

The Influence of Creative Process Engagement on Employee Creative Performance and Overall Job Performance: A Curvilinear Assessment

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Integrating theories addressing attention and activation with creativity literature, we found an inverted *U*-shaped relationship between creative process engagement and overall job performance among professionals in complex jobs in an information technology firm. Work experience moderated the curvilinear relationship, with low-experience employees generally exhibiting higher levels of overall job performance at low to moderate levels of creative process engagement and high-experience employees demonstrating higher overall performance at moderate to high levels of creative process engagement. Creative performance partially mediated the relationship between creative process engagement and job performance. These relationships were tested within a moderated mediation framework.

Keywords: creative process, creative performance, creativity, job performance, work experience

Because creativity is increasingly recognized as an important underpinning of innovation, interest in factors influencing creativity in organizations continues to burgeon (Hirst, Van Knippenberg, & Zhou, 2009). As one manifestation, the business press has been carrying an accelerating number of articles calling for greater creativity to fuel organizational growth and sustain competitiveness (Amabile & Khaire, 2008; Cohn, Katzenbach, & Vlak, 2008; George, 2007; Hargadon & Sutton, 2000). Scholars, too, have focused more research effort on the question of how to foster increased idea production, leading to significant advances in our understanding of factors that influence creative outcomes in organizations (Shalley & Zhou, 2008; Zhou & Shalley, 2008). Though progress has been admirable, a critical area that has not received much research focus is the connection between engaging in the creative process itself and ultimate job performance (Gilson, 2008). Yet only through such a connection can efforts toward creativity actually aid the competitive advantage of organizations.

To date, much of the research on creativity has focused on creative performance, which refers to creative outcomes—that is, the novel and useful ideas concerning products, services, methods, or procedures that are ultimately produced (Zhou & George, 2003; Zhou & Shalley, 2003). Considerably less literature has addressed creativity considered as the process by which creative outcomes are achieved (Drazin, Kazanjian, & Glynn, 2008; Gilson & Shalley, 2004; Gilson, Shalley, & Ruddy, 2005; Shalley & Zhou, 2008; Shalley, Zhou, & Oldham, 2004). In contrast to creative performance, creative process engagement refers to “employee involvement in creativity-relevant methods or processes, including (1) problem identification, (2) information searching and encoding,

and (3) idea and alternative generation” (Zhang & Bartol, 2010, p. 108). Along with a lesser focus on creative process engagement, research on creativity has tended to direct attention almost exclusively to the creativity requirements of jobs and related creative performance rather than include the total requirements of jobs and overall job performance. (For exceptions connecting creative performance and job performance, see Gong, Huang, & Farh, 2009; Ng & Feldman, 2009; Oldham & Cummings, 1996.) This narrow stance has curiously left open the question of how creative process engagement interfaces with the broader duties and responsibilities that tend to be part of jobs with strong creativity components (Amabile & Conti, 1999; Gilson & Shalley, 2004). This void is particularly significant because creative process engagement tends to be cognitively demanding and time consuming (Ford, 1996; Gilson et al., 2005; Shalley & Gilson, 2004). For instance, Amabile and Grysiewicz (1987) found that being able to allocate sufficient time to creative activities was a major concern among the research and development scientists they interviewed. In fact, some scholars point to potential negative aspects of encouraging employees toward creative endeavors because employees may spend too much time on such activities to the detriment of others (R. H. Scott, 1995).

Researchers have also noted the difficulties organizations experience in being “ambidextrous” (i.e., being able to carry out immediate operational activities while also being able to innovate; Gilson et al., 2005; O’Reilly & Tushman, 2008). At the level of the individual employee, such concerns can translate into needing to focus both on being creative and on achieving broader job goals. Yet the fact that individuals in organizations might have multiple demands vying for attention has not received much research consideration (Jett & George, 2003). Clearly, part of the challenge of encouraging creative efforts in organizations is ensuring that such activities convert into positive employee performance that ultimately aids organizational competitive advantage (Dougherty & Tolboom, 2008; Gilson, 2008; Gong et al., 2009).

In this study, we draw on Kahneman’s (1973) attention capacity theory to propose that trade-offs exist in the extent to which

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creative process engagement on behalf of achieving creative outcomes is congruent with fulfilling broader responsibilities in complex jobs. Within such trade-offs, employees need to consider the extent to which they emphasize the creative process that is conducive to the creative performance needed in complex jobs (Oldham & Cummings, 1996; Shalley, Gilson, & Blum, 2009) versus balance the various factors needed for successful overall job performance (Gilson 2008; Gilson & Shalley, 2004). As Kahneman and others (e.g., Lien, Ruthruff, & Johnston, 2006) have noted, there are limits to the attention capacity of individuals, and engaging heavily in one activity, particularly one with the high cognitive demands of creative process (Shalley & Gilson, 2004), has cognitive capacity implications for other activities. Drawing on activation theory (W. E. Scott, 1966), we further develop this perspective by arguing that engagement in creative processes will be most beneficial to overall job performance when such engagement is at intermediate levels.

In considering the impact of creative process engagement on job performance, we also draw on work experience literature (Quinones, Ford, & Teachout, 1995; Sturman, 2003; Tesluk & Jacobs, 1998), as well as attention capacity theory (Kahneman, 1973), to explore a potential moderating role of work experience. Early research on work experience may have understated its importance because the nature of the work was generally not given sufficient consideration when the impact of experience was evaluated (Murphy, 1989; Sturman, 2003). Subsequent research has pointed to work experience as mattering more in jobs that are high rather than low in complexity (Schmidt, Hunter, & Outerbridge, 1986; Sturman, 2003), but the issue has generally not been raised relative to creative process engagement. We aimed to address this gap by investigating an expected moderating impact of work experience on the connection between creative process engagement and overall job performance.

