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Dual Tuning in Creative Processes: Joint Contributions of Intrinsic and Extrinsic Motivational Orientations

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Intrinsic and extrinsic motivational orientations often coexist and can serve important functions. We develop and test a model in which intrinsic and extrinsic motivational orientations interact positively to influence personal creativity goal. Personal creativity goal, in turn, has a positive relationship with incremental creativity and an inverted U-shaped relationship with radical creativity. In a pilot study, we validated the personal creativity goal measure using 180 (Sample 1) and 69 (Sample 2) employees from a consulting firm. In the primary study, we tested the overall model using a sample of 657 research and development employees and their direct supervisors from an automobile firm. The results support the hypothesized model and yield several new insights. Intrinsic and extrinsic motivational orientations synergize with each other to strengthen personal creativity goal. Personal creativity goal in turn benefits incremental and radical creativity, but only up to a certain point for the latter. In addition to its linear indirect relationship with incremental creativity, intrinsic motivational orientation has an inverted U-shaped indirect relationship with radical creativity via personal creativity goal.

Keywords: intrinsic motivational orientation, extrinsic motivational orientation, personal creativity goal, creativity, motivational synergy

The role of motivation in creativity (i.e., the generation of new and useful ideas; Amabile, 1996) has drawn considerable interest (George, 2007; Zhou & Shalley, 2011). Intrinsic and extrinsic motivational states, in particular, have received extensive scholarly attention. One view contends that induced extrinsic motivational states (e.g., through the giving of rewards) reduce intrinsic motivational states (e.g., feeling interested and engaged; Deci, 1971; Deci, Koestner, & Ryan, 1999). Yet another view suggests that extrinsic motivational states can actually boost intrinsic motivational states (Cameron & Pierce, 1994; Eisenberger, Pierce, & Cameron, 1999). In the creativity literature, however, intrinsic motivational orientation (i.e., the desire to engage in an activity primarily for its own sake) and extrinsic motivational orientation (i.e., the desire to engage in an activity primarily for some extrinsic reward) have received little attention (for exceptions, see Amabile, Hill, Hennessey, & Tighe, 1994; Tierney, Farmer, & Graen, 1999).

As chronic trait-like dispositions, intrinsic and extrinsic motivational orientations often coexist, and employees often possess both simultaneously (Amabile, 1993; Moneta & Spada, 2009; Vansteenkiste et al., 2007). For example, an employee may have an intrinsic desire to develop interesting new product ideas and at the same time be extrinsically oriented to meet the deadlines set by his or her manager (Amabile, 1993). While some employees may have a dominant orientation, many others can have high levels of both orientations, and employees are dually motivated in many, if not all, jobs (Amabile, 1993; George, 2007). Theory and research suggest that both intrinsic and extrinsic motivational orientations serve important functions. The intrinsic desire promotes a process focus, and the extrinsic desire prompts an outcome focus (Abuhamdeh & Csikszentmihalyi, 2009; Amabile, 1993, 1997; Grant, 2008; Shalley, Zhou, & Oldham, 2004). We therefore argue that it is informative to consider both intrinsic and extrinsic motivational orientations and examine how they interact (George, 2007). Curiously, prior research has largely overlooked the interplay between

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the two orientations (George, 2007). The interesting but unresolved question, then, is this: How do intrinsic and extrinsic motivational orientations interact in the motivational processes leading to creativity outcomes? This question addresses not only the mechanisms necessary for intrinsic motivational orientation to take effect but also the conditions under which it has a greater or lesser effect. The intrinsic motivation perspective on creativity (Amabile, 1988, 1996) would remain incomplete if the potential theoretical mechanisms and boundary conditions were left unexamined. Unlike motivational states, intrinsic motivational orientation can be orthogonal to extrinsic motivational orientation (Amabile et al., 1994), thus providing the opportunity to examine the potential interplay of the two orientations (Amabile, 1993, 1997).

In this study, we posit that intrinsic and extrinsic motivational orientations interact positively to influence personal creativity goal (defined as the personal standard or aspiration that one's own job output should be creative; Shalley, 2008; Tierney, 2010). Our focus on motivational orientations and personal creativity goal is consistent with the motivation sequence framework (Locke, 1991, 2001). This framework suggests that distal needs, values, and motives (e.g., intrinsic motivational orientation) drive proximal motivational states (e.g., having a personal creativity goal), which, in turn, enhance outcomes, such as creativity. We further draw upon the resource allocation theory (Kanfer & Ackerman, 1989, 1996; Kanfer, Ackerman, Murtha, Dugdale, & Nelson, 1994) to posit that personal creativity goal has a positive linear relationship with incremental creativity (i.e., ideas providing minor modifications to existing routines; Madjar, Greenberg, & Chen, 2011) but an inverted U-shaped relationship with radical creativity (i.e., ideas departing fundamentally from existing routines; Madjar et al., 2011). We depict the posited relationships in Figure 1.

In testing the relationships, we contribute to the literature in several ways. First, attesting to the benefit of extrinsic motivational orientation, we show that it amplifies the effect of intrinsic motivational orientation on personal creativity goal. In doing so, we contribute to the creativity literature, which has overlooked the interactive effect of intrinsic and extrinsic motivational orientations on creativity-related processes. Second, we bring to light and examine the differential relationships that personal creativity goal has with incremental and radical creativity (relationships that are linear and inverted U-shaped, respectively). As such, we contribute to the creativity literature by showing that a strong personal creativity goal is not always beneficial: the type of creativity (incremental or radical) matters. Third, we contribute to the intrinsic motivation perspective on creativity (Amabile, 1988, 1996) by identifying personal creativity goal as one mechanism linking intrinsic motivational orientation to creativity outcomes. We also advance research from this perspective by showing that there is an inverted U-shaped indirect relationship between intrinsic motivational orientation and radical creativity (via personal creativity goal). In other words, intrinsic motivational orientation is beneficial to radical creativity up to a certain point, but then becomes detrimental.

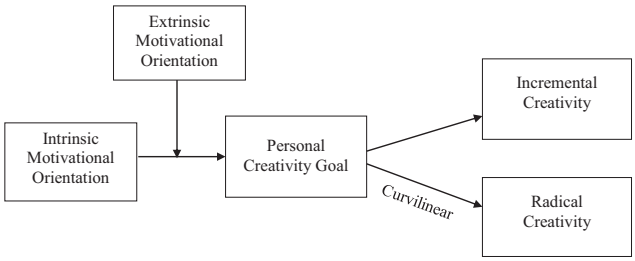

Figure 1. The overall model.

Hypotheses Development

Intrinsic Motivational Orientation and Personal Creativity Goal

Intrinsic and extrinsic motivational orientations are relatively enduring tendencies (Amabile et al., 1994) and they can be "thought of as general and pervasive orientations toward one's work or one's activities" (Amabile, 1996, p. 116). Intrinsic motivational orientation has the following aspects: "self-determination, competence challenge, task involvement, curiosity, enjoyment, and interest" (Amabile, 1993, p. 190). Research on intrinsic motivational orientation can enable us to "better understand and predict motivational behaviors in a variety of social situations" (Amabile et al., 1994, p. 951). The motivation sequence framework (Locke, 1991, 2001) suggests that the motivational core (e.g., needs, values, and motives, or what the individual would like to achieve or think should be achieved) drives activities (e.g., developing personal goals) at the motivational hub—the part of the motivation sequence closest to actions in terms of both time and causality. Situated in the motivational hub, personal goals reflect needs, values, and motives; Personal goals, in turn, determine specific outcomes, such as creativity. Extending this argument to creativity, we posit that personal creativity goal serves as a mechanism linking intrinsic motivational orientation and individual creativity.

Personal creativity goal refers to the personal standard or aspiration that one's own job output should be creative (Tierney, 2010). As one specific type of personal goals, personal creativity goal reflects an individual's striving to achieve creative output in his or her job and is consciously articulated and cognitively accessible (Brunstein, Schultheiss, & Grässmann, 1998; Elliot, Chirkov, Kim, & Sheldon, 2001). On the one hand, personal creativity goal does not refer to a general dispositional tendency, because it is specific to an individual's job domain and chosen to meet the individual's superordinate needs and motives. On the other hand, like other personal goals in the workplace (Brunstein et al., 1998; Maier & Brunstein, 2001), personal creativity goal is not tied to a particular task but is the future-oriented representation of what an individual strives to achieve in a job. It influences actions across multiple tasks that an employee often performs in the job. In that sense, it is broader than task-specific goal. In this study, our operational definition refers to the extent to which individuals have or embrace personal creativity goal in their current jobs. Research has shown that simply having such a goal—as distinct from the specificity of such a goal (e.g., to produce a specific quantity of creative ideas)—can promote creative performance by directing an individual's attention and efforts (Shalley, 1991; Shalley & Koseoglu, 2013).

