; Shalley & Gilson, 2004; Shin & Zhou, 2003; Stahl & Koser, 1978; Tierney & Farmer, 2002, 2004; see also chap. 7, this volume). The motivational approach to creativity suggests that when leadership or supervisory behaviors are informational, the employees’ intrinsic motivation is likely to be maintained or enhanced, and consequently, they are likely to exhibit high levels of creativity at work. In contrast, when supervisors’ behaviors are controlling, their employees’ intrinsic motivation tends to be diminished, and subsequently the employees are unlikely to exhibit high levels of creativity. For example, using hierarchical regression analysis, Shin and Zhou (2003) found positive relations between transformational leadership and creativity ($\Delta R^2 = .05, p < .01$). In addition, employees’ intrinsic motivation partially explained these positive relations. However, several studies showed that managers’ controlling behaviors were negatively related to their employees’ creativity, presumably via reducing the employees’ intrinsic motivation (Stahl & Koser, 1978; George & Zhou, 2001 [$\beta = -.28, p < .01$]; Zhou, 2003 [Study 1, $\Delta R^2 = .20, p < .01$; Study 2, $\Delta R^2 = .04, p < .01$]).

Coworker behaviors or influences. The motivational approach suggests that when employees are surrounded by coworkers whose behaviors are informational, the focal employees’ intrinsic motivation will be boosted, along with their creativity. In contrast, when their coworkers exhibit controlling behaviors, the employees’ intrinsic motivation and creativity will be lower. There have not been a large number of studies that have directly tested these ideas, and results from prior research have been mixed: Whereas some studies have yielded results consistent with these theoretical predictions (e.g., Amabile & Gryskiewicz, 1989; Cummings & Oldham, 1997; Madjar, Oldham, & Pratt, 2002; Zhou, 2003; Zhou & George, 2001), other studies have found nonsignificant results (e.g., George & Zhou, 2001; Van Dyne, Jehn, & Cummings, 2002), and still other studies have found results that seemed to be contradictory to arguments based on the motivational approach (e.g., Shalley & Oldham, 1997). It is possible that in studies in which no results or contradicting results were found, individuals did not have highly interdependent working relationships with their coworkers, thereby rendering coworker influences relatively nonsalient or unimportant. It is also possible that these studies did not measure individual differences and examine the interaction effects of individual differences and coworker influences. Future research is needed to investigate these possibilities.

Goals. The motivational approach would suggest that production goals would be controlling. Specifically, production goals could serve as an external constraint that pressures individuals to meet these goals, resulting in reduced intrinsic motivation and creativity. However, Shalley (1991) argued that depending on the type of goal assigned (i.e., production goal vs. creativity goal), a goal could have a positive effect on an individual’s intrinsic motivation and creativity. Specifically, she proposed that a creativity goal can direct one’s attention and help provide a standard so that an individual can judge his or her own performance. A creativity goal is a stated standard that an individual’s output should be creative or that an individual should attempt to engage in creative activities (e.g., playing with ideas, being flexible in their thoughts, widely scanning their environment). Therefore, the assignment of a creativity goal can help individuals to understand what is expected of them, so rather than constraining their intrinsic motivation and creativity, do-your-best and difficult creativity goals would inform participants of exactly what they should be trying to do and have a positive effect on their intrinsic motivation and subsequent creativity. A few studies have examined this issue, and they have found that it is the type of goals that are assigned that determine whether they are perceived as informational or controlling (Carson & Carson, 1993; Shalley, 1995). For example, Shalley (1991)
found that when either a do-your-best or a difficult productivity goal was assigned, this resulted in lower creativity. Conversely, in this same study, when a do-your-best or difficult creativity goal was also assigned, this resulted in higher creativity. Shalley (1991) reasoned that the creativity goal helps to motivate and focus individuals on the task at hand while disregarding any felt pressure when they also had a productivity goal. Finally, Gilson and Shalley (2004) examined customer service technician teams’ engagement in creativity processes at work. They found that the more creative teams were higher on shared goals for task accomplishment. These researchers argued that high levels of agreement among team members about what is important for their job can increase motivation, efficiency, and effectiveness.

Feedback and evaluation. Receiving and providing feedback and evaluation are a fact of life in organizations. A series of studies have examined effects of the expectation of evaluation and the type of feedback actually given (Amabile, Goldfarb, & Brackfield, 1990; Shalley, 1995; Shalley & Perry-Smith, 2001; Zhou, 1998, 2008; Zhou & Oldham, 2001). Following the motivational approach to creativity, informational evaluation or feedback should boost intrinsic motivation and creative performance, whereas a more judgmental or controlling evaluation should be detrimental for both individuals’ intrinsic motivation and their creativity. Research in this area in general has not measured intrinsic motivation, but the results have supported this view, with studies finding that controlling evaluations or feedback restricts creativity (Amabile, 1979; Amabile et al., 1990; Bartis, Szymanski, & Harkins, 1988; Cheek & Stahl, 1986; Szymanski & Harkins, 1992; Zhou, 1998), whereas informational evaluations or feedback seems to facilitate creativity (Shalley, 1995; Zhou, 1998; Zhou & Oldham, 2001). One study (Shalley & Perry-Smith, 2001) directly manipulated the informational and controlling nature of the evaluation expected to be received and actually included a measure of intrinsic motivation. Specifically, Shalley and Perry-Smith (2001) found that the creativity of individuals who anticipated a judgmental evaluation was significantly lower than that of those expecting a developmental evaluation in which experts would evaluate their work and provide suggestions for alternative approaches to consider in the future. However, they found no significant mediation for intrinsic motivation in the relation between expected evaluation and creativity. Shalley and Perry-Smith (2001) suggested that one possible reason for this is that high intrinsic motivation may be important for creativity but that to have a significant effect on creativity, it might need to exist along with other intervening variables. They proposed that future research should further examine this possibility as well as be open to considering other potential mediators.

