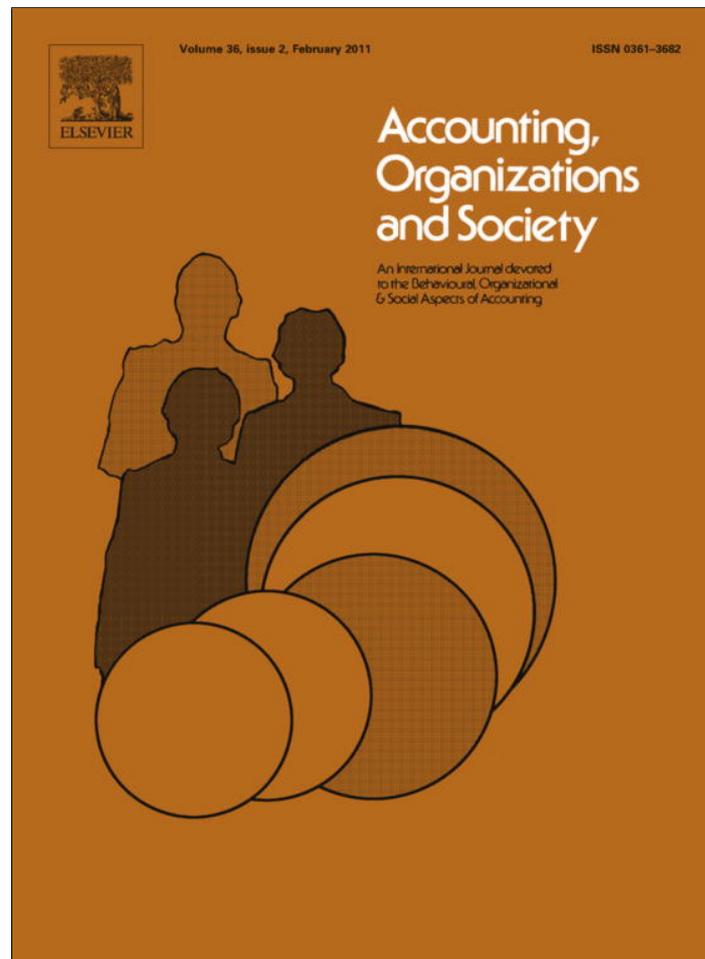


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Combining creativity and control: Understanding individual motivation in large-scale collaborative creativity

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A B S T R A C T

Recent research has shown that management control systems (MCS) can improve performance in contexts characterized by high levels of task uncertainty. This seems to conflict with a second stream of research, which argues that MCSs risk undermining the intrinsic motivation needed for effective performance in such settings. To solve this puzzle, we build on theories of perceived locus of causality and self-construal and develop an integrative model summarized in 15 propositions. To explicate our proposed solution and to show its robustness, we focus on the class of activities we call *large-scale collaborative creativity* (LSCC) – contexts where individuals face a dual challenge of demonstrating creativity and embracing the formal controls that coordinate their creative activities with others'. We argue that LSCC requires the simultaneous activation of intrinsic and identified forms of motivation, and simultaneously independent and interdependent self-construals. Against some scholarship that argues or assumes that such simultaneous combinations are infeasible, we argue that they can be fostered through appropriate attraction–selection–attrition policies and management control systems design. We also show how our propositions can enrich our understanding of motivation in other settings, where creativity and/or coordination demands are less pressing.

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Introduction

Recent management accounting literature has identified an important role for management control systems in highly uncertain situations and has documented the positive impact of management control systems on creative exploration and innovation activities in settings such as new product development and knowledge-intensive firms (e.g., Abernethy & Brownell, 1999; Ahrens & Chapman, 2004; Bisbe & Otley, 2004; Brown & Eisenhardt, 1997; Cardinal, 2001; Chapman, 1998; Davila, 2000; Davila, Foster, & Li, 2009; Ditillo, 2004). For example, Simons

(1995) develops a “levers of control” framework to address the question of how managers can combine innovation and control. Chapman (1998) uses four in-depth case studies conducted in the UK clothing and textile industry to show the beneficial role of accounting in highly uncertain conditions. Using a contingency approach, Davila (2000) shows how companies adapt their systems to the characteristics of different product development efforts. In a sample of 57 pharmaceutical firms, Cardinal (2001) finds that input, behavior, and output controls all enhance radical innovation. Ditillo (2004)'s case studies of three project teams in a large UK software firm document contribution of management controls to performance in software development. Indeed, recent theoretical and empirical research in management accounting and control represents a paradigm shift away from the traditional focus on established objectives and stable environments (Davila, Foster, & Oyon, 2009; Davila, Foster, & Li, 2009; Simons, 1995). The new

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paradigm highlights the role of management control systems in innovation and uncertain environments, envisioning formal management control systems as “flexible and dynamic frames adapting and evolving to the unpredictability of innovation, but stable to frame cognitive models, communication patterns, and actions” (Davila, Foster, & Li, 2009, p. 327).

However, another stream of research builds on an impressive body of work in psychology, especially studies of motivation and creativity, to argue that management control systems risk undermining the intrinsic motivation needed for effective performance of highly uncertain tasks. For example, Ouchi (1979) argues that in a research setting, strong forms of output or behavioral controls would not be as effective as “clan” controls, which rely on shared values to orient researchers’ behavior. Empirically, Amabile and her associates have conducted a series of studies in R&D labs and other innovation-intensive settings to highlight the importance of intrinsic motivation, freedom, and minimal formalized procedures and constraints (e.g., Amabile, 1998; Amabile & Gryskiewicz, 1987). Abernethy and Lillis (1995) find that flexible manufacturing firms rely more heavily on “spontaneous contact” and “integrative liaison devices” than traditional firms. In a research and development setting, Abernethy and Brownell (1997) find that when task uncertainty is high, personnel controls are more effective than accounting or behavioral controls in enhancing performance.