The literature on personal goal—that on creativity goal in particular—has indicated the ways through which a person achieves his or her personal creativity goal. Specifically, having a personal goal motivates individuals to direct their activities toward goal attainment, such as by developing plans and strategies and engaging in effortful, goal-directed action (Brunstein, Schultheiss, & Maier, 1999; Read & Miller, 1989). In line with the research on personal goal generally, researchers have suggested that personal creativity goal directs an individual's attention and efforts toward creativity-relevant activities—such as developing strategies for being creative, gathering information, exploring possibilities, and coming up with alternatives—so that the individual can generate novel and useful ideas in his or her job (Shalley, 1991; Shalley & Koseoglu, 2013). That being so, although a personal creativity goal is not tied to one specific task or project only it still has a motivating effect in one's job domain because it is a goal closely related to one's job (Tierney, 2010). Evidence of the motivating effect of personal goal has been found in a number of domains (Brunstein et al., 1999; Maier & Brunstein, 2001). For example, Maier and Brunstein (2001) found that organizational newcomers' personal work goals motivate them to make progress toward the attainment of these goals and that these work goals are not tied to the newcomers' particular work tasks.

Individuals with an intrinsic motivational orientation are likely to pursue a personal creativity goal by exploring freely at work because they engage in work for its own sake. Intrinsic motivational orientation directs and energizes individuals to seek creative self-expression, active involvement, novelty, and challenge at work, and it leads them to enjoy doing so (Abuhamdeh & Csikszentmihalyi, 2009; Amabile, 1993; Amabile et al., 1994; Malka & Chatman, 2003). This tendency propels them to pursue a personal creativity goal, because this is consistent with their predilection for creative self-expression, active involvement, novelty, challenge, and intellectual fulfillment (Amabile, 1993; Malka & Chatman, 2003); and striving for and attaining such a goal will be enjoyable and satisfying for them. Overall, consistent with their predilection, individuals with intrinsic motivational orientation embrace personal creativity goal to guide their active pursuit of developing and expressing creative ideas about products, services, or processes at work. Therefore, we hypothesize the following:

> *Hypothesis 1:* An individual's intrinsic motivational orientation is positively associated with his or her personal creativity goal.

Grounded in the self-determination theory (Deci & Ryan, 1985), scholars have long examined intrinsic and extrinsic motivational states in both noncreativity- and creativity-related areas. Deci (alone and with colleagues) found that extrinsic motivational states induced by rewards tend to decrease intrinsic motivational states (Deci, 1971; Deci et al., 1999). In contrast, the findings of Cameron and Pierce (1994) and Eisenberger et al. (1999) suggest that extrinsic rewards have the potential to increase intrinsic motivational states. Regarding the role of intrinsic motivational states in creative processes, while some studies have shown a positive effect (Koestner, Ryan, Bernieri, & Holt, 1984; Shin & Zhou, 2003), others have reported a weak or null effect (Amabile, 1985; Shalley & Perry-Smith, 2001). Turning to extrinsic motivational states, research has yielded mixed findings as well. Although some studies have demonstrated that an induced extrinsic motivational state undermines creativity (Amabile, 1985; Amabile, Hennessey, & Grossman, 1986), other studies have suggested that it actually benefits creativity (Eisenberger & Armeli, 1997; Eisenberger & Aselage, 2009).

In contrast to the large volume of research on intrinsic and extrinsic motivational states, research on intrinsic and extrinsic motivational orientations has been much less (for exceptions, see Abuhamdeh & Csikszentmihalyi, 2009; Amabile et al., 1994; Malka & Chatman, 2003; Moneta & Spada, 2009; Tierney et al., 1999; Vansteenkiste et al., 2007). Extant research has examined intrinsic and extrinsic orientations in life generally (e.g., well-being in Kasser & Ryan, 1996), in education (e.g., approaches to studying in Moneta & Spada, 2009), and in the workplace (e.g., creativity in Amabile et al., 1994; job satisfaction in Vansteenkiste et al., 2007). In the work-related research on this topic, Amabile et al. (1994) developed a measure of motivational orientations in the workplace; they showed that these orientations are enduring dispositional tendencies and that they are distinct from other constructs. Research has found that the two motivational orientations are relatively independent and can coexist (Amabile et al., 1994; Moneta & Spada, 2009; Vansteenkiste et al., 2007). For instance, Vansteenkiste et al. (2007) found that the two were positively correlated (r = .21 in Study 1, and .31 in Study 2). Studies on intrinsic motivational orientation and job outcomes (e.g., job satisfaction) have generated mixed findings (Amabile et al., 1994; Vansteenkiste et al., 2007). Specific to creativity, Amabile et al. (1994) reported that intrinsic motivational orientation was positively related to judge-rated creativity in a sample of student artists but was unrelated to judge-rated creativity in a sample of professional artists. Tierney et al. (1999) found that intrinsic motivational orientation was positively associated with supervisor-rated creativity and the number of invention disclosure forms that employees completed, but not with the number of published research reports.

The foregoing review suggests that the findings regarding intrinsic motivation orientation have been mixed and that the theoretical mechanism has been largely unexamined. Moreover, prior research has not examined the interactive effect of intrinsic and extrinsic motivation orientations in the motivational processes leading to creativity (George, 2007). Extrinsic and intrinsic motivational states fluctuate and may not necessarily coexist; one may undermine or enhance the other (see Deci & Ryan, 1985). However, as we showed earlier, intrinsic and extrinsic motivational orientations are stable and often do coexist. Due to such co-occurrence and relative stability, a focus on orientations enables us not only to better predict motivational behaviors in different situations (Amabile, 1993; Amabile et al., 1994) but also to examine how they interact in the motivational processes leading to creative outcomes.

In this study, we posit that extrinsic motivational orientation strengthens the relationship between intrinsic motivational orientation and personal creativity goal. First, individuals with extrinsic motivational orientation value rewards and recognition that confirm for them their self-worth, competence, and professional status (Amabile et al., 1994; Vansteenkiste et al., 2007). With their desire for rewards and recognition, individuals with an intrinsic motivational orientation embrace more strongly personal creativity goal, because achieving it not only satisfies their intrinsic desire for

self-expression, active involvement, novelty, challenge, and enjoyment, but also leads to the rewards and recognition that they desire.

Second, compared with intrinsic motivational orientation, extrinsic motivational orientation is less process-focused and more outcome-focused (Abuhamdeh & Csikszentmihalyi, 2009; Amabile, 1993; Grant, 2008). Individuals with an intrinsic motivational orientation tend to view work as an end in itself and enjoy the process of doing their work (Abuhamdeh & Csikszentmihalyi, 2009; Amabile, 1993); those with an extrinsic motivational orientation tend to view work as a means to an end (e.g., rewards and recognition; Abuhamdeh & Csikszentmihalyi, 2009; Malka & Chatman, 2003). Hypothesis 1 posits that intrinsic motivational orientation prompts an individual to embrace personal creativity goal to guide and advance his or her active pursuit of the development and expression of creative ideas. Extrinsic motivational orientation amplifies this relationship because its means-to-an-end focus makes outcome goals (such as creativity goal) even more central and instrumental in personal striving. In other words, the combination of both motivational orientations leads to stronger personal creativity goal because of the greater centrality of such a goal to the individual who has it (Abuhamdeh & Csikszentmihalyi, 2009; Amabile, 1993). In sum, we hypothesize the following:

> *Hypothesis 2:* An individual's extrinsic motivational orientation moderates the relationship between his or her intrinsic motivational orientation and personal creativity goal such that the positive relationship is stronger when the extrinsic motivational orientation is greater.

Personal Creativity Goal, Incremental Creativity, and Radical Creativity

Research on creativity goal has examined creativity as a single category and neglected the different levels of complexity of the activities associated with generating different types of creativity. In the broader literature, scholars have begun to distinguish between radical and incremental creativity. The former refers to ideas that substantially alter existing products, processes, or services; the latter denotes ideas that offer only minor modifications (Gilson & Madjar, 2011; Gilson, Lim, D'Innocenzo, & Moye, 2012; Madjar et al., 2011). Both types of creativity are desirable, and one is not necessarily better than the other (Gilson & Madjar, 2011). In the context of our current study, both incremental and radical creativity are valuable in the consulting and automobile firms where we collected data. An example of incremental creativity in the consulting firm is the development of reports and presentations to clients. After deciding the outline, the consultants work on the details, such as modifying figures (e.g., from bars to curves) in reports or slides to make them more creative. An example of radical creativity is the development of a new framework (system) for evaluating a client's public relations effectiveness, where this framework (system) includes a completely new set of indicators and algorithms. In automobile engineering, research and development (R&D) scientists can either use existing materials to incrementally redesign vehicle components to reduce their weight (i.e., incremental creativity) or adopt completely different (e.g., biological) materials to achieve weight reduction (i.e., radical creativity). The activities associated with radical creativity are often highly complex and based on new knowledge, while those associated with incremental creativity are often simple to moderately complex and based on existing knowledge (Jaussi & Randel, 2014; González-Gómez & Richter, 2015). Drawing upon the resource allocation theory (Kanfer & Ackerman, 1989, 1996; Kanfer et al., 1994), we contend that personal creativity goal has a positive relationship with incremental creativity but an inverted U-shaped relationship with radical creativity.