Job complexity. Another contextual factor influencing employees’ creativity is the nature of the employees’ job. Motivationally, job complexity should facilitate creativity via maintaining or enhancing the job holders’ intrinsic motivation. Job complexity refers to the extent to which jobs are significant and identifiable, provide the employees with autonomy and feedback, and provide the employees with opportunities to use a variety of skills (Hackman & Oldham, 1980). Especially for employees who welcome challenges and strive to grow on the job (cf. Hackman & Oldham, 1980), high levels of job complexity are likely to lead to high levels of intrinsic motivation, which, in turn, leads to high levels of creativity. Although in most studies documented in the literature, intrinsic motivation was not measured and hence the mediating role of intrinsic motivation was not directly tested, the pattern of relationships between job complexity and creativity was consistent with the theoretical prediction that job complexity was positively related to creativity (Amabile & Gryskiewicz, 1989; Farmer, Tierney, & Kung-McIntyre, 2003; Hatcher, Ross, & Collins, 1989; Oldham & Cummings, 1996; Shalley et al., 2009; Tierney & Farmer, 2002, 2004). The pattern of results held regardless of how job complexity (e.g., self-reported vs. objective job complexity measures) or creativity (e.g., supervisory ratings of creativity, self-ratings of creativity, or the number of creative ideas that employees submitted to their organization’s suggestion system) was measured or operationalized.
Rewards. The effects of rewards on creativity have been rather mixed (Shalley et al., 2004). A direct application of the motivational approach to predicting the effects of rewards on creativity would suggest that when rewards are informational, they maintain or boost individuals’ intrinsic motivation and subsequently their creativity. In contrast, when rewards are controlling, they diminish individuals’ intrinsic motivation and subsequent creativity. However, whereas some prior studies have found detrimental effects of rewards on creativity (e.g., Amabile, Hennessey, & Grossman, 1986; Kruglanski, Friedman, & Zeevi, 1971), others have found facilitative effects (Eisenberger & Armeli, 1997; Eisenberger & Rhoades, 2001). Thus, it appears that the effect of rewards on creativity is more complex than previously thought. Whether rewards are interpreted by the focal employee as informational or controlling may be contingent on a host of other factors. Indeed, more recent studies have shown that rewards interact with other personal and contextual factors to affect creativity. For example, Baer, Oldham, and Cummings (2003) found that rewards interacted with cognitive style and job complexity to be related to creativity such that rewards were positively related to creativity when employees had an adaptive cognitive style and worked on simple jobs and were negatively related to creativity when employees had an adaptive style and worked on complex jobs or when employees had an innovative style (see Kirton, 1976, 1994, for a complete set of definitions and measurement of adaptive vs. innovative styles) and worked on simple jobs (overall model \( R^2 = .21, p < .01 \)).

George and Zhou (2002) found that rewards interacted with bad mood and clarity of feelings to be related to creativity in such a way that bad mood was positively related to employees’ creativity when rewards and clarity of feelings were both high (\( \Delta R^2 = .13, p < .01 \)). It would be worthwhile for future research to continue investigating under what conditions individuals will interpret rewards as informational versus controlling and how these interpretations affected their intrinsic motivation and subsequently their creativity.

In summary, because creativity is still a relatively young field of inquiry, continuing research using the motivational approach at the individual level of analysis is still likely to yield valuable insights into what factors facilitate or inhibit creativity and why these effects occur. Furthermore, research focused on the team level or cross-levels of analysis is likely to produce even greater insights, particularly because creativity research at the team level and cross-levels of analysis will inform researchers and practitioners of the unique antecedents and processes of creativity at those levels because individuals are embedded in the team and social contexts and because research at those levels of analysis has been rare. For a more detailed conceptual treatment of various multilevel models of creativity and ideas for future research using these models than what limited space allows us to do here, see Zhou and Shalley (2008b).

In addition to continuing multilevel (e.g., individual-, team-, and cross-level) research, future research focusing on the effects of motivation on creativity is also likely to benefit from conceptual advancement on whether intrinsic motivation includes different elements. For example, it may be productive to conceptually separate intrinsic motivation into multiple elements (e.g., enjoyment, mastery, curiosity, interest) and investigate how each of these elements influences the creative process (Gedo, 1997; Mumford, 2003).

Finally, although the motivational approach has already guided a relatively large body of empirical research on creativity, theoretical advancement in this area is still vibrant. For example, Unsworth (2001) developed a conceptual framework that attempts to unpack creativity into different types on the basis of the drivers for creative engagement (external vs. internal) and the type of problems (open vs. closed). Also, research has indicated that employees can accurately identify when creative activity is required by their job (Shalley et al., 2000) and that job-required creativity is an important proximal determinant of employee creativity (Shalley, 2008; Unsworth, Wall, & Carter, 2005). Relatedly, Gilson and Shalley (2004) hypothesized and found that the more teams believed their jobs required creativity, the more frequently the team members reported engaging in creative processes. Although many creativity studies have focused on jobs that require creativity, such as research and development
(e.g., Perry-Smith, 2006; Scott & Bruce, 1994), other studies have looked at jobs that did not necessarily require or expect creativity (e.g., Madjar et al., 2002). For example, Shalley et al. (2009) studied the drivers of creative performance for a broad range of jobs that varied in their level of complexity and need for creativity. Theorizing and research along these lines are very important and promising because they will help researchers answer questions for which we currently do not have answers or do not have satisfactory answers. These questions include: What motivates employees to find creative ideas during routine task performance that does not require creativity? What role does serendipity play in creativity? When does creativity happen when it is required, and when does it happen spontaneously?