In the current state of management control systems research, we are therefore confronted with a puzzle: how can companies use management control systems effectively to support relatively uncertain and creative tasks if in doing so they risk undermining the required employee motivation? This puzzle is particularly important in the context of activities where individuals face a dual challenge of demonstrating creativity and embracing the formal controls that coordinate their creative activities with others’. We call such activity *large-scale collaborative creativity* (LSCC). Creativity is needed when tasks are uncertain; formal controls are needed when tasks are complex and interdependent. These two conditions are frequently found together in the demands facing employees involved in LSCC activities such as developing a new drug or designing a new generation car, airplane, or large-scale software system. The available theories of motivation for creativity have been developed primarily in the context of *individual* and *small-group creativity*. These theories highlight the critical role of intrinsic motivation, of values that honor individuals’ divergent thinking, and of the autonomy from organizational controls that is critical to the maintenance of such psychological orientations (Collins & Amabile, 1999). In LSCC tasks, however, informal coordination must be supplemented by formal management control systems because the number of contributors is too large and their creative contributions are too differentiated and too closely interdependent (Mintzberg, 1979). Therefore, contributors in LSCC must be motivated simultaneously to exercise individual creativity *and* to embrace formal management controls and values that honor conforming to organizational constraints and serving collective goals.

Existing theories of motivation make it difficult to understand how these dual demands of LSCC can be met. Indeed, in the opinion of some scholars, LSCC poses a real paradox (Chu, Kolodny, Maital, & Perlmutter, 2004; Gotsi, Andropoulos, Lewis, & Ingram, 2010; Lewis, 2000; Sitkin, Sutcliffe, & Schroeder, 1994; Zhou & George, 2003). The recommendations that flow from these theories of motivation are to partition the organization so that individuals can focus on one type of demand or the other (Lawrence & Lorsch, 1967; Tushman & O’Reilly, 1997). Nevertheless, a growing body of organization-level research challenges this skepticism and suggests that creativity and coordination can indeed be combined. Recent research on “contextual” ambidexterity (Gibson & Birkenshaw, 2004) suggests that organizations do not need to be partitioned to excel at both exploitation and exploration because individuals and teams within the same unit can master both challenges. Supporting this more optimistic view, recent management accounting research has drawn on concepts such as interactive control systems (Simons, 1995) and enabling bureaucracy (Adler & Borys, 1996) to highlight the potentially positive role of formal management control systems in creative tasks. The motivational underpinnings of such organizational designs remain, however, as yet unclear.

To resolve the dual-goal paradox, we bring together two clusters of concepts from the psychology literature: perceived locus of causality (PLOC) and self-construal. In the first step of our argument, we use the concept of PLOC to examine a range of *forms of motivation* arrayed along a spectrum from purely internal to purely external. Between these two ends of the spectrum lie two intermediate forms – introjection (motivation based on avoidance of guilt, shame or disapproval) and identification (motivation based on congruence with one’s values or goals) (Ryan & Connell, 1989). We consider all four forms’ effects on creativity and coordination. We highlight the connection between the intrinsic form of motivation and creativity, and between the identified form of motivation and coordination. We argue that LSCC requires simultaneously high levels of intrinsic and identified motivation, and we explain how this simultaneity is feasible.

Identification, however, has different effects on both creativity and coordination depending on whether the associated internalization has created an individual – a *subject of motivation* – whose self-construal is more independent or more interdependent, and whose values are correspondingly more individualistic or more collectivistic. In the second step of our argument, we argue that independent self-construals facilitate creativity and that interdependent self-construals facilitate coordination. We argue that LSCC requires that people experience as salient both independent and interdependent self-construals, and we explain how this simultaneity too is feasible.

The third step of our argument specifies the antecedent conditions required for the emergence of such a complex type of motivational orientation and suggests that these conditions can be attained through a combination of attraction–selection–attrition policies and management control systems design choices. The final step generalizes beyond LSCC settings to tasks with lower creativity and/or coordination demands.

Our study makes two primary contributions to the management control systems literature. First, even though [Simons \(1995\)](#)'s levers of control framework and much recent work on creative activities have emphasized the requirements for both creativity and control, this work leaves unanswered the question of how management control systems influence employees' motivation. By elucidating the individual-level motivational orientations that enable LSCC, we establish an important link between control mechanisms and outcomes of organizations' innovation activities, thus providing a more complete understanding of the processes through which control systems can support collective creativity. Second, we help resolve the mixed findings on the effects of management control systems on performance in creative activities such as new product development. [Davila \(2000\)](#) uses a contingency framework to explain this mixed evidence, while [Ditillo \(2004\)](#) attributes the mixed evidence to the variation in the variables that have been used to capture uncertainty and the role assigned to management control systems. Our study provides an additional explanation for these mixed results. Management control systems that support collaborative creative activities must be designed and implemented so as to induce both intrinsic and identified motivation as well as independent and interdependent self-construals; depending on organizations' success in meeting this challenge, outcomes will vary.

The challenge of large-scale collaborative creativity

Creativity is the generation of ideas that are simultaneously novel and useful ([Amabile, 1988](#); [Ford, 1996](#); [Oldham & Cummings, 1996](#); [Perry-Smith & Shalley, 2003](#)). *Coordination* is the effective management of interdependencies among tasks and resources ([Malone & Crowston, 1994](#)). Organization theory teaches us that: (a) creativity is needed to the extent that tasks are uncertain (i.e., their successful performance requires solving relatively new problems), and (b) coordination is needed to the extent that tasks are both complex (involve relatively numerous types of problems) and interdependent (the solutions to these problems are relatively more closely linked by input, output, or process dependencies) ([Perrow, 1986](#)). Management control theory tells us that the coordination of complex, interdependent tasks requires formal, rather than merely informal or input controls ([Merchant, 1985](#)). This section first defines the combination of creativity and control that we call LSCC, and then pinpoints the motivational challenge it poses.

What is large-scale collaborative creativity?

We define *large-scale collaborative creativity* as a type of activity that fits all of the following four conditions: (a) individual contributors' tasks require creativity, and (b) these contributors' creative inputs are interdependent, and more specifically, they are conjunctive rather than disjunctive or additive ([Steiner, 1972](#)) because ideas from one contributor spark ideas in others and the result is a synthesis rather than a sum; (c) the scale and complexity of this

interdependence are so great that formal control mechanisms are required; and (d), as a result of the combination of conditions (a)–(c), contributors must simultaneously display individual creativity and embrace formal control mechanisms.