According to the resource allocation theory, individuals have limited attentional resources and need to allocate them among task activities (i.e., task engagement, such as learning and performing), self-regulatory activities (i.e., self-monitoring, self-evaluation, and self-reaction), and off-task activities (e.g., worries, negative emotional processing or thoughts, and daydreaming; Kanfer & Ackerman, 1989, 1996; Kanfer et al., 1994). An increased amount of attentional resources devoted to task activities leads to improved task performance. Attention given to off-task activities, however, is detrimental to task engagement and thus task performance. The consequence of allocating attention to self-regulatory activities is less straightforward. While self-regulatory activities can motivate effort (the benefit), they also consume precious attentional resources (the cost) that could otherwise be used for actual task engagement. Examples of self-regulatory activities include monitoring or assessing one's own behaviors through feedback and the consequences of such behaviors (self-monitoring); comparing one's own performance against a benchmark or the performance of others (self-evaluation); and forming affective self-perception—for example, dissatisfaction with self (self-reaction). Kanfer and Ackerman (1989) point out that "Unless the benefits of self-regulation are stronger than the costs of resource diversion, performance (and subsequent learning) will suffer" (p. 663). Self-regulatory activities are beneficial when there are sufficient attentional resources for such activities. This is the case in simple to moderately complex (or familiar) tasks because such tasks do not require large amounts of attentional resources to be performed well. Given limited attentional resources, when a complex (or unfamiliar) task itself already requires a high level of attention to master it, the benefit of self-regulatory activities for task performance does not materialize; and such self-regulatory activities may even hamper task engagement because they deprive the complex task of necessary attentional resources.

The resource allocation theory suggests that the relationships between goals and task performance are different for low-to-moderate complexity versus high-complexity tasks. In a simple to moderately complex (or familiar) task, the goal and associated self-regulatory activities (e.g., self-monitoring and self-assessment via feedback) can motivate effort (the benefit). Self-regulatory activities initiated by the goal consume attentional resources (the cost), but they require fewer attentional resources in a simple to moderately complex (or familiar) task; here, self-regulatory activities do not interfere with task engagement because such a task does not require large amounts of attentional resources either (Kanfer & Ackerman, 1989). Therefore, the goal enhances performance in a simple to moderately complex (or familiar) task.

In contrast, in a complex (or unfamiliar) task, a large amount of attentional resources is needed to master and perform the task, due to the cognitively demanding nature of such a task (Randall, Oswald, & Beier, 2014). The high attentional resource demand of a high-complexity (or unfamiliar) task reduces or eliminates the benefits of self-regulatory activities because such activities com-

pete with the task itself for limited attentional resources (Schneider, Dumais, & Shiffrin, 1984). Embracing a goal too strongly initiates intensive self-regulatory activities (e.g., spending a significant amount of time assessing one's own performance, frequently monitoring the consequences of one's own behaviors, and comparing oneself with others) and off-task activities (e.g., worrying) that consume a large amount of attentional resources (Karoly, 1993), leading to a significant reduction in the attentional resources allocated to the task itself (Kanfer & Ackerman, 1989). As the competition for and diversion of attentional resources increases, the level of performance in tackling such a task decreases.

Prior research has provided substantial support for the resource allocation theory (e.g., Kanfer & Ackerman, 1989; Kanfer et al., 1994; Lam, DeRue, Karam, & Hollenbeck, 2011; Randall et al., 2014). Kanfer and Ackerman (1989) showed that goal increases reported task pressure and frequency of negative self-reactions in a complex simulation task. Moreover, goal leads to less attention being devoted to on-task activities and more attention being devoted to off-task activities and relative performance standing, especially in complex tasks. Negative events, such as setbacks, are inevitable in complex or difficult jobs. Lavallee and Campbell (1995) found that negative events trigger negative moods and elicit higher levels of self-focused attention and rumination. Moreover, the more relevant the negative events are to personal goals, the stronger is this effect. A recent meta-analysis of studies on attention regulation found that when "executive control shifts away from a primary task to the processing of personal goals" (Smallwood & Schooler, 2006, p. 946; cf. mind wandering), performance suffers, especially in complex tasks (on mind-wandering, see Randall et al., 2014). Drawing upon the resource allocation theory, Lam et al. (2011) suggested that when levels of feedback are moderate (processing feedback is an important self-regulatory activity often associated with pursuing goals) individuals can devote "sufficient cognitive resources to process feedback while also maintaining their effort directed at on-task learning and performance. In addition, individuals should not experience increased stress or tension due to an overabundance of feedback information, thus limiting the diversion of cognitive resources towards off-task activities" (pp. 218–219). Increasing this feedback, however, prompts "self-regulatory processes to consume more of the available cognitive resources" and increases experience of "increased tension and anxiety related to processing the feedback while also learning and performing the task, thus shifting cognitive resources toward off-task activities as well" (p. 219). Consistent with the resource allocation theory, they found that feedback frequency had an inverted-U relationship with task performance and that this relationship was mediated by on-task effort in a complex dynamic decision-making simulation task.

Drawing upon the resource allocation theory, we theorize that personal creativity goal has differential relationships with incremental and radical creativity. Incremental creativity involves only minor modifications to existing products, services, and processes. The associated activities often involve familiar knowledge elements within an individual's current area or organizational boundary and are at most moderately complex and uncertain (Gilson et al., 2012; González-Gómez & Richter, 2015; Madjar et al., 2011). Such activities require fewer cognitive resources, as compared to highly complex and unfamiliar activities (Madjar et al., 2011). Personal creativity goal has a positive relationship with incremental creativity because such a goal motivates effort in creative activities. At the same time, the self-regulatory activities associated with such a goal do not compromise the on-task attentional resources that are necessary for performing such relatively simple to moderately complex (or familiar) activities (Kanfer & Ackerman, 1989; Kanfer et al., 1994).

In contrast, radical creativity captures ideas that differ substantially from those behind existing routines and often arises from unfamiliar knowledge and information located outside an individual's current area of expertise or organizational boundary (Alexander & van Knippenberg, 2014; Jaussi & Randel, 2014). Activities associated with generating radical creativity are beyond the moderate level of complexity (unfamiliarity) and uncertainty because they often entail acquisition of new knowledge, associations between dissimilar and seemingly unrelated knowledge elements (schemas), and significant challenges to the status quo (Alexander & van Knippenberg, 2014; Gilson et al., 2012; Jaussi & Randel, 2014; Madjar et al., 2011). In other words, radically creative activities are highly complex, unfamiliar, and cognitively demanding. A weak personal creativity goal does not benefit radical creativity because this does not motivate much endeavor (e.g., new knowledge searching and encoding) directed toward being creative. A moderate personal creativity goal (with the associated self-regulatory activities) motivates endeavor directed toward achieving creativity. At the same time, the self-regulatory and off-task activities do not consume too much in the way of attentional resources because such activities are not too intensive (Kanfer & Ackerman, 1989). In other words, the self-regulatory and off-task activities present little cognitive interference with the engagement in radically creative activities, and thus such a goal has a beneficial effect on radical creativity.

The benefit from personal creativity goal plateaus and is eventually outweighed by the cost associated with the increasingly large amount of attentional resources allocated to self-regulatory and off-task activities, leading to a decline in radical creativity. This is because too strong a personal creativity goal initiates intensive self-regulatory activities (e.g., spending a significant amount of time on frequently assessing one's own performance, monitoring its consequences, and comparing it with others); it diverts an increasing amount of attentional resources to self-regulatory activities and thus interferes with the engagement in radically creative activities which are complex and unfamiliar (Kanfer & Ackerman, 1989). It also engenders experiences of pressure and anxiety, which—along with the difficulties and setbacks typically associated with performing complex, unfamiliar activities—direct more attention to off-task activities, such as negative emotional processing or thoughts (George & Zhou, 2007; Madjar et al., 2011). In other words, because the self-regulatory and off-task activities now consume an increasingly large amount of attentional resources, they compete for and tax the limited attentional resources; this leaves few attentional resources for complex and unfamiliar activities associated with generating radical creativity—which themselves require considerable attentional resources—and radical creativity suffers as a result (Kanfer & Ackerman, 1989, 1996). In sum, we hypothesize the following:

Hypothesis 3: An individual's personal creativity goal is positively associated with his or her incremental creativity.

Hypothesis 4: An individual's personal creativity goal has an inverted U-shaped relationship with his or her radical creativity. The relationship is positive initially and then becomes negative as personal creativity goal becomes stronger.