COGNITIVE APPROACH

Cognition has played a central role in the study of creativity. To produce creative outcomes, it is commonly accepted that individuals need to engage in certain creativity-relevant skills and processes that have been termed creative cognition (Finke, Ward, & Smith, 1992; Smith, Ward, & Finke, 1995). Creative cognition as a construct covers a broad range of cognitive processes that can facilitate creativity. Although both Amabile’s (1996) and Woodman et al.’s (1993) models refer to cognitive skills or creativity-relevant skills as being important for creativity, the ones they refer to are included within the construct of creative cognition, with many more also elaborated on. For example, of the nine cognitive skills and abilities that Amabile mentions, most of them would be subsumed under divergent thinking, which is an important part of the cognitive activities needed for creativity but does not represent all the necessary activities. Convergent thinking, for example, is also very important for creativity. Therefore, we use the concept of creative cognition to discuss the cognitive view because it is most comprehensive in its coverage.

Creative cognition deals with the fundamental cognitive operations that can help produce creative thoughts. It begins with the premise that all individuals have the capacity to be creative. According to this approach, much of the observed differences in creativity can be explained by differences in individuals’ use and intensity of application of certain cognitive processes or combinations of processes, the capacity of memory systems, and the flexibility of stored cognitive structures (Ward, Smith, & Finke, 1999).

In attempting to produce creative work, individuals need to search within and across categories of knowledge for diverse information that can be used to creatively explore problems, link ideas from multiple sources, and seek out new ways of working on a task. Sometimes individuals need to recognize the relevance of old or known information to new problems and combine concepts to generate more complex ones. As such, creative cognition involves generating a number of ideas about problems or work processes, combining ideas, evaluating them as to their merit, and selecting those that need further consideration and elaboration. Conceptual expansion is one strategy that helps generate novel ideas by using different categories of knowledge to generate ideas and making remote associations between seemingly unrelated ideas (Leung, Maddux, Galinsky, & Chiu, 2008; Shalley & Perry-Smith, 2008; Ward et al., 1999).

A number of conceptual pieces have discussed the cognitive processes needed for creativity to occur (e.g., Amabile, 1996; Csikszentmihalyi, 1988, 1996; Drazin et al., 1999; Ford, 1996; Woodman et al., 1993). For example, Campbell’s (1960) evolutionary model of creativity proposed that creativity requires extensive trial and error and hard work. He argued that individuals have to generate multiple solutions to difficult problems and to do this they need to use a wide variety of approaches. As such, his model stressed the importance of variation in terms of ideas and the selective retention of promising ideas while culling out less desirable ones. The process of selective retention requires individuals to use what they know, in terms of their background, knowledge, and skills, to determine what ideas merit further consideration and which should be discarded.

Building on Campbell’s (1960) model, Simonton’s (1999) evolutionary theory of creative thinking proposed a process of variation and selective retention. Simonton proposed that variation primarily contributes to idea novelty, whereas the process of
selection primarily contributes to idea usefulness. His theory was focused more on variation than on selective retention because novelty is what distinguishes creative ideas from more routine ones. According to Simonton, although ideas initially occur within one individual's mind, as the individual tests ideas against relevant criteria for novelty and appropriateness or usefulness, they are shared with others. Additional variation and selection of ideas then occur as others have input as well.

Empirical research on creative cognition has focused on examining the specific cognitive operations or processes that people need to engage in on a variety of tasks that require some level of creativity. This work has been experimental in nature, with research examining the effect of certain subsets of creative cognitive processes (e.g., Basudur, Graen, & Green, 1982; Reiter-Palmon & Illies, 2004; Runco & Chand, 1995). For example, Mumford and his colleagues (e.g., Dailey & Mumford, 2006; Reiter-Palmon, Mumford, Boes, & Runco, 1997; Vincent, Decker, & Mumford, 2002) have conducted empirical studies to examine the cognitive skills needed to be able to find or construct problems, generate alternatives, and evaluate ideas. As an example, research on problem identification and construction has indicated that this is a critical process for creative problem solving. Specifically, some studies have found that problem construction is related to solution originality and quality and that the ability to construct problem solving effectively explains creativity over and above the contribution of intelligence (Okuda, Runco, & Berger, 1991; Reiter-Palmon, Mumford, & Threlfall, 1998; Smilansky, 1984). Recently, Yuan and Zhou (2008) found that when individuals engaged in variation, those who expected external evaluation generated fewer numbers of ideas. However, during selective retention, individuals who expected external evaluation performed better in improving idea appropriateness, and those who expected evaluation only during selective retention produced the most creative ideas. The effect sizes in their study ranged from .22 to .40.

Stages of the Creative Thought Process
A great deal has been written about the different stages of the creative thought process (e.g., Amabile, 1996; Koestler, 1964; Parnes, Noller, & Biondi, 1977; M. I. Stein, 1967). For example, Wallas's (1926) classic model described four stages of creative thinking: preparation (e.g., examination of the problem and goals for addressing it), incubation (e.g., suspending conscious work on the problem but unconsciously working on it), illumination (e.g., the solution presents itself—the aha effect), and verification (e.g., use of logic and knowledge to evaluate the idea and refine it so that it is an appropriate solution). Hogarth (1980) proposed four stages: preparation, production, evaluation, and implementation. Although there are slight variations in each of the different models of the stages of the creative thought process, they all include some identification of a problem or opportunity, gathering information, generating ideas, and evaluating ideas. As such, these models characterize creativity as involving an iterative process that can include reflection and action, experimenting, seeking feedback, and searching for new ways to do things. When individuals engage in the cognitive processes needed for creativity (i.e., creative cognition), this can help move an idea through the stages of the creative thought process, such as from generation to implementation (Ford, 1996; Shalley & Perry-Smith, 2008).