Consider the work of 5000 or more engineers involved in the design of a new-generation aircraft ([Sabbagh, 1996](#)). Each engineer must display creativity and simultaneously embrace the formal controls within local design teams and across the broader design program. Successful design in this setting demands that individual contributors actively embrace, rather than merely reluctantly conform to, these controls. The resulting motivational challenges are evidenced in this statement by a manager of aircraft design at Boeing:

We feel that technically brilliant but uncooperative individuals can do as much harm to the program as cooperative but mediocre members. (Simpson, Field, & Garvin, 1991, p. 4)

Such is also the challenge facing some types of software design. While some large-scale software systems development efforts can be modularized, in many other cases, modularization is infeasible or uneconomical ([Boehm & Turner, 2003](#)). In these latter cases, developers working on any one part of the system must be mindful of how their designs will affect the functioning of other components and of how well they are conforming to the procedures that help coordinate these interdependencies. Developers need to be imaginative in writing their own code or tests, and at the same time they need to actively embrace these control mechanisms as stimuli to, rather than constraints on, their creativity. The motivational challenges of LSCC in this context are evidenced in this statement by a software developer who worked under a highly structured project management discipline with some 250 other people for over 3 years to design and develop a very innovative system:

Think of bridge-building. Back in the eighteenth century, there were some very beautiful bridges built, but quite a few of them collapsed because they were designed by artists without any engineering understanding. Software is like bridge-building. Software developers think of software as something of an art, and yes, you need that artistry, but you better have the engineering too. Developers often don't like the constraining rules, but the rules are necessary if you want to build complex things that have to work together. If you have only two or three people, you don't need all these rules. But if you have hundreds of people, the way we have here, then you need a lot of rules and discipline to get anything done. (Adler, 2006, p. 236)

Consider too the professional symphony orchestra, typically comprising 80 or more performing members. As [Sawyer \(2006, p. 160\)](#) writes:

Even in scored and conducted ensembles, group creativity is necessary to an effective performance, because a score under-determines performance. Otherwise, 'performing works would be akin to minting coins' (Godlovitch, 1998,

p. 85); as orchestral musicians sometimes put it, 'you're either making music or just playing notes'. (Faulkner, 1983, p. 74)

Indeed, great symphony orchestra performances require creativity not only from the composer and the conductor, but also from each and every musician (Salonen, 2008). Without this creativity, the performance is flat, as musicians fall into "playback" mode (as described by Marotto, Roos, & Victor, 2007, p. 402). At the same time, musicians in the symphony orchestra, unlike musicians in a small, improvisational jazz group for example, cannot rely on informal, face-to-face coordination through mutual adjustment: the large-scale and complex interdependencies of the symphony orchestra call for formal organizational controls in the form of hierarchical authority (the conductor) and formal procedures (the score). To achieve the "ensemble" effect required for great symphony performance, musicians must actively embrace, rather than merely reluctantly conform to, the authority of the conductor and the discipline of the score. Both in rehearsal and in performance, this requires active generation of novel ideas that both contribute to the orchestra's overall sound and conform to parameters set by the score and the conductor. The individual musician, one of the second violinists for example, is therefore confronted with dual challenge: to contribute imaginatively while embracing these formal coordination requirements (Chan, 1992).

The dual motivational demands characteristic of LSCC are common in movie production, too, which involves both high levels of creative performance from hundreds of specialized contributors and highly disciplined coordination across these contributors. This combination is facilitated by extensive role socialization into the specialized film-production crafts; but it also requires considerable reliance on formal management control systems such as a complex, multi-tiered authority hierarchy and detailed, written standards and schedules (Bechky, 2006; Mintzberg, 1979).

In all these cases of LSCC – complex electro-mechanical design, integrated software development, movie production, orchestras – formal coordination mechanisms are crucial to the overall creative success, and contributors must actively embrace this coordination discipline. As illustrated by the "playback" problem in symphony orchestras, mere reluctant conformance will fail to achieve the desired collective outcome.

The tension between creativity and control

What kind of motivation is needed by contributors engaged in LSCC? A long tradition of research has highlighted the importance of intrinsic motivation to the successful performance of creative tasks (e.g., Amabile, 1996; Amabile, Goldfarb, & Brackfield, 1990; Mainemelis, 2001; Mainemelis & Ronson, 2006). The motivational requirements of activities that combine creativity and formal controls have been much less studied (as noted by Drazin, Glynn, & Kazanjian, 1999; Kurtzberg & Amabile, 2000; Oldham & Cummings, 1996).

Indeed, in the current state of motivation theory, it is not clear how the motivational demands of LSCC can be met.

Whereas the embrace of formal controls requires attention to others, often to hierarchical superiors, rather than to the pleasures of the task itself, creativity requires attention focused on the task rather than on others (Crutchfield, 1962; Csikszentmihalyi, 1990; Henle, 1962). Whereas the embrace of formal controls requires that employees accept collective goals, conform to pre-given standards and plans, and sacrifice individual interests in order to achieve group goals, a considerable body of theory argues that such formal organizational controls will undermine the intrinsic motivation needed for creativity (Amabile, 1996; Shalley, Gilson, & Blum, 2000). Studies of problem-solving styles show marked differences between the innovation style required for creativity and the adaptation style required for conformance to controls (Kirton, 1976). Moreover, in much current research, the emotional requirements of creativity and control also appear to be inconsistent. Creativity is enhanced by positive affect (Davis, 2009; Grawitch & Munz, 2005) because positive affect encourages approach rather than avoidance (Carver, 2001; Erez & Isen, 2002),¹ which in turn encourages individuals to define the task as seizing an opportunity rather than avoiding a problem (Higgins, 1997) and to address problems rather than shy away from them (Amabile, Barsade, Mueller, & Staw, 2005; Frederickson, 2001; Seo, Barrett, & Bartunek, 2004). Further, positive affect increases the breadth of attention (Kasof, 1997), which in turn increases the chances of fruitful ideational combination of conceptually distant elements (Mednick, 1962). By contrast with creativity's focus on multiplying options, control requires identifying and eliminating options that threaten the success of the creative endeavor, and negative affect is more useful in meeting these demands (George & Zhou, 2002).