In testing our theoretical frame, we uniquely propose and empirically test a curvilinear relationship to capture the potentially more complex impact of creative process engagement on employee job performance than has typically been explored. We also examine the moderating role of work experience in influencing the proposed curvilinear relationship between creative process engagement and job performance. We evaluate this moderation in the context of simultaneously considering the potential partial mediating role of creative performance in the linkage between creative process engagement and overall job performance (Edwards & Lambert, 2007).

Theory and Hypotheses

Although creativity literature, such as the componential theory of creativity (Amabile, 1996), commonly makes explicit acknowledgment of creative processes elements (see also Gilson & Shalley, 2004; Mumford, 2001), much of the research relating to creativity has concentrated on individual and contextual factors that influence creative performance (for a review, see Shalley et al., 2004). As a result, the creative process aspect has not received attention commensurate with its importance (Drazin et al., 2008; Gilson & Shalley, 2004; Mainemelis, 2001; Shalley & Zhou, 2008; Shalley et al., 2004). A search of the literature relevant to creative process engagement reveals that the exact number of steps considered to be involved in the creative process has differed some-

what in various conceptualizations. Nonetheless, theorists generally include three aspects: problem identification, information searching and coding, and idea and alternative generation (Amabile, 1983; Reiter-Palmon & Illies, 2004; Shalley & Zhou, 2008; Torrance, 1988). For the purposes of the present research, we consider these three aspects to encompass creative process engagement. Choosing among generated ideas or alternatives in terms of best suitability for execution, another step that is sometimes included, is more commonly considered to be part of the implementation phase that follows (Gilson & Shalley, 2004; Reiter-Palmon & Illies, 2004). The implementation phase typically also incorporates action to put the chosen alternative into practice (Basadur, 1997; Mumford, 2001).¹

In our theorizing and our subsequent empirical test we focus on complex jobs, because they have been shown to encompass a significant creativity component (Oldham & Cummings, 1996; Shalley et al., 2009) and, hence, are likely to be enlightening with regard to our phenomena of interest. Moreover, they are usually the ones that have the best prospects for aiding competitive advantage and are of major concern to organizations (Shalley, Gilson, & Blum, 2000; Shin & Zhou, 2007). Complex jobs are characterized by substantial autonomy, relatively low amounts of routine work, and considerable decision leeway (Shalley et al., 2009). Because they require creativity, such jobs typically involve engagement in creative processes (Amabile, 1996; Gilson & Shalley, 2004; Mumford, Mobley, Uhlman, Reiter-Palmon, & Doares, 1991; Shalley et al., 2000). Such jobs are also likely to have other significant duties and responsibilities (Amabile & Conti, 1999; Elsbach & Hargadon, 2006; Huhtala & Parzefall, 2007; Van Dyne, Jehn, & Cummings, 2002).

Our theoretical framework is shown in Figure 1. In the next section, we consider the theoretical underpinnings and logic of our proposed relationship between creative process engagement and job performance.

Creative Process Engagement and Employee Job Performance

Although creativity literature has acknowledged conceptually the notion of a creative process (e.g., Amabile, 1988; Gilson & Shalley, 2004; Shalley et al., 2004), such considerations have generally not addressed how creativity efforts fit into the overall job responsibilities of individuals in complex jobs. The present study addresses this broader perspective by drawing on attention capacity theory (Kahneman, 1973) to aid understanding about how creative process engagement might be expected to impact not only

¹ Lubart (2001) and Mumford, Mobley, Uhlman, Reiter-Palmon, and Doares (1991) have argued that the creative process differs from standard, rational, and less creatively oriented problem solving. One major difference is that the creative process is usually aimed at problems that are more ill defined than standard types of problems. In addition, standard types of problems tend to lend themselves to utilizing previously acquired procedures and solutions, whereas the creative process is aimed at generating new and novel solutions. Finally, in the creative process, information is searched, encoded, combined, or reorganized, whereas in standard problem solving, information is recalled and understood using existing category structures. Thus, creative process engagement is conceptually distinct from standard problem solving and rational decision making broadly.

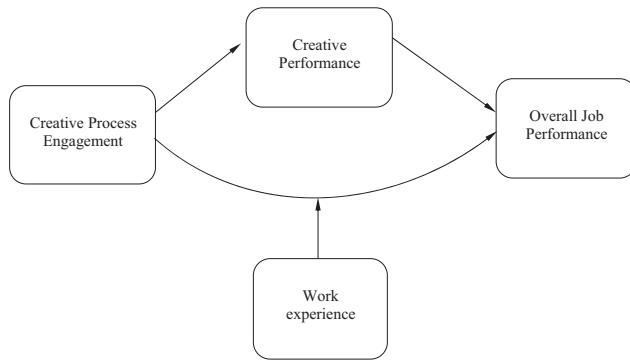


Figure 1. The hypothesized model.

creative performance but also overall job effectiveness. We note that the strategy field has developed the attention-based view, which recognizes limitations in the ability of a firm's decision makers to attend to the multitude of factors that can impact the firm (Barnett, 2008; Ocasio, 1997). Researchers in organizational behavior have also been addressing cognitive resource issues, particularly with regard to self-concerns about performance and the distractions these create (e.g., Beal, Weiss, Barros, & MacDermid, 2005; Kanfer & Ackerman, 1989). Yet there has been a puzzling neglect of another important set of factors vying for attention, namely, the competing job demands that are rather ubiquitously present in jobs involving reasonable levels of complexity (Amabile & Conti, 1999; Elsbach & Hargadon, 2006; Fraser, 2001). These conditions require some balancing of attention and effort, yet we know surprisingly little about how creative process engagement influences overall performance in complex jobs. In this research we consider overall job performance (hereafter referred to simply as job performance) as in-role or prescribed behaviors expected of job incumbents (O'Reilly & Chatman, 1986; C. A. Smith, Organ, & Near, 1983; Williams & Anderson, 1991).