Regarding the specific stage of incubation, there has been some work that has tried to show its benefits and explore the theoretical reasons for how incubation works (e.g., Jett & George, 2003; Olton & Johnson, 1976; Segal, 2004). For example, Madjar and Shalley (2008) proposed that individuals’ focus of attention and experience of cognitive exhaustion may explain how multiple tasks, multiple goals, and discretion may effect incubation and subsequent creativity. Also, Elsbach and Hargadon (2006) suggested that breaks provide a time for nontaxing or mindless work in which the individual can think of non–task-related thoughts. They proposed that professionals’ creativity could be enhanced by designing workdays to include hours of cognitively challenging, high-pressure work interspersed with some hours of mindless work.

Personal Characteristics That Can Affect Creative Cognition
Some researchers have suggested that differences in how people approach problem solving can have an
effect on whether they engage in the cognitive processes necessary for creative performance (e.g., Jabri, 1991; Kirton, 1994). Some empirical studies (e.g., Tierney et al., 1999) have looked at the relationship between individuals' preferred cognitive style and creative outcomes and found that individuals with a more innovative style tend to be more creative than those with a more adaptive style. Furthermore, some studies have looked at the effect of the interaction between cognitive style and contextual conditions on employees' creative behavior (e.g., Baer et al., 2003; Miron, Erez, & Naveh, 2004; Scott & Bruce, 1994). For example, Baer et al. (2003) found a positive relation between extrinsic rewards and creativity for employees with an adaptive cognitive style who worked on relatively simple jobs. In this study, they also found a weak relationship between rewards and creativity for employees with an innovative cognitive style who worked on complex jobs and a negative relation for those in the adaptive style–complex job and innovative style–simple job conditions.

There is also research that has examined the importance of what individuals focus on when they are attempting to solve problems or generate creative ideas. For example, Friedman and Forster (2001) found that when individuals focused on potential gains versus losses, this increased the accessibility of unconventional ideas and led them to generate more creative ideas. Also, Kray, Galinsky, and Wong (2006) found that problem solving using counterfactual thinking (i.e., structuring thought around salient relationships and associations) helps on creative association tasks but harms performance on creative idea-generation tasks. Their findings are consistent with Peterson and Nemeth’s (1996) premise that cognitive styles can have a differential influence on problem-solving effectiveness depending on what is required by the task.

Also, a number of studies have examined personality factors that are related to an individual’s overall potential to engage in cognitive processes that lead to creativity (e.g., Barron & Harrington, 1981; Gough, 1979). For example, individuals who have more creative personalities tend to approach problems with broad interests and have the capacity to recognize divergent opinions. They are also self-confident, persistent in developing new ideas, and tolerant of the ambiguity that arises from competing viewpoints. Some studies have empirically supported the association between creative personality and creativity (e.g., Oldham & Cummings, 1996; Zhou & Oldham, 2001).

Some research has examined how individuals’ view of themselves or others’ view of them can translate to their being more creative. For example, Tierney and Farmer (2002, 2004) developed the construct of creative self-efficacy, which is the extent to which employees believe they have the ability to produce creative work, and found that creative self-efficacy was positively associated with creativity. Also, Farmer et al. (2003) examined the relationship between creativity and creative role identity, which is whether an individual views him- or herself as a creative person. They found that the highest level of creativity occurred when employees had a strong creative role identity and perceived that their organization valued creative work. Carmeli and Schaubroeck (2007) found that the perceived expectations of leaders, customers, and family were positively associated with employees’ self-expectations for creativity, and these self-expectations were associated with creative involvement at work. Relatedly, Thatcher and Greer (2008) found that when others (i.e., team members) know the relative importance of an individual’s identity, this positively relates to the individual’s creativity. They argued that when individuals feel known and understood, they are more likely to freely share ideas, leading them to be more creative. Finally, Janssen and Huang (2007) found that individuals’ differentiation from others in their team and organization may be a critical driver for generating new ideas for organizational change.

Creativity as Planned Action Versus Unconscious Thought Process

Research on whether individuals’ intention to be creative actually leads to creative outcomes has also emerged. In particular, Choi (2004) directly applied the theory of planned action (e.g., Ajzen, 1991) to creativity research in arguing that individuals’ subjective intention to be creative determines their actual creative performance. He found that individu-
als’ creative intention was positively related to their actual creativity.

Whereas research linking individuals’ intention to be creative assumes that creativity is the result of explicit and conscious decisions (e.g., Choi, 2004), other studies have focused on investigating the relations between unconscious thought processes and creativity (e.g., Dijksterhuis & Meurs, 2006; Zhong, Dijksterhuis, & Galinsky, 2008). For example, Dijksterhuis and Meurs (2006) maintained that whereas conscious thought tends to be convergent, unconscious thought tends to be divergent. This is because conscious thought may restrict individuals to a limited set of attributes that they consider to be relevant and at the same time takes them away from attributes that are seemingly less relevant and less obvious but are more likely to lead to novel responses. Alternatively, unconscious thought leads to less focused and more associative processes that allow individuals to access materials that are less obvious and less accessible. In other words, unconscious thought allows for greater divergent thinking. To the extent that divergent thinking leads to creativity (Guilford, 1956, 1967), it is likely that unconscious thought processes result in greater creativity than do conscious thought processes. In a series of experiments (Dijksterhuis & Meurs, 2006), research participants worked on experimental tasks in which they were asked to generate items according to three experimental conditions (i.e., generating items immediately after receiving instructions, generating items after a few minutes of conscious thought, and generating items after a few minutes of distraction during which time unconscious thought was theorized to take place). In the unconscious thought condition, participants were found to produce more associative and original responses than the participants in the other two conditions.