A more robust theory of individual motivation for LSCC

Motivation is, of course, only one of several challenges facing individuals in the successful performance of creative tasks. Alongside motivation, Amabile (1983, 1996) points to creativity skills and domain knowledge; Woodman, Sawyer, and Griffin (1993) add personality. We focus on LSCC's motivational challenge because we believe that our understanding of LSCC is currently hobbled by a truncated understanding of the psychology of motivation. As noted above, some scholars see the dual-goal challenge as not only difficult but paradoxical. We argue against this skepticism. We believe it reflects a tendency in much of the creativity literature to focus too exclusively on individualistic values and intrinsic motivation. In this, our concerns echo the critique of much contemporary motivation theory that points to its bias towards "individualistic hedonism" (Shamir, 1991) and "romanticism" (Eisenberger & Cameron, 1996).

To understand how individuals can assure simultaneously creativity and formal control, we bring together

¹ Affect refers to an individual's evaluative response to a stimulus that has either positive or negative valence (Fiske & Taylor, 1991). It is an intermediate internal state that can be influenced by a variety of factors including moods, emotions, and contextual factors such as monetary incentives (Bonner, 2008).

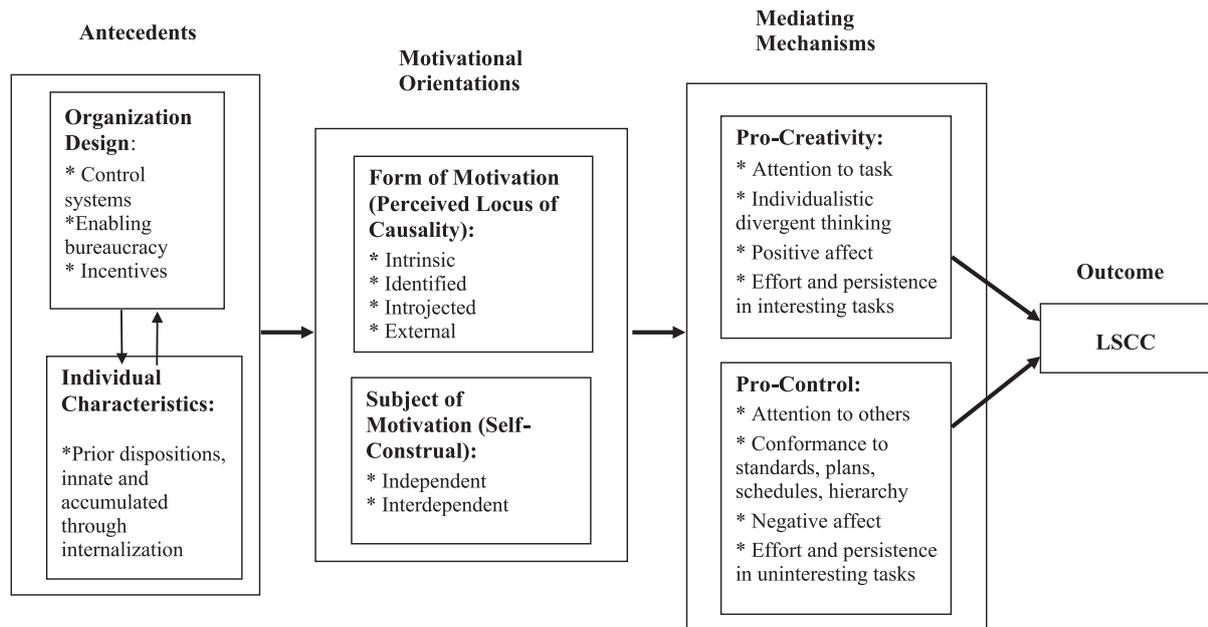


Fig. 1. Conceptual model of motivation for large-scale collaborative creativity (LSCC).

two clusters of concepts: perceived locus of causality (PLOC) and self-construal. Fig. 1 summarizes the broad outline of our argument. In the first step of this argument, we posit that LSCC requires simultaneously high levels of intrinsic and identified motivation, and we explain how this simultaneity is feasible. In the second step of our argument, we posit that LSCC requires that people experience as salient both independent and interdependent self-construals, and we explain how this simultaneity too is feasible.

In the following subsections, we advance a series of propositions that summarize this argument. Some of these propositions recapitulate relatively well-established theory and empirical findings; others are deductions that follow from this literature; and others again are more conjectural and call for empirical testing. Putting them all together suggests how the puzzle of individual motivation in LSCC could be resolved.

Perceived locus of causality

Much of the literature cited above argues that intrinsic motivation is necessary for creativity, and that intrinsic motivation is unlikely if the organization simultaneously implements the formal controls necessary for large-scale coordination. The force of this argument depends on two key assumptions: first, that forms of motivation can be characterized as either intrinsic or extrinsic, and second, that only one form can be operative at any given time. The following paragraphs synthesize elements of prior research to challenge these two assumptions in turn.

We begin with the concept of perceived locus of causality (PLOC) – the perceived locus relative to the person of variables that cause or give impetus to behavior (Ryan & Connell, 1989). PLOC has been shown to be a key antecedent of motivation (e.g., Deci & Ryan, 1985; Kernis,

Zuckerman, & McVay, 1988). The earlier work on perceived locus of causality was premised on a polarization of internal and external. According to Heider (1958), fundamental to the question of why someone behaves in a certain way is whether the perceived locus of causality for that behavior is in the person (internal) or in the environment (external). Similarly, deCharms (1968) distinguished “origin,” an individual who experiences the locus of causality of behavior as internal, from “pawn,” an individual who experiences the locus of causality of behavior as external. This polarization was challenged by Ryan and Connell (1989). Adapting Kelman (1958, 1960, 1961), Ryan and Connell defined two intermediate forms, and reconceptualized PLOC as a “gradient of autonomy from external to internal locus of causality” (p. 759), a gradient that ranged from external, to introjected, to identified, and finally to intrinsic motivation.² In their empirical study, the authors first identified four categories of reasons (extrinsic, introjected, identified, and intrinsic) for achievement-related behaviors (e.g., doing homework, trying to do well in school) through one-on-one informal interviews with elementary school children:

External reasons were those where behavior is explained by reference to external authority, fear of punishment, or rule compliance. Introjected reasons were framed in terms of internal, esteem-based pressures to act, such as avoidance of guilt and shame or concerns about self- and

² Theories of internalization suggest that identification has the effect of assimilating deeply (more deeply than in the case of introjection) external regulations to the self, resulting in a strong congruence of external regulations with one's values or goals (Kelman, 1958; Ryan & Connell, 1989; Ryan & Deci, 2000). Deci and his colleagues use the term identification to refer to the result – i.e. a behavior or activity is now seen as congruent with an individual's personal goals and values (Gagne & Deci, 2005) – without specifying the process that leads to that result. In the current study, we are interested in both the result and underlying process, because we want to understand the conditions under which management control systems can support identified motivation.

other-approval. Identifications were captured by reasons involving acting from one's own values or goals, and typically took the form of "I want." [...] [I]ntrinsic reasons for action [were] where the behavior is done simply for its inherent enjoyment or for fun." (Ryan & Connell, 1989, p. 750)

They then surveyed 355 children from grades 3–6 in an elementary school to identify their reasons for achievement-related behavior. Their analysis of the correlations among the different categories based on these surveys supported the proposed PLOC continuum, in that those categories adjacent along the continuum correlated more highly than those more distant along the continuum.

Prior research suggests that the PLOC gradient correlates with creativity. Creativity has degrees; the greatest creativity will be most likely when motivation is intrinsic; and the potential for creativity declines as motivation shifts towards the external end of the gradient. As we observed earlier, the importance of intrinsic motivation for creativity has been demonstrated in many empirical studies. Identification and other forms of motivation on this gradient may play a more productive role in tasks that require disciplined conformance to pre-established procedures (Amabile, 1983, 1996). Gagne and Deci (2005) argue that intrinsic motivation is more effective in predicting persistence on interesting tasks, and internalized motivation such as identification better predicts persistence on uninteresting tasks that require discipline and concerted effort. Burton, Lydon, D'Alessandro, and Koestner (2006) provide empirical evidence that, in individual learning tasks, intrinsic motivation predicts psychological well-being outcomes such as positive affect, independent of performance, whereas the effect of identified motivation on positive affect is contingent upon performance. To the extent that positive affect supports creativity, this evidence suggests that intrinsic motivation should support creativity better than identified motivation. There is little research on the link between introjected motivation and creativity. George and Zhou (2001) demonstrated empirically that conscientious individuals exhibit low levels of creativity when they are closely monitored by supervisors and have unsupportive coworkers. Even though George and Zhou (2001) did not examine introjected motivation specifically in their study, a combination of conscientiousness, close supervisor monitoring, and unsupportive coworkers is likely to engender guilt and anxiety, which, in turn, lead to introjected motivation. Thus, we interpret their findings as suggestive evidence that introjected motivation does not support creativity. Thus, assuming provisionally that only one form of motivation can be activated at a time, we could conclude:

Proposition 1. *Creativity is best supported by intrinsic motivation, and progressively less well supported as motivation shifts to identified, then introjected, and finally external forms of motivation.*

The PLOC gradient has a more complex relation to the embrace of formal controls: we argue that it is curvilinear. Intrinsic motivation will not be a robust foundation for

control, since the latter requires the subordination of individual gratification to organizational imperatives. At the other end of the gradient, external motivation and introjection are also unreliable foundations because, even in highly routinized activities, numerous spontaneous and unprogrammable local adjustments are needed to assure high levels of coordination and control (Feldman, 2000); the need for proactive adjustment is all the greater in LSCC settings. We argue that the greatest potential for the effective control of large-scale coordination lies in identification-based motivation.

Identification can result from psychological internalization prompted by high levels of interaction and interdependence (Kelman, 1958; O'Reilly and Chatman, 1986). Social identity theory argues that a similar result can emerge even absent these conditions so long as individuals categorize themselves as members of a social group (Tajfel & Turner, 1986). Both mechanisms, however, point to the possibility that individuals can be powerfully motivated by group goals when their identity as members of the group has sufficient psychological salience for them (Ashforth & Mael, 1989; Ashmore, Deaux, & McLaughlin-Volpe, 2004; Dutton, Dukerich, & Harquail, 1994; Ellemers, de Gilder, & Haslem, 2004; van Knippenberg, 2000).

Organizational identification has been shown to sustain high levels of commitment and performance even in highly routinized work subject to extensive formal coordination controls. This is because under conditions of strong identification, the controls are seen as effective ways of achieving valued goals (Adler, 1993; Adler & Borys, 1996; Dukerich, Golden, & Shortell, 2002; Pfeffer, 1988). Identification with the group motivates people to exert discretionary effort to achieve collective goals, to focus on collective outcomes rather than individual rewards, and to maintain their commitment to the collective even when it does not benefit the individual (Ellemers et al., 2004; van Knippenberg, 2000), all of which in turn facilitate coordination. This argument is supported by studies of very routine work with high sequential interdependencies such as we find in auto assembly, where reliance on purely extrinsic controls leads to significantly lower levels of quality and productivity than reliance on identification (see e.g., Adler, 1993; O'Reilly and Chatman, 1996).

Neither intrinsic nor, on the other end of the spectrum, introjected and extrinsic motivation contribute as effectively to group cohesiveness or to the development of social identification with the group, and hence do not help as much with large-scale coordination through formal controls. Thus, and still provisionally assuming that only one form of motivation can be active at a time, we conclude:

Proposition 2. *Control is best supported by identified motivation and less well supported by intrinsic or (at the other end of the PLOC gradient) external and introjected forms of motivation.*

Simultaneously Intrinsic and Identified Motivation

Propositions 1 and 2 together suggest that, in order to meet the dual-goal challenge of LSCC, individuals need simul-

taneously high levels of both intrinsic and identified motivation. Is that possible? The answer is not obvious: recall that Ryan and Connell (1989) found that all four PLOCs were well differentiated in their survey responses and subjects were differentiated by the form of motivation they expressed.