Within his attention capacity theory, Kahneman (1973) has argued that individuals have limited attentional capacity and cognitive resources, which may constrain their ability to focus strong simultaneous attention and effort on all relevant aspects of their job. Arousal generated by exposure to stimuli influences attention and potentially the exertion of effort. If arousal is low, attention and effort are likely to be similarly low, with inadequate performance implications. On the other hand, if arousal and the need for cognitive resources become high due to complex joint task demands, increased attention and effort tend to be insufficient to compensate for the rising challenge. Moreover, the high arousal causes attention to become both narrower and more labile—forcing attention allocation choices and decrements in performance—resulting in an inverted *U*-shaped pattern. Complementary curvilinear arguments stem from W. E. Scott's activation theory (1966; Gardner, 1986), which posits that moderate levels of arousal or activation are most conducive to performance. According to the theory, stimuli that are novel, complex, uncertain, and meaningful can lead to excessively high activation levels, which challenge cognitive resources and undermine performance. Limited research supports this stance. For instance, related research by Xie and Johns (1995) indicated a curvilinear relationship between

job complexity and emotional exhaustion. Janssen (2001) demonstrated a curvilinear relationship between job demands and performance. Similarly, Gardner (1986) found a curvilinear relationship between task stimulation and performance.

On the basis of these theoretical frames and related empirical results, we expected job performance would be highest when creative process engagement levels were moderate. This is because low levels of creative process engagement are likely to reflect low activation toward a significant aspect of the job (i.e., the need to be creative). On the other hand, too high a level is likely to reflect the higher levels of activation that lead to attention and effort difficulties across task demands. Such circumstances are likely to lead to decrements in overall job performance. Thus we hypothesized as follows:

Hypothesis 1: Creative process engagement has a curvilinear relationship with employees' job performance (an inverted *U* shape), with a moderate level of engagement in creative processes being most conducive to high job performance.

Work Experience as a Moderator

Attention capacity theory (Kahneman, 1973) also suggests that the extent of work experience may qualify the nature of the expected curvilinear relationship between creative process engagement and job performance, at least for complex jobs (Schmidt et al., 1986; Sturman, 2003). Work experience refers to the accumulation over time of work-relevant knowledge and skill acquired through behaviors, practice, and observation associated with tasks, duties, and circumstances (Quinones et al., 1995; Sturman, 2003; Tesluk & Jacobs, 1998).

Drawing on attention capacity theory and related literature, we note there are at least two major reasons to expect experience to moderate the relationship between creative process engagement and job performance. One reason is cognitive capacity differences related to experience. For instance, evidence suggests that experience with a phenomenon can reduce the attention and effort allocation needed in similar circumstances (Kahneman, 1973; Kanfer & Ackerman, 1989; Lien et al., 2006) and can shift characteristic arousal levels to allow effective performance at higher levels of job demand (Gardner & Cummings, 1988).

A second reason to expect that work experience will moderate the relationship between creative process engagement and job performance is differences in activation patterns (W. E. Scott, 1966). For low-experience individuals, the high job demands inherent in creative processes are likely to engender high arousal even at relatively low levels of creative process engagement. This may aid job performance by helping to focus attention and effort, at least up to moderate levels. In accordance with both attention capacity theory and activation theory, though, such engagement is likely to lead to serious decrements in performance as creative process engagement increases beyond the moderate range.

In contrast, at low levels of creative process engagement, high-experience individuals may feel insufficient arousal and direct inadequate attention to the creative demands of the job, thereby delivering low job performance. For instance, researchers have pointed to the possibility that high-experience individuals may tend to lean on past, and now relatively mundane, solutions rather than expend the effort involved in being creative (Shalley &

Gilson, 2004; Ward, Smith, & Finke, 1999). At the same time, high-experience individuals may be able to tolerate higher levels of creative process engagement than low-experience individuals because they are able to better deal with conflicting demands due to enhanced cognitive capacity and greater familiarity with varied job circumstances (Schmidt et al., 1986; Tesluk & Jacobs, 1998). Therefore, we should see high-experience individuals function more effectively than their low-experience counterparts at higher levels of creative process engagement. In a related study, Hunter and Thatcher (2007) found that work experience was associated with greater capacity to channel arousal associated with job demands into effective performance. Therefore, we hypothesized as follows:

Hypothesis 2: Work experience moderates the curvilinear relationship between creative process engagement and employee job performance. Low-experience employees exhibit generally higher levels of job performance at low to moderate levels of creative process engagement than at moderate to high levels, whereas high-experience employees exhibit generally higher levels of job performance at moderate to high levels of process engagement than at low to moderate levels.

Creative Performance as a Mediator

Amabile's componential theory and theoretical frameworks by several other creativity researchers (e.g., Amabile, 1996; Amabile & Mueller, 2008; Gilson, 2008; Shalley et al., 2004; Shalley & Zhou, 2008; Zhou & George, 2003) point to a positive relationship between creative process engagement and creative performance. Empirical research supports this positive connection, with evidence suggesting that engagement in creative process elements leads to greater creative performance (e.g., Amabile, Conti, Coon, Lazenby, & Herron, 1996; Mumford, Baughman, Threlfall, Supinski, & Constanza, 1997; Reiter-Palmon, Mumford, Boes, & Runco, 1997) and that training can enhance creative process engagement, thereby positively influencing creative performance (G. Scott, Leritz, & Mumford, 2004).