Social Side of Creativity

Recently, some work has started to explore different ways in which interactions with others can affect individuals’ creative cognition. We briefly discuss this research.

Social networks. Perry-Smith and Shalley (2003) focused on the social side of creativity by highlighting the importance of others to individuals generating ideas. They proposed that when individuals connect with others, build networks, and interact with those not in their own field, this can allow them to make novel combinations of ideas and ultimately be more creative. In a recent empirical piece, Perry-Smith (2006) examined the role of several social network parameters on research scientists’ creative performance. She found that weak ties seemed to facilitate the generation of alternatives and encourage autonomous thinking. Results of this study highlighted the importance of understanding tie strength and the interactive effects of position within the broader social environment and outside ties for creativity.

Finally, Zhou, Shin, Brass, Choi, and Zhang (in press) examined the influence of social networks and a personal value (i.e., conformity value) on employees’ creativity. They found a curvilinear relationship between the number of weak ties and creativity. Employees’ conformity value was found to moderate this curvilinear relationship, such that when conformity was low, employees exhibited greater creativity at intermediate levels of number of weak ties than when conformity was high.

Presence of creative role models. The presence of creative role models who can facilitate the observer’s acquisition of creativity-relevant skills and strategies has been examined in two studies. For example, using social cognitive theory (Bandura, 1986) to develop a social learning perspective, Shalley and Perry-Smith (2001) found that observing creative role models allows individuals to acquire the strategies and approaches that can enable them to be more creative in their work. Zhou (2003) found that the presence of creative coworkers positively affected individuals’ creativity when supervisors’ close monitoring was low (ΔR² = .16, p < .01, in Study 1, and ΔR² = .04, p < .01, in Study 2) or developmental feedback was high (ΔR² = .04, p < .01).

Multicultural experiences. Leung et al. (2008) proposed that exposure to multiple cultures in and of itself can enhance creativity. They argued that multicultural experiences can facilitate creativity in a number of ways. First, multicultural experiences can broaden the range of accessible ideas and concepts.
used in problem solving. Second, by having multicultural experiences, individuals may be better equipped to realize that the same form can have different functions and implications. Third, multicultural experiences can weaken and lead to questioning of established associations while increasing the individual’s willingness to seek out ideas from diverse outlets. Finally, multicultural experiences can build cognitive complexity. Thus, multicultural experiences can introduce individuals to a range of behavioral and cognitive scripts that enable the conceptual expansion process. In a series of studies, Leung et al. found that extensiveness of multicultural experiences is positively related to the use of creativity supporting cognitive processes (i.e., creative cognition) and creative performance. Furthermore, they found that the benefits for creativity of having multicultural experiences may depend on the extent to which an individual is open to the foreign culture.

Identity integration. Cheng, Sanchez-Burks, and Lee (2008) examined the effects of identity integration on creativity. When individuals perceived that two social identities they have are compatible, they had higher levels of identity integration and demonstrated greater creativity. More specifically, the researchers showed that (a) Asian Americans who had higher identity integration demonstrated greater creativity on a task in which they were asked to develop new dishes when both Asian and American ingredients were available to them and (b) female engineers who had higher identity integration were more creative on a product design task when female users were the target user group of the product. Presumably, individuals who have high levels of identity integration have access to multiple knowledge domains, which provides a relatively large variety of raw materials for creative idea production.

Cognition at the Team Level
Although cognition is generally an individual phenomenon, it is entirely possible that teams can engage in the cognitive processes needed to be creative. Despite the recognized importance of understanding team cognition as it relates to team creativity (Kurtzberg & Amabile, 2001), there has been very little work in this area. One notable exception is Shalley and Perry-Smith’s (2008) development of the construct of team creative cognition. In their multilevel conceptual article, they introduced the construct of team creative cognition, a shared framework for how to approach problems creatively, and emphasized how it develops and evolves from one team member to others. In particular, they proposed that the emergence of team creative cognition comes from particular ties outside of the team and the infusion within the team is determined by the member’s centrality in the team’s sociocognitive network.

Some researchers have examined teams’ overall engagement in creative processes at work (e.g., Gilson, Mathieu, Shalley, & Ruddy, 2005; Gilson & Shalley, 2004; Kazanjian, Drazin, & Glynn, 2000). Also, studies have examined how group processes and team climate can help facilitate engagement in cognitive processes needed for creativity (e.g., Amabile et al., 1996; Pirola-Merlo & Mann, 2004). For example, Leenders, van Engelen, and Kratzer (2003) studied new product development teams and found that a moderate frequency of communication was best for creativity because members could share their ideas and have a constructive dialogue while not being overloaded by the amount of information exchanged and still having the cognitive capacity to focus on the value of the information. As another example, Taggar (2002) examined the interaction between team members’ individual disposition to be creative (e.g., cognitive ability and personality dimensions) and team creativity-relevant processes (e.g., effective communication, addressing conflict) on the creativity of the teams’ products. The highest creativity was found in teams that had creative members and high levels of creativity-relevant processes.