So far, we have hypothesized that intrinsic motivational orientation relates positively to personal creativity goal (Hypothesis 1), which in turn has a positive relationship with incremental creativity (Hypothesis 3) but an inverted U-shaped relationship with radical creativity (Hypothesis 4). In addition, we have hypothesized that extrinsic motivational orientation moderates the positive relationship between intrinsic motivational orientation and personal creativity goal such that the relationship is stronger when extrinsic motivational orientation is greater (Hypothesis 2). Combining the mediating role of personal creativity goal (in linking intrinsic motivational orientation and creativity outcomes) and the moderating role of extrinsic motivational orientation (on the relationship between intrinsic motivational orientation and personal creativity goal) results in a moderated indirect relationship model (Edwards & Lambert, 2007; Hayes & Preacher, 2010). The indirect relationship between intrinsic motivational orientation and incremental creativity, via personal creativity goal, is stronger when extrinsic motivational orientation is greater. This is because intrinsic motivational orientation leads to a stronger personal creativity goal under greater extrinsic motivational orientation; the stronger personal creativity goal motivates endeavor, but the associated self-regulatory and off-task activities do not compromise the attentional resources necessary for incrementally creative activities, thus leading to greater incremental creativity.

With regard to radical creativity, the indirect inverted U-shaped relationship between intrinsic motivational orientation and radical creativity, via personal creativity goal, is initially positive and of greater magnitude when extrinsic motivational orientation is greater. Intrinsic motivational orientation leads to a stronger personal creativity goal under greater extrinsic motivational orientation and thus leads to greater radical creativity *initially*, because embracing a personal creativity goal to low-to-moderate degrees directs effort toward creative tasks without consuming a great deal of attentional resources in self-regulatory and off-task activities. Personal creativity goal becomes detrimental to radical creativity *later on*—when intrinsic and extrinsic motivational orientations jointly lead to too strong personal creativity goal—because such a goal initiates intensive self-regulatory and off-task activities and diverts an increasing amount of attentional resources to such activities, eventually compromising the attentional resources necessary for performing complex and unfamiliar, radically creative activities themselves. Taken together, the indirect relationship between intrinsic motivational orientation and radical creativity, via personal creativity goal, is of greater positive magnitude initially, but of greater negative magnitude later on, when extrinsic motivational orientation is greater. Therefore, we hypothesize the following:

Hypothesis 5: The indirect positive relationship between an individual's intrinsic motivational orientation and incremental creativity, via his or her personal creativity goal, is stronger when his or her extrinsic motivational orientation is greater.

Hypothesis 6: The indirect inverted U-shaped relationship between an individual's intrinsic motivational orientation and radical creativity, via his or her personal creativity goal, is stronger (i.e., more positive initially, and more negative later on) when his or her extrinsic motivational orientation is greater.

Method

Pilot Study

Purpose. Although research on creativity goal has been growing, evidence regarding the validity of its measures has been lacking. We used the three-item scale from Tierney (2010) to measure personal creativity goal. We first conducted a pilot study, with two samples, to validate the three-item personal creativity goal measure. We followed the translation-back-translation procedure (Brislin, 1980) to translate the English-language scales into Chinese. All measures were rated using a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*).

Regarding evidence of discriminant validity (Sample 1), we expected that personal creativity goal is distinct from personal productivity goal. Personal creativity goal emphasizes the novelty and usefulness standards of one's job outputs and encourages variety or variation (Campbell, 1960; Yuan & Zhou, 2008). In contrast, personal productivity goal emphasizes efficiency in producing one's own work outputs (Shalley, 1991, 1995) and may encourage repetition of, and thus improved proficiency in, the same set of routines. The items for personal productivity goal were adapted from the three items for personal creativity goal (see Table 1 for the items measuring creativity and productivity goals). Regarding convergent validity (Sample 2), we expected that Tierney's (2010) three-item measure would converge with Shalley and Perry-Smith's (2001) two-item creativity goal measure ("I tried to be creative on this job" and "I had a creativity goal to meet on this job").

Samples and measures. The project was funded by and started at the third author's institution. All data used in this paper were collected by the third author. Research ethics committees such as an Institutional Review Board (IRB) are not available in the institution with which she is affiliated. It is noted that she strictly followed the American Psychological Association requirements regarding the treatment and protection of human participants while conducting the study. We collected data on Sample 1 (from a consulting firm in China) to assess the discriminant va-

Table 1
Pilot Study's Exploratory Factor Analysis of Personal Creativity Goal and Productivity Goal

Items	Factor 1	Factor 2
Creativity goal		
1. I strive to be more creative in doing my job.	**.810**	.067
2. Generating new ideas for work-related processes/products is a goal of mine.	**.890**	.023
3. I consider being creative an important goal in my job.	**.832**	−.065
Productivity goal		
1. I strive to be more productive in doing my job.	.102	**.780**
2. Working more productively is a goal of mine.	−.080	**.902**
3. I consider being productive an important goal in my job.	.005	**.924**

Note. $N = 180$ (pilot study Sample 1). Loadings with an absolute value greater than .40 are displayed in bold.

lidity of the personal creativity goal scale. We assured all the participants that their participation was voluntary and their responses would be kept strictly confidential. Two hundred and two employees (who were not managers) in the consulting firm received the invitation to participate. We asked these employees to participate in an online survey regarding their personal creativity goal, personal productivity goal, and demographic information. We received complete information from 180 employees (a response rate of 89.11%). Of the 180 employees, 68% were female and the average age was 27 years (with a range of 18 to 44 years). Regarding education, 7% had a high school degree, 52% a college or associate degree, 39% a bachelor's degree, and 2% a master's or higher. The average organizational tenure was 3 years (with a range of 1 month to 14.67 years). For the items pertaining to personal creativity goal ($\alpha = .88$) and personal productivity goal ($\alpha = .90$), we instructed the respondents to rate the items according to their personal situation in their current jobs.

Using Sample 2, we examined the convergent validity of the measure. We asked an independent sample of 71 employees from the same consulting firm to complete an online questionnaire, and we received complete data from 69 employees (a response rate of 97.18%). Of the 69 employees, 44% were female, and the average age was 26 years (with a range of 18 to 34 years). Regarding education, 2% had a high school degree, 43% a college or associate degree, 52% a bachelor's degree, and 3% a master's or higher. The average organizational tenure was 16 months (with a range of 2 months to 14.17 years). We included the same three-item Personal Creativity Goal Scale ($\alpha = .89$) from Sample 1, as well as Shalley and Perry-Smith's (2001) two-item creativity goal measure ($\alpha = .88$).

Results. With the data collected from Sample 1 ($N = 180$), we conducted an EFA using maximum-likelihood factor analysis and oblique rotation. The EFA results indicated a clear two-factor structure with the personal creativity goal items and productivity goal items loading on their respective factors. No substantial cross-loadings were present (see Table 1). The two factors accounted for 74.44% of the total variance. The correlation between personal creativity goal and productivity goal was moderate, $r = .33$, $p < .01$. With the data collected from Sample 2 ($N = 69$), we conducted an omnibus confirmatory factor analysis (CFA) to examine the convergent validity of the two measures of the creativity goal. The two creativity goal measures were highly correlated, $r = .85$, $p < .001$. We tested two models. Model 1 was a two-factor model. This model had a satisfactory fit: $\chi^2(4) = 4.60$, *ns*; comparative fit index (CFI) = 1.00, Tucker–Lewis Index (TLI) = 1.00, root mean square error of approximation (RMSEA) = .047. In Model 2 (the more parsimonious model), the two measures of creativity goal loaded on one factor. Model 2 showed a satisfactory fit: $\chi^2(5) = 6.82$, *ns*; CFI = .99, TLI = .99, RMSEA = .073; and its fit was as good as that of Model 1, $\Delta\chi^2(1) = 2.22$, *ns*. The comparison between Model 2 and Model 1 shows that the two measures of creativity goal have convergent validity.

Primary Study

Procedure and sample. To test the proposed model as depicted in Figure 1, we collected multisource, time-lagged data from R&D employees in a large automobile design and manufacturing firm in China. Before the data collection began, one of the authors interviewed the vice-president for human resources (HR) and two HR managers. The interviews indicated that, although the firm desired creativity and innovation, it did not assign specific creativity goals to employees (e.g., generating 10 ways to improve an electronic component) as part of its managerial practices. This enabled us to focus on personal creativity goal and remove the extraneous impact of assigned goals. Furthermore, both radical and incremental creativity were present in the firm and desired by the management. For example, electronic components development had traditionally focused on wear and tear and thus had been separated from software management. A few years ago, a software upgrade led to a mismatch with the functions of these electronic components. A radically creative idea was proposed and implemented to integrate and synchronize the development of electronic components and the associated software management so that these two processes, historically done separately, worked in tandem. As an example of incremental creativity, a cover on a stand of a power generator was cylindrical and therefore was hard to affix to the vehicle. An R&D employee investigated the production line and suggested adding notched gears onto the cover to make it easier to attach.