The question of whether intrinsic and identified forms of motivation can coexist is arguably related to an older debate over whether intrinsic and external forms can coexist. Some motivation theorists have argued that external controls (notably outcome-based rewards) risk undermining (“crowding-out”) intrinsic motivation (e.g., Deci, 1975; Deci & Ryan, 1985). However, Kunz and Pfaff (2002) conducted a comprehensive review of the theoretical and empirical evidence on the crowding-out effects of external rewards and concluded that the empirical evidence was mixed, and that the antecedents for crowding-out are seldom present and easily avoidable in business settings.

A growing body of research argues a contingency position, namely that whether external motivators undermine intrinsic motivation depends on the nature of those external motivators, and in particular on whether they are perceived as helpfully informative or as coercive constraints (Adler, 1993; Amabile, 1996; Bonner, Hastie, Sprinkle, & Young, 2000; Gagne & Deci, 2005). Amabile (1997) thus argues that informational external motivators can be synergistic with intrinsic motivation.

If intrinsic and external forms of motivation can be combined under some conditions, it should be even easier to combine intrinsic and identified forms. Indeed, Gagne and Deci's (2005) analysis of the contextual factors that maintain identified and intrinsic motivation reveals that these factors are quite similar. Specifically, these factors include choice and acknowledgement. In an organizational context, leaders who convey the importance of tasks and provide autonomy-supportive work climates are promoting both intrinsic and identified motivation. In support of this argument, we can cite the findings of Amabile, Conti, Coon, Lazenby, and Herron (1996): this study evaluated the work environment for creativity for 141 pairs of high- and low-creativity projects, and found that creativity was powerfully stimulated by both challenge – a condition particularly conducive to intrinsic motivation – and by organizational encouragement, work group supports, and supervisory encouragement – which are particularly conducive to identified motivation. Empirical research also suggests that intrinsic and identified motivations have similar effects on employees' psychological well-being and job attitudes. In fact, Sheldon and Elliott (1999) combine intrinsic and identified motivation into one composite *self-concordance* scale and show that these two types of motivation are positively associated with positive affect and performance. Similarly, Bono and Judge (2003) find that individuals with self-concordant goals (i.e., intrinsic or identified motivation) have greater affective commitment to their organizations and greater job satisfaction. To the extent that intrinsic and identified motivation lead to positive affect, and positive affect supports both creativity and pro-social behaviors such as helping others (Isen & Baron, 1991), a combination of intrinsic motivation and identified motivation should enable creativity and coordination without individuals having to “work harder” at these behaviors.

In everyday experience, very diverse forms of motivation seem to combine rather commonly and easily. Ratelle, Guay, Vallerand, Larose, and Senecal (2007) show that both high-school and college students appeared to be motivated by complex combinations of intrinsic, identified, introjected, and external motivations (although somewhat different combinations prevailed in the two populations). Hidi and Harackiewicz (2001) argue that researchers have inappropriately polarized extrinsic versus intrinsic motivation along with the related concepts of performance versus mastery goals.³ They marshal evidence that in practice – in long-term, complex, and effortful engagements, as distinct from laboratory studies of relative short-term, time-bound, and simple tasks – these polarities are replaced by a dynamic and fluid interplay of the different goals and forms of motivation. Markus, Manville, and Agres (2000) and Roberts, Hann, and Slaughter (2006) show that participants in open-source software development have multiple motivations simultaneously, including intrinsic motivation (i.e., inherent interest in writing programs), identified motivation (i.e., desire to enhance user value or reputation), and external motivation (i.e., being paid to write programs). Field research on motivation (such as Hidi & Harackiewicz, 2001; Järvelä & Salovaara, 2004; Pintrich, 2000; Sansone & Thoman, 2005) has shown that in reality people have multiple simultaneous goals and motivations, including intrinsic (seeks mastery, likes autonomy and intellectual challenge), identified (“I want to be at the top of my class”), introjected (“I don't want to look incompetent”), or external (“I just want to get done with minimal effort”). This research shows that the relative salience of these different types of goals and forms of motivation shifts rapidly with the evolving social context, and moreover that it is not uncommon to find more than one goal and more than one form of motivation operative at any given time. Thus:

Proposition 3. *Intrinsic and identified motivation can coexist.*

Proposition 4. *Large-scale collaborative creativity will be best supported when contributors have simultaneously high levels of identified and intrinsic forms of motivation.*

Self-construals

Our discussion so far has abstracted from a key, complicating factor: depending on the nature of the internalized values, identification will have rather different effects on creativity and control. Consider the case of the “bureaucratic personality” (Merton, 1940): here the employee is strongly identified with the organization; but the values thus internalized, while they might support at least some kinds of control, are hostile to creativity. Or consider the software development case cited earlier in this paper: the software “artists” often identify strongly with a “hacker

³ *Performance goals* refer to goals that orient individuals toward seeking positive evaluations of their ability and trying to outperform others, whereas *mastery goals* refer to are goals that lead individuals to acquire new skills and improve their level of learning and competence.

culture" (Raymond, 2001); this occupational culture is one that values autonomy and the intrinsic pleasure of writing elegant code; and it disdains formal organizational controls and authority. Strong identification with such a group will support creativity, but will simultaneously undermine the controls needed for large-scale coordination. On the other hand, identification with software engineering and its "bridge-building" culture will support control, but arguably might weaken the drive for individualistic, divergent thinking that is needed to support creativity.

If creativity requires intrinsic motivation and identification with values of individualism, and if formal control offers little scope for intrinsic motivation and is best supported by identification with more collectivistic values, then resolving the dual-goal paradox requires that we resolve a further puzzle: not only must both identified and intrinsic motivation be able to operate simultaneously, but people must be able to identify simultaneously with both individualistic and collectivistic values. We therefore need to explore in more depth not only the *form* of motivation but also the *subject* of motivation – the individual's values and self-construal.