There is also a large body of work on group brainstorming (e.g., Goncalo & Staw, 2006; Paulus, 2000; Paulus & Yang, 2000). Group brainstorming research focuses on ideational creativity, which involves the generation of novel ideas related to a particular problem (e.g., find new uses for an existing object, how to market a new product). Traditionally, this research has been conducted in the laboratory with groups given the rules for brainstorming (e.g., generate a large number of ideas, do not criticize ideas; Osborn, 1953). Creativity is expected to arise from the statis-
tical advantage of having a large sample of ideas and the combining of ideas to form new ones. One potential benefit of group brainstorming is that individuals are exposed to diverse and potentially new categories of knowledge that can be applied to the problem. Also, within categories of knowledge, ideas generated can stimulate others to think of related ideas that are new (Paulus, 2008). Although this group idea-exchange process is primarily a cognitive activity, group social interactions can inhibit its effectiveness. For example, motivation losses such as loafing or free riding can occur, as well as the coordination losses that can lead to production blocking.

A stream of research that has fascinated researchers for quite a number of years now is concerned with the relation between team diversity and creativity. Presumably, when team members have diverse backgrounds such as differences in age, gender, race, and educational specialization, the teams would possess a diverse set of information and benefit from the members’ differing perspectives and viewpoints, which, in turn, would lead to higher levels of team creativity. However, although not specifically focusing on team creativity as the outcome variable, a number of reviews of empirical studies have suggested that the relations between team diversity and team outcomes are more complex than previously thought (Jackson, Joshi, & Erhardt, 2003; Milliken & Martins, 1996; Williams & O’Reilly, 1998). Indeed, two recent studies that focused on team diversity and creativity did not find any main effects of team diversity on creativity (e.g., Pearsall et al., 2008; Shin & Zhou, 2007). Rather, whether team diversity facilitates or inhibits team creativity is likely to depend on context.

For example, Pearsall et al. (2008) examined effects of gender diversity on team creativity. They found that only when gender faultlines (i.e., attributes existing in teams that potentially divide them into subgroups; Lau & Murnighan, 2005) were activated did gender diversity negatively affect team creativity ($\Delta R^2 = .04, p < .05$). Pearsall et al. further demonstrated that the moderated, negative relation between gender diversity and team creativity was partially mediated by emotional conflict.

As another example, Shin and Zhou (2007) examined the relation between employees’ educational specialization heterogeneity and team creativity. Shin and Zhou proposed that transformational leadership is especially useful in creating a unified team identity, energizing teams, and helping teams to fully take advantage of the diverse information and knowledge they possess to work together and come up with new and useful ideas. Using data from 75 research and development teams from 44 companies, they found that when transformational leadership was high, the teams’ educational specialization heterogeneity was greater and the teams’ creativity was higher ($\Delta R^2 = .06, p < .05$).

Cross-Level

Hargadon and Bechky (2006) proposed a model of collective creativity in which the focus of creative problem solving can shift from individuals to interactions of a collective. They discussed how four different types of social interactions (i.e., help seeking, help giving, reflective reframing, and reinforcing) can lead to collective creativity by influencing comprehension of problems and generation of solutions that leverage the past experiences of this collection of individuals. As such, this is a cross-level model that describes how individuals’ creative cognition is influenced by the collective and at the same time may contribute to other individuals’ creative cognition in this collective.

In sum, cognition has been central to the study of creativity, and much work has used this approach. However, further research and theorizing on the important role of cognition in facilitating creative performance is warranted. In particular, more work is needed in the new and emerging area of how social identity and interactions influence individual and team creative cognition. Furthermore, as the Hargadon and Bechky (2006) model attests, more work at the team level and cross-levels of analysis would help to further extend our knowledge of creativity using a cognitive approach.

AFFECTIVE APPROACH

The third theoretical approach that has guided creativity research is the affective approach. There are three related concepts used by researchers in this
area: affect, emotion, and mood (George & Brief, 1992). Moods refer to generalized affective states that are temporary and fluctuating and do not have a clear target. Compared with mood states, emotion is stronger in magnitude and clearer in terms of a target or an exogenous factor causing it. Affect is a general term that typically includes both mood states and emotion. Earlier research tended to categorize affect, mood, and emotion into two dimensions: positive and negative. Consistent with this research tradition in the affect literature, initial sociopsychological research using the affective approach to understanding creativity conceptualized affect as having positive and negative dimensions and focused on the role of positive affect.

Positive Affect and Creativity
One of the leading researchers in this area is Isen, and much of her research concerning affect, divergent thinking, and creativity has used laboratory experiments in which positive affect was usually induced by showing the research participants a short film clip or by giving them small bags of candy. After showing the film clip for a few minutes, for example, the research participants were then asked to work on word association or insight tasks. In those experiments, Isen and her associates found that research participants in the positive affect condition produced more unique responses on unusual word association tasks (Isen, Johnson, Mertz, & Robinson, 1985) or were more likely to solve the functional fixedness problem presented in Duncker’s (1945) candle task (Isen, Daubman, & Nowicki, 1987). Although the candle task has a single demonstrably correct solution and it is thus straightforward to measure performance on this task, word associations were rated as unique or unusual if they were produced by a very small percentage of research participants (e.g., equal to or fewer than 2.5% of the participants).

Although in Isen and colleagues’ (Isen, Daubman, & Nowicki, 1987; Isen, Johnson, Mertz, & Robinson, 1985) experiments, positive affect was usually induced rather than directly measured, Amabile et al. (2005) conducted a diary study in which they directly measured positive affect by using self-reported items, such as being happy or satisfied with the team, which tapped the pleasantness dimension of affect (see Russell, 1980). They found that positive affect was an antecedent of creativity.