With the support of the HR department, we invited all 795 R&D employees from 80 teams to participate. One author distributed the questionnaires to the employees and their team leaders (onsite, during working hours) and informed the participants that their participation was voluntary and their responses would be kept confidential. The employees and team leaders completed their questionnaires independently and returned the completed questionnaires directly to one of the authors. We collected data from two sources at two time points. At Time 1, all the R&D employees filled out a questionnaire containing items on their intrinsic and extrinsic motivational orientations and demographic characteristics. One month later (Time 2), the same employees filled out a questionnaire on their personal creativity goal, while their team leaders rated each employee's incremental and radical creativity. We obtained usable responses from 657 employees working in 79 R&D teams, yielding an overall response rate of 82.3% at the employee level and 98.8% at the team leader level. The number of employees rated by a team leader ranged from four to 13.

Of the 657 employees, 22% were female. The participants were generally young: 17% were under 26 years old, 68% were between 26 and 30 years old, 12% were 31 to 35 years old, and only 3% were older than 35. They were well educated, with 15% having college or associate degrees, 71% a bachelor's degree, and 14% a master's or higher. Their average organizational tenure was 3.26 years, and their average dyadic tenure with the team leaders was 2.17 years. Using personnel records from the firm, we examined potential nonresponse biases and found no significant differences between the respondents and nonrespondents in terms of age, gender, education, or tenure. Of the 79 team leaders, 12% were female; 43% were between 26 and 30 years old, 42% were 31 to 35 years old, and 15% were older than 35. In terms of education, 1% had college or associate degrees, 84% a bachelor's degree, and 15% a master's or higher. Their average organizational tenure was 6.61 years.

Measures. We followed the same translation-back-translation procedure (Brislin, 1980) as in the pilot study. Unless otherwise indicated, all measures were rated on a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*). To measure intrinsic and extrinsic

motivational orientations, we used the 30-item scale developed and validated by Amabile et al. (1994). A sample item for assessing intrinsic motivational orientation is "What matters most to me is enjoying what I do." A sample item for assessing extrinsic motivational orientation is "I am strongly motivated by the money I can earn." The reliability coefficients for the intrinsic and extrinsic motivational orientations were .79 and .82, respectively. We used the three-item personal creativity goal measure used in the pilot study. The reliability coefficient was .83. We used Gilson and Madjar's (2011) scale to assess incremental and radical creativity (four items for each). The team leaders were instructed to rate each subordinate independently and in an objective manner. A sample item for assessing incremental creativity is "This employee makes suggestions on incremental changes to existing processes or products (services)." A sample item for assessing radical creativity is "This employee makes radical inventions beyond existing processes or products (services)." The reliability coefficients for incremental and radical creativity were .89 and .94, respectively.

We controlled for employee age (1 = *under 26 years*, 2 =*26–30 years*, 3 =*31–35 years*, 4 = *36–40 years* . . . 8 =*56–60 years*, 9 = *over 60*), gender (0 = *male*, 1 = *female*), education (1 = *junior high school*, 2 = *senior high school*, 3 = *college or associate degree*, 4 = *bachelor's degree*, 5 = *master's or above*), organizational tenure (in years), and dyadic tenure with team leader (in years). Prior research suggests that these variables potentially influence employees' engagement in creative processes and their creativity (Amabile, Barsade, Mueller, & Staw, 2005; George & Zhou, 2007; Gong, Huang, & Farh, 2009; Hirst, van Knippenberg, Chen, & Sacramento, 2011; Hirst, van Knippenberg, & Zhou, 2009; Tierney & Farmer, 2002; Zhou, Shin, Brass, Choi, & Zhang, 2009). The participants were nested within teams. Following prior creativity research (Amabile et al., 2005), we used multilevel path modeling to control for unique variances from the teams in all the analyses. Moreover, we controlled for team size, which potentially influences team processes (e.g., communication, social interaction, and information sharing) and individual creative outcomes (Gong, Kim, Lee, & Zhu, 2013; Hirst et al., 2009; Hirst et al., 2011).[1]

Analytic strategy. We first conducted CFAs to examine the discriminant validity of the variables measured through employee self-ratings (intrinsic motivational orientation, extrinsic motivational orientation, and personal creativity goal) and supervisor ratings (incremental and radical creativity). Multilevel path analytical modeling with *Mplus* (Muthén & Muthén, 1998-2015) was used to accommodate the nested data structure and to account for the fact that each team leader had rated multiple employees. Compared with hierarchical linear modeling (Raudenbush & Bryk, 2002), multilevel path modeling has the advantage of simultaneously examining multiple outcome variables and indirect relationships. We used group-mean centering for intrinsic motivational orientation, extrinsic motivational orientation, and personal creativity goal; this ensured that we had correct interpretations of the main and the indirect effects (Enders & Tofighi, 2007; Hofmann & Gavin, 1998). In addition, group-mean centering can minimize the potential problem of multicollinearity when testing curvilinear relationships. We followed Snijders and Bosker (2012) to calculate pseudo-R^2 for the multilevel path model.

We tested the inverted U-shaped relationship (Hypothesis 4) by examining the quadratic term of personal creativity goal in the multilevel path model. To test the first-stage moderated indirect effect model that involves only linear relationships (Hypothesis 5), we followed Edwards and Lambert (2007) to compare the indirect effects at high and low levels of the moderator (1 *SD* above and below the mean). To test the first-stage moderated indirect effect model involving a curvilinear relationship (Hypothesis 6), we followed the procedures recommended by Hayes and Preacher (2010) to examine the instantaneous indirect effect at high and low levels of the moderator (1 *SD* above and below the mean). These instantaneous indirect effects need to be examined at several levels of the mediator (from 2 *SD* below the mean to 2 *SD* above the mean). Case-based bootstrapping is not yet available in *Mplus* or other multilevel programs. Therefore, to calculate the 95% confidence intervals (CIs) of the indirect effects and the difference between the two indirect effects, we used Monte Carlo bootstrapping (with 20,000 replications), as recommended by Preacher and Selig (2012).

Primary Study Results

Table 2 reports the means, standard deviations, reliability coefficients, and correlations of the variables in the primary study. Table 3 shows the CFA results for all items in the employee self-reported variables (intrinsic and extrinsic motivational orientations and personal creativity goal). We randomly assigned the 15 items for intrinsic motivational orientations into five parcels of three items, and we did the same to the 15 items for extrinsic motivational orientation. As shown in Table 3, the proposed three-factor model demonstrated satisfactory fit: $\chi^2(62) = 154.33$, $p < .001$, CFI = .97, TLI = .97, RMSEA = .045. When we combined the indicators of two variables to represent one factor, the resulting two-factor models fit the data poorly, with CFIs ranging from .78 to .83, TLIs from .73 to .79, and RMSEAs from .111 to .125. A single-factor model also demonstrated poor fit: $\chi^2(65) = 1{,}335.96$, $p < .001$, CFI = .61, TLI = .54, RMSEA = .164.

We also conducted CFAs on the two variables reported by team leaders (four items each for incremental and radical creativity). As Table 3 shows, the proposed two-factor model demonstrated satisfactory fit: $\chi^2(19) = 94.49$, $p < .001$, CFI = .98, TLI = .97, RMSEA = .076. The single-factor model showed poor fit: $\chi^2(20) = 597.18$, $p < .001$, CFI = .87, TLI = .81, RMSEA = .204. Based on these results, we proceeded to analyze the study variables as distinct constructs.

We tested the hypotheses using two multilevel path models in which personal creativity goal served as the mediator and incremental and radical creativity as the dependent variables. Our first model was the main effect model, used to test Hypotheses 1 and 3. This was a fully saturated model and thus had perfect fit. The unstandardized coefficients and their associated standard errors are reported in Table 4. The second model built upon the first by adding the interaction term between intrinsic and extrinsic motivational orientation and the squared term of personal creativity goal. This second model showed satisfactory fit: $\chi^2(16) = 28.68$, $p < .05$, CFI = .97, TLI = .91, and RMSEA = .035. The

[1] As a supplementary analysis, we controlled for two team contextual variables, that is, team formalization and team centralization (both were from Hirst et al., 2011). Adding these two control variables did not change our findings and conclusions.