To this end, we draw on cross-cultural psychology to characterize in more detail the linkage between group values and individual psychic functioning. Cross-cultural psychology research has long highlighted the importance of the collectivism–individualism contrast (Earley & Gibson, 1998), and recent research in this field has linked this macro-cultural contrast to psychological differences in self-construals. Markus and Kitayama (1991) distinguish between independent and interdependent self-construals (Triandis (1995) labels these ideocentric and allocentric). Independent self-construals see the person as "a bounded, unique, more or less integrated motivational and cognitive universe, a dynamic center of awareness, emotion, judgment, and action organized into a distinctive whole and set contrastively both against other such wholes and against a social and cultural background" (Geertz, 1975, p. 48). In contrast, interdependent self-construals see the person as "part of an encompassing social relationship and recognizing that one's best behavior is determined, contingent on, and, to a large extent organized by what the actor perceives to be the thoughts, feelings, and actions of others in the relationship" (Geertz, 1975, p. 227). Markus and Kitayama (1991) observe that Western motivation theories usually assume some type of internal, individualistic need or motive, i.e., the motive to enhance one's self-esteem, to achieve, to affiliate, to self-actualize, etc., but that people with interdependent self-systems experience motives that have the other as referent and view agency as collective rather than individual. Building on Markus and Kitayama (1991) and Fiske, Kitayama, Markus, and Nisbett (1998) offer a comprehensive cultural-psychological critique of ostensibly culture-free theories of motivation. In particular, Fiske et al. criticize common assumptions in the psychology literature that people value autonomy and self-determination (Deci & Ryan, 1985), individual self-efficacy (Bandura, 1973), and a sense of personal control (Langer, 1983). They observe that these premises would not hold for people with more interdependent self-construals.

There is ample empirical support for a more culturally grounded approach to motivation (e.g., Earley, 1989; Erez & Earley, 1993; Iyengar & Lepper, 1999; Tajfel & Turner, 1986). For example, Earley (1989) finds that the phenomenon of "social loafing," while well documented in Western cultures, appears to be non-existent among members of more collectivistic cultures. Earley (1993) finds that whereas American factory workers perceived themselves as more capable and performed better in contexts in which they were individually responsible, Chinese factory workers perceived themselves as more capable and performed better when their groups were held responsible. Iyengar and Lepper (1999) challenge the often-assumed linkages between the provision of individual choice and intrinsic motivation by demonstrating experimentally that this, too, is a culturally-bound phenomenon.

More directly relevant to the problem of LSCC are studies showing that the effect on work motivation of formal organizational controls – a key requirement for coordination in LSCC – differs considerably across cultures. Agarwal (1993) shows that whereas US industrial salespeople experience lower organizational commitment and higher job alienation as job codification and rule observation increase, Indian salespeople experience higher organizational commitment and lower alienation. Michaels, Dubinsky, Kotabe, and Lim's (1996) cross-cultural study documents a strong positive relationship between formalization and organizational commitment in collectivistic Korea, a significant but weaker positive relationship in somewhat less collectivistic Japan, and no significant relationship in the individualistic US (see also Gibson, 1999). As suggested above and as shown in Fig. 1, attention is the key cognitive mechanism mediating the effect of self-construals on control and creativity. Several studies have shown that when independent self-construals are primed, people focus on task objects, and when interdependent self-construals are primed, people focus instead on their social context (Haberstroh, Oyserman, Schwarz, Kühnen, & Ji, 2002; Kühnen, Hannover, & Schubert, 2001; Kühnen & Oyserman, 2002).

These results suggest that self-construals should be taken into account when examining the relationship between individual motivation and LSCC. Extending the earlier argument, we propose that the type of self-construal that best supports task demands will depend on the nature of the task. Abstracting provisionally from creativity demands, when tasks have many interdependent components, formal control is essential, and this control will be better assured by people with interdependent self-construals because such people focus attention on other people and not only on their own task, and because they view agency as collective rather than individual. This helps the collectivity avoid both relationship-based conflict (disrupting the interpersonal interaction among members) and process conflict (creating difficulties for members in coordinating with each other and in working toward a common goal) (Kurtzberg & Amabile, 2000).

On the other hand, abstracting provisionally now from control demands, successful performance of creative tasks relies more on individual capacity for deviating from the majority view and generating novel ideas, and here independent self-construals are valuable. Research at the

culture level argues that individualism is often associated with independence and creativity, and that collectivism is often associated with obedience, cooperation, and acceptance of in-group authority (e.g., Triandis et al., 1993, p. 368). Similarly, research at the individual level has established associations between the traits of individualism and behaviors strongly linked to creativity, such as offering an original opinion as opposed to following the crowd (Maslach, 1974; Sternberg & Lubart, 1995; Whitney, Sagrestano, & Maslach, 1994). For example, Goncalo (2004) found that people in groups with more individualistic values, who attribute their success to the unique contributions made by individual members, tend to think more divergently than people in groups with more collectivistic values, who attribute their success to the group as a whole. Beersma and De Dreu (2005) found that pro-self social motives stimulated more creativity and divergent thinking that pro-social motives. Goncalo and Staw (2006) found that groups who were primed to think individualistically generated more novel solutions than groups who were primed to think collectivistically. Conversely, collectivism has been shown to encourage compromise and conformity, which powerfully assist coordination but facilitate only more incremental forms of creativity (Hui, 1988; Kilmann, 1989; Reich, 1987). Thus:

Proposition 5. *Creativity is better supported by independent self-construals than interdependent self-construals.*

Proposition 6. *Control is better supported by interdependent self-construals than independent self-construals.*

Before turning to the possibility of combining independent and interdependent self-construals, we should note in passing that even in models that assume independent self-construals, motivation can will be influenced by a range of factors that make more or less salient various “social rewards” such as reputation and status (e.g., Markus et al., 2000; Roberts et al., 2006). The salience of social rewards does not, however, imply an interdependent self-construal, nor even fully internalized group values: people with largely independent self-construals can be sensitive to social rewards due to the partial internalization associated with introjection (as noted by Roberts et al., 2006). Thus Deci, McClelland, and Maslow all register the importance of social rewards and relatedness needs; but they treat these as secondary to individual self-determination, individual achievement, and individual self-actualization – and they continue to see these latter as crucial prerequisites for the highest levels of motivation such as are needed for creativity.