Limited evidence also suggests a positive association between creative performance and overall job performance. For instance, Oldham and Cummings (1996) found, although not formally hypothesized, a significantly positive relationship between the creative performance of manufacturing engineers and technicians and their overall job performance as rated by supervisors. Similarly, research by Ng and Feldman (2009) showed a significant correlation between the creative performance of individuals working in a variety of mainly professional positions and their job performance as assessed by coworkers. A study by Gong et al. (2009) found a significant connection between the creative performance of insurance agents and both supervisor-rated job performance and actual sales.

Such findings provide support for the notion that, when jobs are complex and creativity thereby is an important aspect of the job, it is reasonable to expect that creative performance will then have a positive influence on overall job performance (Gilson, 2008). Successful performance in complex jobs typically requires the incorporation of novel and useful ideas (Drazin, Glynn, & Kazanjian, 1999). An important source of such ideas would be the creative performance of the job incumbent (Gong et al., 2009;

Oldham & Cummings, 1996). Such creative performance is more likely to the extent that the incumbent engages in an effective creative process (Gilson, 2008). Therefore, the sequence of creative process engagement, creative performance as mediator, and subsequent enhanced job performance provides an explanation of how creative process engagement can be ultimately connected to job performance.

We posit partial mediation because research suggests that not all efforts to be creative are likely to be successful in terms of creative performance, particularly in view of other obligations. As we have argued above, we expect that most complex jobs will also encompass duties and responsibilities beyond solely creative performance (Amabile & Conti, 1999; Elsbach & Hargadon, 2006; Fraser, 2001; Huhtala & Parazell, 2007; Van Dyne et al., 2002). Such multiple job requirements constrain the extent to which creative performance can be expected to account for overall job performance. In addition, it is possible that some novel and useful ideas are not implemented for various reasons, such as dependence on the absorptive capacity of others, political turf issues, and lack of time and resources (Cohen & Levinthal, 1990; Kanter, 1988; Tierney, 2008). Accordingly, we hypothesized as follows:

Hypothesis 3: Creative performance partially mediates the relationship between creative process engagement and job performance.

Method

Research Setting and Participants

The hypothesized model was tested with data from the headquarters of a large-scale information technology company in China. Participants were professional-level employees and their respective supervisors. The employees worked in complex jobs that required substantial creativity to be effective (e.g., software design or new product research and development).

The human resources department provided the contact information for the professional-level employees and their direct supervisors. All of these potential participants then received an e-mail from the vice president of the company supporting the study and encouraging participation. This step was taken because many studies (e.g., Dillman, 2000; Roth & BeVier, 1998) have suggested that top management support is important for gaining the attention of potential participants and, thereby, increasing the response rate. A total of 670 professional employees received a Web survey link via their company e-mail address and 498 completed the survey, constituting a 74.3% response rate. Upon receipt of employee responses, we contacted the 219 relevant direct supervisors. Of these, 164 supervisors filled out the surveys, for a 74.9% response rate. Finally, we were able to match 367 usable responses from both direct supervisors and employees.

Among the 367 participants constituting the final sample, 48% worked in the software design division, whereas the rest worked in the strategic marketing division (e.g., new product R&D). The average age of the participants was 30.4 years. The average organizational tenure was 3.62 years. Of those participating, 63.2% were male, 68% held bachelor degrees, and 32% had graduate degrees.

Measures

The specific measures are described below, along with the results of Cronbach's alpha calculations for the various measures. Before set-up of the survey, all measures were translated from English into Chinese and then back translated into English by two independent bilingual individuals to ensure equivalency of meaning (Brislin, 1980). Creative process engagement, work experience, and demographic variables were provided by employees, whereas employee creative performance and job performance were rated by direct supervisors.

Creative process engagement. The measure for creative process engagement was an 11-item scale developed by Zhang and Bartol (2010). The scale has three dimensions: problem identification, information searching, and idea generation. As part of the development of this scale, six experts (doctoral students and individuals with doctorates) separately correctly sorted the items according to their intended dimensions and assessed the items as acceptable indicators of their respective dimensions. Respondents answered on a 5-point scale ranging from *never* to *very frequently*. Representative items are "I spend considerable time trying to understand the nature of the problem" (problem identification), "I search for information from multiple sources" (information seeking), and "I generate a significant number of alternatives to the same problem before I choose the final solution" (idea generation). Confirmatory factor analyses with three first-order factors and one second-order factor showed reasonable indices for the scale, $\chi^2(41) = 93.419$, $p \leq .001$, comparative fit index = .967, goodness of fit index = .957, standardized root mean square residual = .041, root mean square error of approximation = .058. The Cronbach's alpha for the scale was .88.

Overall job performance. Employee overall job performance was measured with a seven-item scale based on Williams and Anderson (1991) and was completed by supervisors. Respondents answered on a 5-point scale ranging from *never or almost never* to *always or almost always*. Representative items are "This employee fulfills all aspects of the job he/she is obligated to perform" and "This employee adequately completes assigned duties." The Cronbach's alpha for the scale was .94.

Work experience. Based on Tesluk and Jacobs (1998) and K. G. Smith, Collins, and Clark (2005), work experience was measured by the years of working experience in similar types of jobs in the relevant industry.

Creative performance. Employee creative performance was measured with a 13-item creativity scale developed by Zhou and George (2001) that was completed by supervisors. Respondents answered on a 5-point scale ranging from *not at all characteristic* to *very characteristic*. Representative items are "This employee comes up with new and practical ideas to improve performance" and "This employee suggests new ways of performing work tasks." The Cronbach's alpha for the scale was .91.