As Davis (2009) concluded in a meta-analytic review that focused on understanding the relationship between positive mood and creativity, the studies he selected to examine demonstrated that this relationship is context dependent. Notably, he found that compared with negative mood, positive mood fostered ideation ($d = 0.24$), which by emphasizing fluency, flexibility, and cognitive variation mainly contributes to the novelty aspect, instead of the usefulness aspect, of creativity. Because workplace creativity is defined as ideas that need to be both novel and useful, the extent to which what he concluded can be translated into an understanding of the relation between positive mood and workplace creativity remains to be investigated. Indeed, Davis also found that compared with negative mood, positive mood showed little advantage on a problem-solving task ($d = 0.02$; the effect size did not significantly differ from zero).

Negative Affect and Creativity
However, organizational life is not all positive and pleasant, and it is simply not realistic to expect organizational members to always be in a positive mood state. In fact, as convincingly argued by Anderson et al. (2004), there are numerous phenomena with negative connotations in organizational life, ranging from individual-level phenomena such as threats to job security and job dissatisfaction to group-level phenomena such as conflict to organizational-level phenomena such as budget deficiencies, shrinking market share, and pressures to restructure organizational processes. These negative events suggest that current ways of doing things no longer meet internal or external challenges. Therefore, creativity may be particularly needed at those negative moments. Although our knowledge concerning the relations between negative events and creativity is still quite limited, findings from a few initial studies are very interesting.

In particular, Zhou and George (2001) formulated and tested a voice perspective of creativity that theorized conditions under which job dissatisfaction led to creativity. According to this perspective, under
certain circumstances (e.g., continuance commitment and coworker useful feedback), dissatisfied employees may engage in creative activities as an expression of voice. Empirical results supported their theoretical predictions ($\Delta R^2$ ranged from .03 \([p < .05]\) to .08 \([p < .01]\)). This study broke new conceptual grounds not only because it was the first published study that theorized and tested a voice perspective concerning job dissatisfaction and creativity but also because it challenged one of the fundamental assumptions in the field of organizational behavior and organizational psychology: that job satisfaction is always desirable and, conversely, that job dissatisfaction is always detrimental for organizations.

Job dissatisfaction has both affective and cognitive underpinnings. So the next steps along this line of research would include studies that focus on each of these components separately. To begin, George and Zhou (2002) investigated when negative mood may be functional for creativity in the workplace. According to the mood-as-input model, individuals’ mood states provide them with information (e.g., Schwarz & Clore, 2003), and the significance and consequences of the information depend on the context (Martin & Stoner, 1996). Adapting this model to creativity research, George and Zhou theorized that under certain conditions, negative moods might foster creativity and positive moods might inhibit it. This is because employees’ work environment or context provides them with cues concerning their ongoing creative behaviors. These cues are valuable to them because when they are engaged in creative activities at work, they often have little objective information and have to decide for themselves when they have tried hard enough to come up with a new and improved procedure or put forth enough effort to come up with a new and better way of completing tasks. Consistent with these theoretical arguments, results showed that negative moods were positively related to creativity when perceived recognition and rewards for creativity and clarity of feelings (a meta-mood process) were high ($\Delta R^2 = .13$, \(p < .01\)). Additionally, results showed that under the same conditions, positive moods were negatively related to creativity ($\Delta R^2 = .09$, \(p < .05\)).

Relatively, De Dreu, Baas, and Nijstad (2008) demonstrated that negative mood did enhance creativity, but only when it was activating (e.g., angry). And, consistent with George and Zhou’s (2002) argument that under certain conditions, individuals experiencing negative mood are likely to discover an unsatisfying state of affairs, put forth great effort in trying to come up new and better ways of doing things, and be persistent until they come up with truly new and useful ideas, De Dreu et al. found that negative mood enhanced creativity by increasing persistence. In addition, they showed that positive mood also enhanced creativity, again only when it was activating (e.g., happy). Moreover, different from the mechanism through which negative mood facilitated creativity, positive mood enhanced creativity by boosting cognitive flexibility.

In a meta-analysis concerning relations between moods and creativity, Baas, De Dreu, and Nijstad (2008) found that compared with mood-neutral control participants, positive moods were more related to creativity ($r = .15$). However, there were no significant differences between negative moods and mood-neutral control participants ($r = -.03$) or between negative moods and positive moods. Overall, they concluded that “the mood–creativity link is better understood as a function of various aspects of specific moods than simply in terms of hedonic tone or level of activation” (Baas et al., 2008, p. 795).

Thus, instead of prolonging the debate on whether positive mood or negative mood enhances creativity, and whether positive mood enhances creativity to a greater extent than negative mood or vice versa, it would be more productive for future research to at least take a two-dimensional view of mood: hedonic tone (positive vs. negative moods) and activation (activating vs. deactivating). It would also be more productive to examine specific aspects of moods.

Finally, the aforementioned results involving negative mood also suggest that future research needs to investigate effects of moods in organizational contexts and use samples from employees working in various functional areas in organizations. Much of the research conducted in the behavioral laboratory, especially studies focusing on effects of positive affect on creativity, has differed from characteristics of field settings in a few ways. First, the lab research used insight tasks such as Duncker’s
(1945) candle problem or remote association tasks (e.g., Mednick, 1962) in which there is one demonstrably correct answer (Baas et al., 2008). In contrast, in organizations creative ideas and solutions often do not have a single demonstrably correct answer. Second, in the lab the research participants are often required to work on a task assigned by the experimenter. In contrast, in an organizational context, the first step of creativity often involves the employees’ discovering problems on their own and deciding for themselves to find solutions to these problems. Third, in the lab the research participants are often given a fixed amount of time, which is frequently less than 1 hour in duration, to work on the experimental task. In contrast, in organizations the employees, especially those who do not work in the research and development function, have to decide for themselves how long they want to work on solving a problem creatively. Fourth, whereas in the lab creativity measures place heavy emphasis on the novelty dimension, in organizations the usefulness dimension is also essential.