Table 2
Descriptive Statistics and Correlations Among the Primary Study's Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. Gender (1 = female, 0 = male)	.22	.41	—										
2. Age	2.00	.66	.00	—									
3. Education	3.94	.58	.00	−.05	—								
4. Organizational tenure (in years)	3.26	2.00	.08*	.32***	−.28***	—							
5. Dyadic tenure (in years)	2.17	1.56	.08*	.21***	.02	.49***	—						
6. Team size	9.94	2.70	−.05	.01	.11**	−.05	.02	—					
7. Intrinsic motivational orientation	5.31	.61	.02	−.05	.06	−.07	.02	.02	(.79)				
8. Extrinsic motivational orientation	4.79	.68	−.05	−.02	−.03	.01	.03	.04	.44***	(.82)			
9. Personal creativity goal	5.36	.94	−.07	−.01	.04	−.06	−.11*	−.02	.31***	.16***	(.83)		
10. Incremental creativity	4.74	.96	−.04	.04	.09*	.05	.11**	.00	.03	−.02	.10*	(.89)	
11. Radical creativity	3.86	1.21	−.01	−.01	.16***	−.04	.06	−.01	.05	−.01	.04	.60***	(.94)

Note. $N = 657$. Reliability coefficients are reported in parentheses. Age and education are categorical variables.
* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

unstandardized coefficients and their associated standard errors are reported in Table 5. In both models, we used manifest variables at their appropriate levels (i.e., leader and follower) and examined the fixed slopes. All the control variables were used to predict the mediator as well as the dependent variables.

Hypothesis 1 suggested a positive relationship between intrinsic motivational orientation and personal creativity goal. As shown in Table 4, this relationship was positive (.41, $p < .001$) after controlling for extrinsic motivational orientation and the control variables. Thus, Hypothesis 1 was supported.

Hypothesis 2 posited a moderating role for extrinsic motivational orientation in the relationship proposed in Hypothesis 1. As shown in Table 5, the interaction term between intrinsic and extrinsic motivational orientations was significant (.20, $p < .05$), with an incremental pseudo-R^2 of .03. We plot this interaction in Figure 2, where the high and low levels are 1 *SD* above and below the mean, respectively. Extrinsic motivational orientation strengthens the positive relationship between intrinsic motivational orientation and personal creativity goal such that the simple slope is .29 ($p < .001$) when extrinsic motivational orientation is weak and .53 ($p < .001$) when extrinsic motivational orientation is strong. Thus, Hypothesis 2 was supported.

Hypothesis 3 suggested that personal creativity goal is positively related to incremental creativity. As shown in Table 4, after controlling for intrinsic motivational orientation, extrinsic motivational orientation, and the control variables, personal creativity goal was positively related to incremental creativity (.09, $p < .01$). Thus, Hypothesis 3 was supported.

Hypothesis 4 suggested an inverted U-shaped relationship between personal creativity goal and radical creativity. As shown in Table 5, after controlling for intrinsic motivational orientation, extrinsic motivational orientation, and the main effect of personal creativity goal, the squared term of personal creativity goal was significant (–.06, $p < .05$) and associated with an incremental pseudo-R^2 of .01. We plot this curvilinear relationship in Figure 3, which shows that the relationship initially has an upward trend but turns downward after personal creativity goal reaches the moderate-to-strong range. The stationary point of this curve is at −.14 *SD* of personal creativity goal, which is the point at which the curve starts to decline. We further tested the simple slopes for various values of personal creativity goal to examine this trend. As shown in Table 7, the simple slope is positive when personal creativity goal is at −2 *SD* (.18, $p < .05$), −1.5 *SD* (.13, $p < .05$), and −1 *SD* (.08, $p < .05$). It becomes nonsignificant when personal creativity goal is at the mean value, and it becomes negative when personal creativity goal is at +1 *SD* (–.11, $p < .05$), +1.5 *SD* (–.16, $p < .05$), and +2 *SD* (–.21, $p < .05$). Overall, these results supported Hypothesis 4.

Table 3
Confirmatory Factor Analyses of the Primary Study's Variables

Model	χ^2	*df*	$\Delta\chi^2(\Delta df)$	CFI	TLI	RMSEA
Employee self-reported measures						
1. *Three factors:* Intrinsic motivational orientation, extrinsic motivational orientation, and personal creativity goal	154.33	62	—	.97	.97	.045
2. *Two factors:* Intrinsic motivational orientation and extrinsic motivational orientation combined	797.56	64	643.23 (2)	.78	.73	.125
3. *Two factors:* Intrinsic motivational orientation and personal creativity goal combined	640.36	64	486.03 (2)	.83	.79	.111
4. *Two factors:* Extrinsic motivational orientation and personal creativity goal combined	779.83	64	525.50 (2)	.78	.74	.124
5. *One factor:*	1,335.96	65	1,181.63 (3)	.61	.54	.164
Supervisor-rated measures						
1. *Two factors:* Incremental creativity and radical creativity	94.49	19	—	.98	.97	.076
2. *One factor*	597.18	20	502.69 (1)	.87	.81	.204

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean squared error of approximation. All chi-square difference tests are significant at $p < .001$.

Table 4
Multilevel Path Modeling for the Main Effects (Primary Study)

Variable	Personal creativity goal		Incremental creativity		Radical creativity	
	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*
Gender	−.20	.12	−.18*	.08	−.09	.07
Age	.03	.07	−.03	.08	−.02	.05
Education	.06	.08	.15*	.07	.13*	.06
Organizational tenure	.05	.03	.04	.02	.01	.02
Dyadic tenure	−.09*	.04	.09***	.03	.07**	.02
Team size	.01	.02	.01	.04	−.01	.06
Intrinsic motivational orientation	.41***	.07	−.01	.08	.07	.06
Extrinsic motivational orientation	.11*	.05	.00	.05	.02	.05
Personal creativity goal			.09**	.03	.04	.03
Total pseudo-R^2	.10		.07		.04	
ΔPseudo-R^2 for adding goal			.01		.00	

Note. Unstandardized coefficients (Coeff.) and their standard errors are reported. Fully saturated model with perfect model fit indices. Pseudo-R^2 and its change are based on Snijders and Bosker (2012).
* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

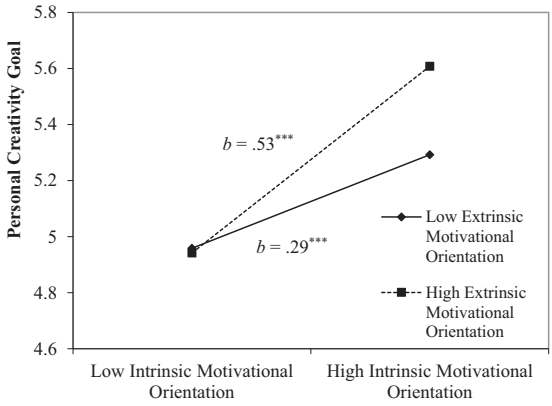

Figure 2. Moderating effect of extrinsic motivational orientation on the relationship between intrinsic motivational orientation and personal creativity goal.

Hypothesis 5 suggested a moderated indirect effect such that the indirect positive relationship between intrinsic motivational orientation and incremental creativity (via personal creativity goal) is stronger when extrinsic motivational orientation is stronger. As shown in Table 6, we calculated the indirect effects based on the coefficients and standard errors associated with paths *a* and *b* in the indirect relationships (Edwards & Lambert, 2007). The indirect effect was .05 ($p < .01$, 95% Monte Carlo bootstrapped CI [.02, .09]) when extrinsic motivational orientation was strong, and .03 ($p < .05$, 95% Monte Carlo CI [.01, .06]) when it was weak. Based on Monte Carlo bootstrapping with 20,000 replications, the 95% CI for the difference between the indirect effects under the two conditions did not include 0. Therefore, the indirect relationship was stronger when extrinsic motivational orientation was stronger rather than weaker. These results thus supported Hypothesis 5.

Hypothesis 6 suggested that the indirect inverted U-shaped relationship between intrinsic motivational orientation and radical creativity (via personal creativity goal) is moderated by extrinsic motivational orientation such that the indirect relationship is of greater magnitude (across the full range of the inverted-U) when extrinsic motivational orientation is stronger. Following the procedures recommended by Hayes and Preacher (2010), we report the indirect effects at strong and weak conditions of extrinsic motivational orientations for various values of personal creativity goal (±2 *SD*, ±1.5 *SD*, ±1 *SD*, and mean; see Table 7). The differences in the indirect effects at strong versus weak extrinsic motivational orientation conditions were marginally significant when personal creativity goal was at ±1 *SD* of the mean; the

Table 5
Multilevel Path Modeling With the Interaction and Squared Terms (Primary Study)

Variable	Personal Creativity Goal		Incremental Creativity		Radical Creativity	
	Coeff.	*SE*	Coeff.	*SE*	Coeff.	*SE*
Gender	−.20	.12	−.18*	.08	−.10	.08
Age	.03	.07	−.03	.08	−.02	.05
Education	.06	.08	.15*	.07	.13*	.06
Organizational tenure	.05	.03	.04	.02	.02	.02
Dyadic tenure	−.09*	.04	.09***	.03	.07**	.02
Team size	.01	.02	.01	.04	−.01	.06
Intrinsic motivational orientation	.41***	.07	−.02	.08	.10	.06
Extrinsic motivational orientation	.11*	.05	.00	.05	.02	.05
Intrinsic Motivational Orientation × Extrinsic Motivational Orientation	.20*	.08				
Personal creativity goal			.10**	.03	−.02	.03
Personal creativity goal–squared					−.06*	.02
Total pseudo-R^2	.13		.07		.05	
ΔPseudo-R^2 for adding interaction term	.03					
ΔPseudo-R^2 for adding goal			.01			
ΔPseudo-R^2 for adding goal-squared					.01	