Control variables. On the basis of previous literature (e.g., George & Zhou, 2001; Grant, 2008; Shalley et al., 2004; Zapata-Phelan, Colquitt, Scott, & Livingston, 2009), we controlled for four variables that have been found to be significantly related to creative and overall job performance. Gender was measured as a dichotomous variable and was coded as 1 for male and 0 for female. Job type was measured as a dichotomous dummy variable coded as 1 for information technology participants and 0 for strategic marketing participants. Employee intrinsic motivation at work was measured with three items adapted from the work of Amabile (1985) and Tierney, Farmer, and Graen (1999). A representative item is "I enjoy finding solutions to complex problems." The Cronbach's alpha for this scale was .82. Finally, openness to experience was measured by 10 items from the personality inventory developed by Goldberg (1992). A representative item is "I am full of ideas." The Cronbach's alpha for this scale was .86.

Results

Table 1 provides the descriptive statistics, correlations, and scale reliabilities for the variables in the study. Some supervisors rated two or more subordinates, due to the nature of our data. Accordingly, we conducted a one-way analysis of variance with job performance as the dependent variable to test for the possibility of nonindependence. The results suggested that there did not appear to be patterns in the ratings of employees on job performance that would be due to systematic differences in the way in which supervisors evaluate their employees' job performance rather than to actual differences in performance, $F(163, 203) = 1.05$, $p = .36$. When we conducted the same analysis for creative performance as for the dependent variable, the results showed a similar lack of pattern for supervisory ratings associated with that variable, $F(163, 203) = 0.975$, $p = .56$. This suggested that it would be acceptable to proceed with our intended moderated hierarchical regression analyses.

Table 1
Descriptive Statistics, Correlations, and Reliability

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Gender	0.63	0.48								
2. Job type	0.54	0.49	.138**							
3. Intrinsic motivation	3.94	0.55	.110*	-.005	(.82)					
4. Openness to experience	3.82	0.43	.152**	.124*	.539**	(.86)				
5. Creative process engagement	3.92	0.43	.181**	.024	.645**	.598**	(.88)			
6. Overall job performance	4.05	0.56	-.022	-.021	.056	.116**	.374**	(.94)		
7. Work experience	7.28	4.59	.062	.015	.044	-.035	.004	-.036		
8. Creative performance	3.72	0.46	.199*	.079	.661**	.641**	.700**	.334**	.004	(.91)

Note. *N* = 367. Internal reliabilities (coefficient alphas) for the overall constructs are given in parentheses on the diagonal.

* $p < .05$. ** $p < .01$.

Because creative process engagement and creative performance are conceptually related and the correlation was high ($r = .70, p < .01$), we also conducted confirmatory factor analysis with the three creative process engagement dimensions and the creative performance dimension to confirm the discriminant validity of these two constructs. Results indicated that the two-factor model provided a significantly better fit than the one-factor model, $\Delta\chi^2(1) = 289.487, p < .001$, and thus supported considering creative process engagement and creative performance as distinct constructs.

The results of the moderated hierarchical regression and the partial mediation analyses associated with our hypotheses are summarized in Table 2. Based on Aiken and West (1991), all independent variables were mean-centered to reduce multicollinearity. To test the hypothesized models (control variables were included in all models), we followed Edwards and Lambert's (2007) approach, in which moderated regression procedures are combined with suggestions for testing mediation in a path analytic framework to supplement Baron and Kenny's (1986) causal steps framework (Edwards & Lambert, 2007; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Shrout & Bolger, 2002; Tepper, Henle, Lambert, Giacalone, & Duffy, 2008).

As shown in Table 2, the coefficient for the creative process engagement quadratic term (creative process engagement squared) was significant ($\beta = -.158, p < .01$). Thus, Hypothesis 1 was supported, as there was a curvilinear relationship between creative process engagement and employee overall job performance, and the plot (see Figure 2) showed that the data exhibited the expected inverted *U* shape.

Hypothesis 2 predicted that work experience interacts with creative process engagement in influencing its curvilinear relationship with employee overall job performance. The results supported this argument ($\beta = .105, p < .05$).² As expected, the plot (see Figure 3) indicated that low-experience employees exhibited generally higher levels of job performance in the low to moderate range of creative process engagement with a fairly steep downward trend in the moderate to high range. Conversely, high-experience employees demonstrated higher levels of job performance in the moderate to high range of creative process engagement and registered lower levels of job performance at the low to moderate range of creative process engagement. Overall, Hypothesis 2 was supported.

Hypothesis 3 predicted that employee creative performance would partially mediate the effect of creative process engagement on employee overall job performance. Results from Table 2 suggested that creative process engagement significantly predicted employee creative performance ($\beta = .343, p < .001$), which in turn significantly predicted employee job performance ($\beta = .500, p < .001$), reducing the coefficient of the effect of creative process engagement on job performance.

In order to better integrate moderation and mediation in our model and further assess the impact of creative process engagement on job performance in the context of moderation by work experience and partial mediation by creative performance, we followed the moderated path analysis procedures recommended by Edwards and Lambert (2007). This procedure facilitates the assessment of simple, indirect, and total effects for creative process engagement on job performance at high (one standard deviation above the mean) and low (one standard deviation below the mean) levels for the moderator variable, work experience. We used the

SPSS regression module to estimate coefficients for the full sample and used the constrained nonlinear regression module (CNLR) to estimate coefficients from 1,000 bootstrap samples with replacement from the full sample. Bias-corrected confidence intervals, computed from the 1,000 bootstrap estimates with adjusted formulas (Stine, 1989), were used to test differences in indirect and total effects across levels of the moderator variable (Edwards & Lambert, 2007; Shrout & Bolger, 2002).