In addition to examining effects of specific moods in specific contexts on specific dimensions of creativity, some researchers have also started to investigate effects of variables being defined as a combination of activation and physiological well-being on self-reported involvement in creative activities. For example, Kark and Carmeli (2008) found that individuals’ vitality was positively related to their self-reported involvement in creativity such that those who experienced high levels of vitality also self-reported high levels of involvement in creative activities. On the basis of Ryan and Bernstein (2004), they defined vitality as a mix of affective and physiological “aliveness” in that a high level of vitality is characterized by high levels of felt energy, vigor, and feelings of physiologically being capable and functioning fully.

**Joint Effects of Positive Affect and Negative Affect**

Because positive, activating moods may facilitate cognitive flexibility and negative, activating moods may boost perseverance (De Dreu et al., 2008) and because both cognitive flexibility and perseverance are needed in coming up with creative ideas in the workplace, it is important for research to examine the joint effects of positive and negative affect.

In particular, on the basis of the mood-as-information theoretical framework and its related research in psychology (e.g., Fiedler, 1988; Kaufmann, 2003; Martin & Stoner, 1996; Schwarz, 2002; Schwarz & Clore, 2003), George and Zhou (2007) advanced a “dual-tuning perspective” in arguing that both positive and negative moods may be functional for creativity in the workplace. Negative moods alert employees to problems, cause the employees to focus on the current situation rather than their preexisting assumptions, and motivate them to exert high levels of effort to make improvements (George & Zhou, 2002; Kaufmann, 2003; Martin & Stoner, 1996; Schwarz, 2002). Positive moods allow employees to be playful with ideas and willing to take risks and explore novel ways of doing things and facilitate divergent thinking. Moreover, and consistent with the person–context interaction approach to creativity (Woodman et al., 1993), the joint effects of positive and negative moods only manifest themselves in a supportive context provided by supervisors. Indeed, George and Zhou (2007) found that positive mood, negative mood, and supportive contexts interacted to affect creativity in such a way that when positive mood and supportive contexts were both high, negative mood had the strongest positive relation with creativity ($\Delta R^2$’s ranged from .03 [$p < .05$] to .07 [$p < .01$]).

Fong (2006) examined effects of emotional ambivalence, which is defined as simultaneously experiencing positive and negative emotions, on creativity. On the basis of the theoretical arguments developed in the affect literature that emotion provides information, Fong reasoned that because emotional ambivalence is commonly viewed as an unusual event, experiencing it increases individuals’ likelihood of making connections to other unusual associations among stimuli in the current environment. To the extent that such “remote” associations or divergent thinking facilitates creativity, individuals’ creativity will be enhanced after they experience emotional ambivalence. Fong conducted an experimental study in which she compared research participants’ creative performance on the remote
association task (Mednick, 1962). The participants worked in one of four experimental conditions: emotional ambivalent, positive emotion (i.e., happiness), negative emotion (i.e., sadness), and emotional neutral. Results showed that compared with the other three experimental conditions, the participants in the emotional ambivalent condition exhibited the highest level of creativity on the remote association task. Interestingly enough, neither positive emotion nor negative emotion had any main effect on creativity.

In summary, in addition to the possibilities discussed earlier, future research using the affective approach may also identify contextual variables that are especially effective in influencing affect and examine whether these variables facilitate or inhibit creativity by influencing employees’ affect. For example, Madjar et al. (2002) conducted a study in which affect was shown as a mediator linking work and nonwork support received by employees from sources inside or outside their work organizations and those employees’ creativity in the workplace.

Future research using the affective approach may also benefit from including the construct of emotional intelligence (George & Zhou, 2002; Zhou & George, 2003). Previous theory and research have suggested that emotional intelligence may influence creativity in two ways. First, George and Zhou (2002) showed that one dimension of emotional intelligence, clarity of feelings, was one of the two conditions under which negative moods were positively related to creativity. Second, in a conceptual article, Zhou and George (2003) theorized that leaders who have high levels of emotional intelligence are more likely to support their employees’ creativity than are leaders whose emotional intelligence is relatively low.

CONCLUDING REMARKS

As our review shows, research taking a motivational, cognitive, or affective approach has been conducted in parallel fashion. Although much progress has been made in understanding creativity by using these approaches, we contend that research continuing in any of the three traditions is necessary and likely to be both productive and informative.

For example, using the motivational approach, research is needed to identify the full range of contextual factors that independently or jointly (with individual differences or other contextual factors) enhance or constrain creativity. Research is also needed to clarify the mixed results documented in the literature on the effects of some of the contextual factors (e.g., coworker influences) on creativity. Moreover, research is needed to directly measure and test whether motivation, especially intrinsic motivation, mediates the relationship between contextual factors and creativity. Furthermore, future research using any of the three approaches is needed to examine creativity at the team level and cross-levels of analysis.

Finally, we believe that synthesizing and integrating these approaches presents yet another promising research direction. For example, future research may investigate the temporal sequencing of motivation, cognition, and affect in influencing creativity. As another example, research using the cognitive approach or the affective approach could benefit from results obtained by using the motivational approach, such as investigating whether the contextual factors that have been demonstrated to foster or restrict creativity by using the motivational approach can also influence creative cognition and affective states that are said to be linked to creativity.

Last but not least, future research is needed to integrate the cognitive and the affective approaches. One way to do this would be to map specific aspects of mood states with the cognitive stages of the creative process. For example, are specific aspects of positive mood states especially useful at the idea-generation stage of creative cognition?

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