Note. Unstandardized coefficients (Coeff.) and their standard errors are reported. Pseudo-R^2 and its change are based on Snijders and Bosker (2012).
* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

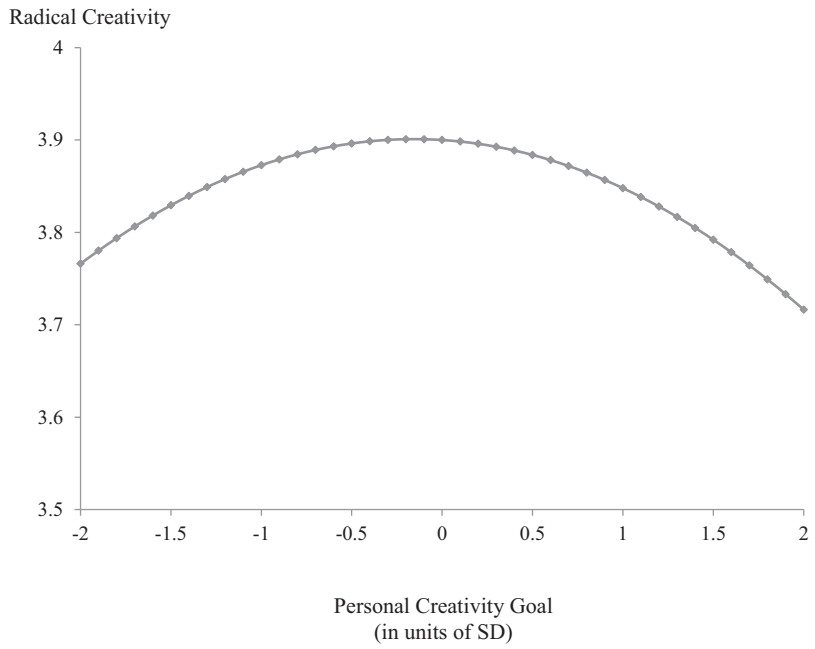

Figure 3. Inverted U-shaped relationship between personal creativity goal and radical creativity. (Exemplar slopes at various values of personal creativity goal are reported in Table 7.)

differences in indirect effects were significant when personal creativity goal was at ±1.5 *SD* and ±2 *SD* of the mean. Overall, the pattern shows that the indirect relationship was of a greater magnitude when extrinsic motivational orientation was stronger. These results supported Hypothesis 6.

Supplementary analysis. We performed a robustness check by excluding those control variables that did not significantly predict the mediator or creativity variables. Our findings remained unchanged after excluding these controls. As a post hoc analysis, we examined whether personal creativity goal had a curvilinear relationship with incremental creativity. The results showed that the coefficient of the squared term of personal creativity goal was not significant in predicting incremental creativity (–.002, SE = .03, $p > .90$).

Discussion

In this study we validated the Personal Creativity Goal Scale and examined whether intrinsic and extrinsic motivational orientations interact positively to influence personal creativity goal. We showed that intrinsic motivational orientation is positively associated with personal creativity goal and that extrinsic motivational orientation strengthens this relationship. Personal creativity goal, in turn, has a positive linear relationship with incremental creativity but an inverted U-shaped relationship with radical creativity. Finally, extrinsic motivational orientation strengthens the indirect (linear and inverted U-shaped, respectively) relationships between intrinsic motivational orientation and both incremental and radical creativity, via personal creativity goal.

Implications for Theory and Research

Intrinsic and extrinsic motivational orientations often coexist and each serves an important function (Amabile, 1993, 1997; George, 2007). While it is tempting to place a singular focus on the benefit of one and the detriment of the other, in reality it may be that a combination of both characterizes individuals' motivations to work (George, 2007). Intrinsic motivational orientation tunes

Table 6
Indirect Effects of Intrinsic Motivational Orientation on Incremental Creativity via Personal Creativity Goal

Moderator	Path *a* (*SE*)	Path *b* (*SE*)	Indirect Effect [95% CI]
High extrinsic motivational orientation (1 *SD* above mean)	.53*** (.09)	.10** (.03)	.05** [.02, .09]
Low extrinsic motivational orientation (1 *SD* below mean)	.29*** (.08)	.10** (.03)	.03* [.01, .06]
Difference between indirect effects under the two conditions			.02* [.003, .05]

Note. Unstandardized coefficients and their standard errors are reported. CI refers to Monte Carlo bootstrapped confidence intervals.
* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

Table 7
Indirect Effects of Intrinsic Motivational Orientation on Radical Creativity via Personal Creativity Goal

Moderator	Path *a* (*SE*)	Path *b* (*SE*)						
		Goal = −2 *SD*	Goal = −1.5 *SD*	Goal = −1 *SD*	Goal = 0 *SD*	Goal = 1 *SD*	Goal = 1.5 *SD*	Goal = 2 *SD*
High extrinsic motivational orientation (1 *SD* above mean)	.53*** (.09)	.18* (.08)	.13* (.06)	.08* (.04)	−.02 (.03)	−.11* (.06)	−.16* (.08)	−.21* (.10)
Low extrinsic motivational orientation (1 *SD* below mean)	.29*** (.08)	.18* (.08)	.13* (.06)	.08* (.04)	−.02 (.03)	−.11* (.06)	−.16* (.08)	−.21* (.10)
		Indirect Effect [95% CI]						
High extrinsic motivational orientation (1 *SD* above mean)		.10* [.02, .19]	.07* [.01, .14]	.05† [−.001, .10]	−.01 [−.04, .02]	−.06† [−.13, .001]	−.09* [−.18, −.01]	−.11* [−.23, −.01]
Low extrinsic motivational orientation (1 *SD* below mean)		.05* [.01, .11]	.04* [.004, .08]	.02† [−.001, .06]	−.004 [−.02, .01]	−.03† [−.07, .001]	−.05* [−.10, −.004]	−.06* [−.13, −.01]
Difference between indirect effects under the two conditions		.05* [.002, .11]	.03* [.001, .08]	.02† [−.001, .05]	−.004 [−.02, .01]	−.03† [−.08, .001]	−.04* [−.11, −.001]	−.05* [−.14, −.001]

Note. Unstandardized coefficients and their standard errors are reported. CI refers to Monte Carlo bootstrapped confidence intervals. "Goal" refers to personal creativity goal.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

employees to creative self-expression, enjoyment, novelty, and challenging seeking, and thus the pursuit of personal creativity goal. Extrinsic motivational orientation tunes employees to focus more on outcome goal that is instrumental in personal striving, and thus amplifies the effect of intrinsic motivational orientation on personal creativity goal. Supporting our conceptual model, the findings suggest that intrinsic and extrinsic motivational orientations interact positively to influence personal creativity goal. While extrinsic motivational orientation has been cast in a negative light, we reveal its positive side by showing its positive moderating role in the motivational process (via personal creativity goal) linking intrinsic motivational orientation and creativity.

This study extends the theory and research on creativity goal by (a) demonstrating the discriminant and convergent validity of a personal creativity goal measure and (b) drawing a distinction between radical and incremental creativity and showing that personal creativity goal relates to each type of creativity in different ways. To advance research on personal creativity goal and conduct rigorous testing of theories, a validated scale is imperative. With the psychometrically sound personal creativity goal measure, in the future researchers can test personal creativity goal related theories with more confidence. In our primary study, we demonstrated that personal creativity goal has a positive linear relationship with incremental creativity but an inverted U-shaped relationship with radical creativity. This is an interesting insight missing in prior research, due to the focus on creativity as a unitary construct. The implication is that a strong personal creativity goal is not necessarily the one most beneficial to radical creativity and may even be detrimental to it; thus, we have revealed a negative side of creativity goal hitherto missing from the literature.

This study also advances knowledge of the mechanism through which intrinsic motivational orientation relates to creativity. We have shown that, consistent with the motivation sequence framework, intrinsic motivational orientation drives personal creativity goal, which in turn influences employee creativity. The finding that personal creativity goal serves as a mechanism is not very surprising but is nonetheless insightful. It shows that intrinsic motivational orientation has differential indirect relationships with incremental and radical creativity (linear and inverted U-shaped, respectively) via personal creativity goal. This insight would not have been gained had we not examined personal creativity goal as a mechanism.