Simple effects for low and high levels of work experience, which are presented in Table 3, showed that the direct effect of creative process engagement on job performance was significant both when the level of work experience was high ($p = .37, p < .05$) and when it was low ($p = .08, p < .05$). The difference in the direct effect at different levels of work experience was also significant ($\Delta p = .29, p < .01$), supporting the existence of direct effect moderation. Consistent with our theoretical arguments, the differences in the first-stage moderation effect ($\Delta p = .12, p > .05$), second-stage moderation effect ($\Delta p = .13, p > .05$), and the indirect moderation effect ($\Delta p = .20, p > .05$) were not significant, indicating the moderation effects existed only on the direct link between creative process engagement and job performance. Thus, these results provide further support for Hypothesis 2. CNLR analyses provided bias-corrected 95% confidence intervals (Edwards & Lambert, 2007) for use in assessing the indirect effects. These results indicated that, although the indirect effect was significant at both low and high levels of work experience, the difference between indirect effects at low and high levels of work experience was not significant. As indicated by Edwards and Lambert, these results are consistent with Hypotheses 3 and our hypothesized model showing the existence of mediation by creative performance of the relationship between creative process engagement and overall job performance but moderation by work experience of only the direct effect between creative processes engagement and overall job performance.

Discussion

Theoretical Contributions and Areas for Future Research

Our research makes three distinct theoretical contributions. First, several scholars recently have suggested that a promising direction for creativity research is to conceptualize creativity as a process and investigate its consequences, particularly with respect to performance (e.g., Gilson, 2008; Mumford, 2000; Perry-Smith, 2006; Shalley et al., 2004; Zhou & Shalley, 2008). We uniquely contribute to this emerging arena of inquiry by drawing on attention capacity theory (Kahneman, 1973) and activation theory (Gardner & Cummings, 1988; W. E. Scott, 1966) to posit and support a curvilinear relationship between creative process engagement and job performance. Attention capacity theory (Kahneman, 1973) forewarns that individuals have limited attention capacity and cognitive resources that constrain their ability to

² As hypothesized, the form of the interaction is a curvilinear *X* relationship, linear *Z* relationship, and Linear \times Linear *XZ* interaction, as depicted in the following equation: $Y = b_1X + b_2X^2 + b_3Z + b_4XZ + b_0$. See Aiken and West (1991).

Table 2
Summary of Regression Analysis Results

Variables and statistics	Creative performance				Overall job performance					
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Control variables										
Job type	.021	.031	.032	.031	-.002	-.001	-.005	-.072	-.071	-.069
Gender	.089*	.060 [†]	.060 [†]	.060	-.175***	-.173***	-.162**	-.165**	-.163***	-.167***
Openness	.386***	.267***	.268***	.268***	-.184**	-.176**	-.194**	-.168**	-.170**	-.174**
Intrinsic motivation	.443***	.290***	.292**	.293***	.174*	.185**	.172*	.096	.098 [†]	.075
Independent variable/Indirect effect										
CPE		.343***	.344***	.344***		-.023	-.046	-.031	-.031	-.016
CPE ²							-.158**	-.144**	-.144**	-.147***
Creative performance								-.500***	.499***	.499***
Moderation										
Work experience			-.009	-.009					-.029	-.032
Experience × CPE				-.005						-.105*
R ²	.559	.617	.617	.617	.063	.063	.086	.315	.329	.339
ΔR ²	.559	.057	0	0	.063	.000	.023	.242	.001	.011
F	114.90***	116.20***	82.628**	72.106**	6.102***	4.889***	5.663***	25.010***	21.906***	20.366***
ΔF	114.90***	54.056***	0.071	0.022	6.102***	0.096	8.992**	129.01***	0.448	5.733*

Note. *N* = 367. M = model; CPE = creative process engagement.

[†] *p* < .10. * *p* < .05. ** *p* < .01. *** *p* < .001.

focus simultaneous strong attention and effort on multiple aspects of complex jobs. Activation theory complements this perspective in positing that moderate levels of activation are likely to lead to the best performance in situations involving complex job demands. Drawing on these theories, our research has challenged the implicit assumption (James, Clark, & Cropanzano, 1999; Mumford, 2003) that creative process engagement has a positive linear impact on job performance. In doing so, our research supports recent speculation by a few creativity researchers (e.g., Gilson, 2008; Mumford, Scott, Gaddis, & Strange, 2002; R. H. Scott, 1995) that increases in engagement in creative process could, at some level, have detrimental effects on other aspects of jobs. Our findings point to the potential value of paying more research attention to overall job demands and suggest incorporation of this perspective into creativity models, such as the componential theory of creativity (Amabile, 1983).

Second, our research provides a new lens for investigating the question of the impact of work experience on the curvilinear relationship between creative process engagement and job performance.

Work experience has not received much research focus in the creativity literature, perhaps because early research suggested that its importance was limited (Murphy, 1989; Sturman, 2003). To the contrary, as anticipated from attention capacity theory (Kahneman, 1973) and activation theory (W. E. Scott, 1966), work experience in the current study proved to be an important moderator of the relationship between creative process engagement and job performance. As expected, the positive relationship at the low end of the continuum was steeper for individuals with high work experience, because job demands requiring very low levels of creative process engagement are less likely to arouse attention and effort from experienced individuals. The opposite proved to be true at the higher end of the creative process engagement continuum, where the negative relationship was weaker for high-experience individuals. With their higher experience, such individuals can be expected to better handle the competing demands likely associated with higher levels of process engagement, both because they possess greater cognitive capacity related to their work experience (Hunter & Thatcher, 2007) and because they are less affected by

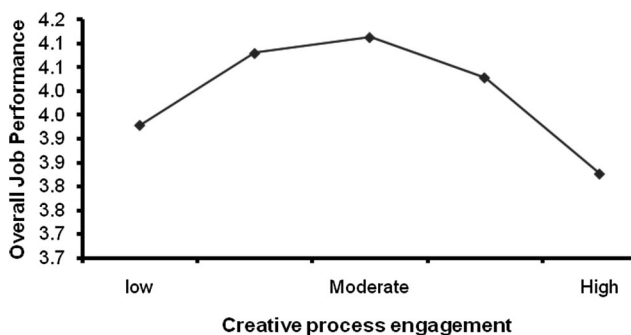


Figure 2. Curvilinear relationship between creative process engagement and overall job performance.