More importantly, our results have implications for the intrinsic motivation perspective. Despite the important role ascribed to intrinsic motivational orientation, our results suggest that its direct effect on personal creativity goal and its indirect effect on creativity via personal creativity goal depend on extrinsic motivational orientation. Intrinsic motivational orientation propels individuals to enjoy the process of being creative, and extrinsic motivational orientation encourages them to place more emphasis on outcome goal. The combination of both strengthens personal creativity goal. Our findings therefore uncover a boundary condition for the intrinsic motivation perspective. In addition, our results also advance research from the intrinsic motivation perspective by revealing the diminishing returns of intrinsic motivational orientation. Specifically, our results suggest an indirect inverted U-shaped relationship between intrinsic motivational orientation and radical creativity via personal creativity goal. The implication is that strong intrinsic motivational orientation that encourages personal creativ-

ity goal is not the one most beneficial for radical creativity. Consistent with this notion, the finding of Amabile et al. (1994) was that professional artists who scored highly on intrinsic motivational orientation did not demonstrate greater creativity (as rated by judges). Based on our findings, one explanation is that strong intrinsic motivational orientation engenders strong personal creativity goal; according to the resource allocation theory, this could divert attention to self-regulatory and off-task activities and thus interfere with the pursuit of complex, unfamiliar, and radically creative activities, leading to lower radical creativity.

Limitations and Future Research Directions

This study has some limitations that suggest fruitful directions for future research. First, even though we collected multisource and time-lagged data, we could not fully establish the causality for the relationships examined. In particular, the motivation sequence framework suggests that personal goals drive behaviors and performance outcomes (including creativity), rather than vice versa. However, there could potentially be a reverse relationship between a personal creativity goal and radical creativity because engaging in greater radical creativity may imply that the person concerned embraces personal creativity goal more strongly. We encourage future research to theorize and examine this potential reverse relationship.

Second, we did not examine the mechanisms through which the interaction between intrinsic and extrinsic motivational orientations leads to personal creativity goal. As such, a potentially fruitful direction for future work is to uncover the intermediate processes in the motivations-goal linkage. One possibility is creative self-efficacy, which may help channel the intrinsic-extrinsic interaction effect into personal creativity goal. Individuals with strong intrinsic and extrinsic motivational orientations may develop and sustain strong creative self-efficacy, which in turn leads to strong personal creativity goal.

Third, we hope this study can spark future research on personal creativity goal and creativity, with an eye on addressing the limitations in our study. Specifically, we measured personal creativity goal in one's job using a sample of R&D employees. Future research could examine whether such goal varies from one job domain to another. Also, when examining the effect of having a personal creativity goal, we controlled for intrinsic motivational orientation, a variable that may capture a creativity orientation to some extent. Future research could ascertain whether an individual's personal creativity goal still matters after controlling for one's creativity orientation directly. In addition, it is possible that personal creativity goal could generate more concrete or specific creativity goal tied to a particular task or project. In particular, it is likely that in a context where a person's job is project-based, a personal creativity goal would translate into a project-based creativity goal according to the features of the project (e.g., project length and output requirements). That being so, future research could investigate how personal creativity goal function in project teams.

Relatedly, in project teams, time may play a role in the creative process as projects usually have clear deadlines to complete. Thus, future research could examine how time may affect the relationships between intrinsic and extrinsic motivational orientations and the creative process in project teams. For example, according to the shifting-focus-of-attention model (March & Shapira, 1992), in project teams, deadline proximity—the amount of time there is or that remains prior to a project deadline—may differently affect individuals with intrinsic and extrinsic motivational orientations (Abuhamdeh & Csikszentmihalyi, 2009; Lehman, Hahn, Ramanujam, & Alge, 2011). Individuals with an intrinsic motivational orientation tend to enjoy and value the process of executing the project. We posit that, as a deadline approaches, individuals with an intrinsic motivational orientation may have to shift their attention to the deadline and outcome; they then feel demotivated (i.e., derive less satisfaction and enjoyment from the tasks currently in hand). By contrast, individuals with an extrinsic motivational orientation may experience a burst of energy as a deadline approaches; and they then exert even greater efforts to complete the job, because they tend to be motivated by extrinsic incentives, such as meeting deadlines and obtaining outcome-based rewards.[2]

Fourth, we focused on individual level antecedents and the intervening processes, whereas team compositions and processes may also influence the motivational processes and subsequent creative outcomes at the individual level. The teams in our sample had quite similar characteristics (the same type, from the same department, and the same organization) and this can potentially reduce between-team variations in team processes. Future research may explicitly identify and examine the team processes that influence individual level motivational processes and subsequent creative outcomes.

Moreover, future research can examine whether team composition in motivational orientations matters at the team level (Alexander & van Knippenberg, 2014; Harvey, 2014). Stimulated by the finding regarding the interactive effect of intrinsic and extrinsic motivational orientations at the individual level, we suggest two approaches to configuring intrinsic and extrinsic motivational orientations at the team level. The first approach is that each team member has, for example, strong intrinsic and extrinsic motivational orientations (the intrapersonal approach). The second approach is that team members are diverse in terms of their motivational orientations, some being intrinsically oriented and others being extrinsically oriented (the interpersonal approach). With the first configuration, the team members could be better able to collaborate effectively in developing team creativity goal, because of the similarity in their motivational orientations. With the second configuration, where the team members differ in their motivational orientations, they may have difficulty integrating their different preferences (e.g., process vs. outcome focus). Potential group process loss (e.g., conflicts) may arise, due to the dissimilarity in the individuals' motivational orientations (Pieterse, van Knippenberg, & van Ginkel, 2011; van Knippenberg, De Dreu, & Homan, 2004). It would be informative to examine whether the first configuration is more effective at the team level.

Whichever approach to take, future research could further theorize and empirically examine *how* team composition in motivational orientations influences team outcomes. Recent work (e.g., Schreurs, van Emmerik, Van den Broeck, & Guenter, 2014) has begun to examine how team level composition (e.g., intrinsic relative to extrinsic orientations) influences individual level out-

[2] We thank an anonymous reviewer for this idea on the role of time for future research.

comes (e.g., work engagement). It would be interesting to examine the mechanisms for team level outcomes. For instance, it is possible that when each member has strong intrinsic and extrinsic motivational orientations, the team will be better able to develop shared team creativity goal, which promotes process gain (e.g., collective work engagement), leading to better team outcomes such as team creativity.

Managerial Implications

A common view on employee motivation is that managers should suppress extrinsic motivational orientations but encourage intrinsic motivational orientations. The managerial conundrum is that the implication of this view is difficult, if not impossible, to implement. In reality, employees often have an extrinsic motivational orientation and routinely express it in the context of omnipresent extrinsic motivators (such as rewards) in real organizations.

The current study reveals the utility of extrinsic motivational orientation: it strengthens the effect of intrinsic motivational orientation on personal creativity goal in the motivation processes leading to creativity. That is, the relationship between intrinsic motivational orientation and personal creativity goal is more positive and stronger at greater extrinsic motivational orientation. The good news is that a naturally occurring extrinsic motivational orientation is *not necessarily always* a regrettable part of work life—it can be potentially valuable. Instead of eliminating extrinsic motivational orientation altogether, managers can actually combine it with intrinsic motivational orientation. It should be noted that our suggestion is to *combine* the two rather than simply encourage extrinsic motivational orientation *alone*, because a strong extrinsic motivational orientation by itself may have negative consequences for certain outcomes (e.g., for job satisfaction, as in Vansteenkiste et al., 2007).

While intrinsic motivational orientation is potentially beneficial, our examination of personal creativity goal as a mechanism reveals more nuanced and useful practical implications. Specifically, strong intrinsic motivational orientation is not necessarily a good thing, because it leads to strong personal creativity goal that eventually hampers radical creativity. Organizations could choose to employ individuals whose intrinsic motivational orientation is not too extreme. Managers can also pull an employee back from overly strong personal creativity goal if they are aiming for radical creativity. This implication is timely and relevant because companies are striving for radical innovation to leapfrog their competitors, and their employees' radical creativity is the essential source of such innovation (Alexander & van Knippenberg, 2014; Leifer et al., 2000). Interventions targeting personal creativity goal, which represents a malleable motivational state, are also practical because such a goal is easier to influence than intrinsic motivational orientations.

Conclusion

In conclusion, this study demonstrates that (a) extrinsic motivational orientation strengthens the relationship between intrinsic motivational orientation and personal creativity goal, and (b) personal creativity goal serves as a mechanism transmitting the indirect effect of intrinsic motivational orientation to the two forms of creativity. Our findings reveal a positive side of extrinsic motivational orientation, in that it synergizes with intrinsic motivational orientation to influence personal creativity goal. We extend the prior literature on creativity goal by demonstrating the differential relationships such goal has with incremental (linear) and radical creativity (inverted U-shaped). We show that strong intrinsic motivational orientation that encourages personal creativity goal is not always beneficial for radical creativity. We hope this study stimulates future research examining how intrinsic and extrinsic motivational orientations combine to influence important processes and outcomes in the workplace.

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