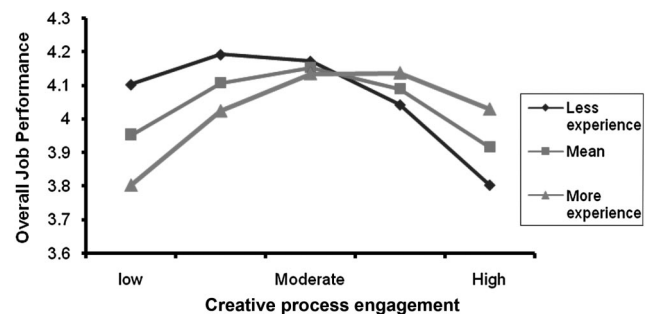


Figure 3. Moderating effects of work experience on creative process engagement and overall job performance.

Table 3

Results of the Moderated Path Analysis: Direct and Indirect Effects of Creative Process Engagement on Overall Job Performance at High and Low Levels of Work Experience

Path	P_{MX}	P_{YM}	Direct effects	Indirect effects	Total effects
			(P_{YX})	$(P_{YM} P_{MX})$	$(P_{YX} + P_{YM} P_{MX})$
Simple paths for low work experience	.77**	.55**	.08*	.42**	.50**
Simple paths for high work experience	.89**	.70**	.37*	.62**	.99**
Differences	.12	.15	.29**	.20	.49**

Note. $N = 367$. Tests of differences for the indirect and total effect were based on bias-corrected confidence intervals derived from bootstrap estimates. Low work experience refers to one standard deviation below the mean of work experience; high work experience refers to one standard deviation above the mean of work experience. P_{MX} = path from creative process engagement to creative performance; P_{YM} = path from creative performance to overall job performance; P_{YX} = path from creative process engagement to overall job performance.

* $p < .05$. ** $p < .01$.

the potentially detrimental impacts of excessive arousal associated with high job demands (W. E. Scott, 1966). Future research might evaluate changes in work experience over time and the differential impact on arousal, attention, and effort. Such inquiries can greatly aid our understanding of how to optimize development of employee creative capacity and the allocation of work requiring creativity.

Finally, our study also contributes conceptually and empirically to the larger issue of relationships among creative process engagement, creative performance, and job performance. In particular, this study supports a partial mediating relationship of creative performance between creative process engagement and job performance. In doing so, these findings take an important step toward a better understanding of how the expected positive impact of creative process engagement on creative performance might ultimately impact job performance itself. At the same time, these results point to a host of intriguing questions. In view of the limited attentional capacity and cognitive resources posited by attention capacity theory (Kahneman, 1973), researchers might productively delve into how the different stages in creative process engagement might influence task switching patterns. For example, it may be easier to switch gears and attend to other tasks when diagnosing the problem and searching for relevant information but more difficult to do so during the alternative generation stage. It would also be helpful to measure the nature of job tasks so as to investigate further their requirements with respect to creative process engagement versus alternative handling.

Some researchers argue that heavily concentrated creative process engagement followed by a hiatus in which an individual in engrossed in some other activity may actually facilitate creativity (George, 2007; Nickerson, 1999). Although controversial, this potential insight raises the intriguing possibility that it may be feasible to structure jobs in ways that could allow individuals to meet multiple job demands but also facilitate creativity. Such a prospect would require considerably greater investigation regarding how the configuration and timing of job demands influence arousal, attention, and effort with respect to creative process engagement. For instance, there is some speculation that individuals may be better able to handle multiple tasks if they are handled serially, rather than simultaneously (e.g., Kahneman, 1973), while others suggest that it may be possible to so extensively practice some tasks as to make them essentially automatic (Lien et al., 2006).

The possibility that individuals may be prone to spend too much time engaging in creative processes also is worthy of further investigation. Given the findings here, it would be worthwhile to study further the factors that influence such choices. In view of related research suggesting that it may be challenging to both engage in creative processes and handle routine matters (O'Reilly & Tushman, 2008; Weisberg, 1999), we know little about how employees make attention allocation decisions. Given evidence that at high levels of attention demand, individuals tend to cope by adopting a unitary focus (Easterbrook, 1959; Kahneman, 1973), it is possible that employees would favor the more interesting creativity engagement, rather than critical aspects of the job in need of less creativity but nevertheless of attention. There may be contextual factors, such as extent of climate for innovation (S. G. Scott & Bruce, 1994), that may affect such allocation decisions. At any rate, such issues have generally not been the focus of research, although researchers are beginning to look more seriously at the related issue of impacts of multiple goals (Carson & Carson, 1993; Shalley, 1991, 1995; Shalley et al., 2004).

Our focus here has been on the impact of creative process engagement. As we have mentioned previously, this is the phase of problem solving that is most commonly viewed as creativity because it involves a process aimed at the generation of novel and useful ideas and alternatives. However, creative ideas and alternatives are not likely to have much impact unless they are actually implemented (Mumford, 2001). Although it is not necessarily the case that the generator of creative ideas is the implementer or the sole implementer, it would be useful for future research to include employee involvement in the implementation phase in order to better gauge the extent to which involvement in implementation competes with creative process engagement and other job demands (Kanter, 1988).

The findings here also provide some support for recent suggestions by creativity researchers (e.g., Gilson, 2008; Zhou & Shalley, 2008) that more research attention be given to the potential negative sides of creative efforts. Our current research points to some conditions when engaging in creative process engagement might be associated with positive consequences and when it might have a negative impact—at least in terms of job performance. Gilson (2008) pointed to possibilities in which employees engage in creative processes for the purpose of inhibiting normal production or hindering a new product introduction, noting that creativity may have a “dark side” (p. 311). Although not the focus here, such

negative uses of creative process engagement might be investigated in the future. Zhou and Shalley (2008) have suggested this direction "could be an exciting area for future research" (p. 364).

Limitations and Practical Implications

As is the case with all studies, this one has limitations. For one thing, the cross-sectional design does not allow for conclusions about causality. Future research with a longitudinal design would help to verify the causal relationships between creative process engagement and job performance. Such an inquiry might enable tracing the allocation of attention and effort across multiple tasks to learn more about the actual trade-offs that employees in complex jobs actually make on behalf of creative endeavors and overall job performance.

We also note that a further consideration in assessing the findings here is the possibility that the curvilinear relationship identified may also be influenced by implementation issues. It is possible that at low to moderate levels of creative process engagement, employees are still able to allocate time to implementation issues necessary for having their creative ideas actually translate into higher job performance. This may become more difficult as the demand for creative process engagement reaches moderate to high levels. Hence, part of the reason for the decrement in job performance at higher levels of creative process engagement may be due to diversion of time and attention created by implementation activities. Given that creative process engagement is heavily oriented toward divergent thinking, whereas implementation is commonly viewed as involving more convergent thinking (Basadur, 1995; Mumford, 2001; Reiter-Palmon & Illies, 2004), it may be that implementations themselves constitute competing job demands with respect to creative process engagement. Future research would be useful in helping to sort out these issues.

Another limitation is that our data were collected within a single organization. Although this factor helped control for confounding variables across companies and across industries, generalizations must be made with caution. This is particularly true as the company operates in the information technology industry, which is known to be one of rapid change. On the other hand, this type of company is a useful venue for this study because of the typically heavy job demands and strong need for creativity.

In addition, similar to Gong et al. (2009), we tested our model in a Chinese organization. Although Zhou and Shalley (2008) pointed out that the uniqueness of a specific cultural context will allow researchers to discover unknowns, rather than confirm what was already known in the Western cultural context, future studies should replicate our findings in other cultures to ensure generalizability. We note, however, that the types of jobs (e.g., software development, new project R&D, market development) involved in our study are found throughout the world. Moreover, Shalley et al. (2009) have suggested that greater global competition and fast-changing environments have increased the need for creativity from workers across different type of jobs and locations.

Our theorizing and our study have focused on complex jobs, which we consider to be a boundary condition in assessing our results. Although literature on which we have based some of our theorizing has differentiated between complex and simple jobs, our study was not able to verify that the findings here are inapplicable to simple jobs, even though we expect that to be

the case. Future research might verify the extent of applicability, perhaps by considering a continuum of complexity (Wood, 1986). Considering such a continuum has the potential to further clarify how job complexity influences attention trade-offs and may have important job design implications.

In our research, we have controlled for openness to experience, which has been associated with creativity (Feist, 1998, 1999; George & Zhou, 2001; McCrae & Costa, 1997; Shalley et al., 2004). Future research might also consider conscientiousness, which may affect the extent to which individuals attempt to balance various aspects of their jobs (Barrick & Mount, 1991; Costa & McCrae, 1992; George & Zhou, 2001). Other individual differences, such as learning goal orientation (Gong et al., 2009), may influence the accrual of valuable experience and are also worthy of further research.

Our research has important implications for managers. Our findings suggest that managers need to think carefully about requirements for creative process engagement on the part of employees. Despite the fact that employee creativity is fundamental to organizational innovation and survival, our data show that high creative process engagement does not necessarily lead to higher job performance. On the contrary, such efforts may be detrimental to job performance if employees spend more time than is necessary or prudent engaged in creative processes. Because both creative performance and job performance are important to any organization and because individual job performance collectively can influence the performance of the entire unit or organization (Gong et al., 2009), it is important for managers and employees to give some thoughts to how to balance the extent of creative process engagement with the need for attention to other aspects of the job.

Our findings with respect to work experience provide some guidance that may be helpful. Our data suggest that individuals with low work experience may perform best at the low to medium levels of creative process engagement but that their performance can degrade rather precipitously beyond that stage. On the other hand, it appears that employees with high work experience may not function well at low levels of creative process engagement but can be much more productive from an overall job performance point of view at moderate levels of creative process engagement and somewhat beyond. For high-experience individuals, low levels of needed creative process engagement may provide insufficient arousal to engender high job performance. Yet, due to their greater experience, high-experience individuals are likely to be effective at handling competing demands associated with medium and somewhat higher levels of creative process engagement because of their greater tolerance for high arousal and expanded cognitive faculties. However, even those with considerable work experience run into limits on their attention capacity and cognitive resources, albeit at a higher level of job demand than their less experienced counterparts. This means that managers must also be concerned so as not to overload even experienced employees, because, as this study demonstrates, such job conditions can be much more counterproductive than has perhaps been previously recognized.

Conclusion

This study uniquely explores how creative process engagement impacts employee overall job performance directly in a curvilinear manner and indirectly through creative performance. It also iden-

tifies a boundary condition for the relationship between creative process engagement and job performance: work experience. Our results highlight the importance of understanding both the positive and negative prospects for creative process engagement, so that optimal levels of job performance can ultimately be achieved.

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