We should also note that some recent research has highlighted a third type of self-construal, distinguishing *relational* interdependence from the *collectivist* form of interdependence discussed above. At issue is whether the interdependence is with others who are personally close or with some larger collectivity taken as a whole (Brewer & Chen, 2007; Brewer & Gardner, 1996; Cross, Bacon, & Morris, 2000; Cross, Morris, & Gore, 2002). The collectivist-interdependent variant will be more effective where coordination requires formal controls, since it is this variant that creates a willingness to subordinate ego's interests

to the needs of the larger collectivity, to figures of authority who may be personally unknown, and to the anonymous authority of formal procedures. The relational-interdependent variant is likely to be more effective in assuring coordination in smaller groups. Thus:

Proposition 7. *Collectivist-interdependent self-construals lead to more effective formal control and large-scale coordination than relational-interdependent self-construals in LSCC projects. The latter are optimal for small-scale coordination.*

Simultaneously independent and interdependent self-construals

To meet the dual-goal challenge of LSCC, there remains one key step: it must be possible for self-construals to be simultaneously independent (to support creativity) and interdependent (to support control). Cultural and cross-cultural psychology offers a rich account of identity; but in this literature, many accounts proceed as if independent and interdependent self-construals were mutually exclusive. Social identity theory too has argued that there is a “functional antagonism” between priming individual versus group levels of identity (Oakes, Haslam, & Turner, 1994, pp. 100, 172). We submit that there are several good reasons to believe that this skepticism is unwarranted.

First, several scholars have found that these self-construals do not appear empirically as polarities on a one-dimension spectrum, and that they are better conceived as independent dimensions. For example, Singelis (1994) has developed a 24-item Self-Construal Scale to measure the strength of an individual's interdependent and independent self-construals. He found two distinct dimensions rather than one in samples of college students. Other researchers have found similar empirical patterns (e.g., Bettencourt & Sheldon, 2001; Gaines et al., 1997; Rhee, Uleman, & Lee, 1996; Wagner, 2002). We observe a common pattern in these studies' empirical results: while overall, interdependence/collectivism and independence/individualism are significantly negatively correlated, the correlation is far from perfect, and a large number of individuals score high on both (Oyserman, Sakamoto, & Lauffer, 1998).

Successful performance in LSCC conditions may be due to the fact that these different orientations are activated at different times, so that in the course of work activity, people switch between them. Consider an engineer who is struggling to design a component that creatively meets not only the demands of the specific function of that component but also the demands facing other parts of the system in which it is embedded. Recalling the two constitutive elements of creativity – novelty and utility – we can imagine the engineer cycling iteratively between (a) novel solutions to the component design problem and (b) assessments of the utility of those solutions in their fit with the demands of both the component and the overall system, moving over successive iterations progressively towards a joint optimum of these demands. Independent and interdependent self-construals can provide cognitive and motivational resources for successive moments in this iterative process. Indeed, this process might make for an

even more creative solution. Kazanjian, Drazin, and Glynn (2000) quote several engineers describing such a process. Similarly, Gotsi et al. (2010) also describe such a process for “practical artists” in new product design consultancies.

A considerable body of research suggests that such switching is indeed possible. A comprehensive meta-analysis of research on individualism and collectivism by Oyserman, Coon, and Kimmelmeier (2002) concluded that all societies socialize for both individualistic and collectivistic values, and that cultures differ primarily in the likelihood that one or other would be activated. Consistent with this assessment, and in contrast to older theories that argue that socialization and internalization create strongly rooted dispositions towards independence/individualism or interdependence/collectivism, much current theory posits that such orientations are highly plastic and the underlying self-categorizations are essentially situational (e.g., Brewer, 1991; Hernandez & Iyengar, 2001; Hong, Morris, Chiu, & Benet-Martinez, 2000; Kanagawa, Cross, & Markus, 2001). Gardner, Gabriel, and Lee (1999) find that although Americans tend to have independent self-construals and Chinese tend to have interdependent self-construals, Americans can respond to interdependent primes and behave similarly to collectivists, and Chinese can respond to independent primes and behave similarly to individualists (see also Triandis, Bontempo, Villareal, Asai, & Lucca, 1988). A plausible middle-ground between the dispositional and situational views is that: (a) culture and early socialization establish both independent and interdependent “working” self-construals; (b) this experience also typically establishes as one of these as a “stored,” preferred self-construal (Markus & Wurf, 1987; Turner, 1982); and (c) specific contexts will prime one or the other type of self-construal.

Given this body of work, we can postulate that in LSCC settings, fluid switching among self-construals could support the dual requirements of creativity and control. Moreover, such switching can happen so rapidly that the image of iterative cycling is no longer accurate. The independent self can be activated at a certain time and the interdependent self as little as 100 ms later (Lin, Lin, & Han, 2008), and if the activation effect of the independent self lasts longer than 100 ms (as in reality it typically does last for a much longer period), the engineer will be under the influence both self-constructs (e.g., Chiu & Cheng, 2007). If we interpret this switching between independent and interdependent self-construals as switching between two cultures, then the findings reported by Leung, Maddux, Galinsky, and Chiu (2008) that multicultural experience enhances creativity are not surprising. As Leung et al. (2008) argue, multicultural experience can contribute to creativity because it enables people to broaden the range of accessible ideas and concepts and increase their readiness to seek out ideas from diverse sources.

Via these various theoretical pathways, we are thus led back to the thesis that independent and interdependent self-construals can indeed be simultaneously salient, now brought together as components of a new, more complex identity – one that Haslam and Ellemers (2005, p. 90) call an “organically pluralistic identity.” We postulate that this would be the result of the simultaneous salience of individual and collective identities. As several authors have

pointed out, in the real world, situational primes are often multiple and heterogeneous, as is the everyday experience of identity (Hird, 1998; Huddy, 2001; Phinney, 1992, 1996). Moreover, several literatures on identification find that people often feel strong simultaneous identifications to different collectivities – their workgroup, organization, occupation, union, profession, gender, nationality, etc. (see e.g., Bamber & Iyer, 2002; Chao & Moon, 2005; Kondo, 1990; Kunda, 1992; Lipponen, Helkama, Olkonnen, & Juslin, 2005; Riketta & van Dick, 2005; Rotondi, 1975; Smith, Tyler, & Huo, 2003). There is, for example, an extensive feminist literature on the “intersectionality” of multiple dimensions of identity (reviewed by Stewart & McDermott, 2004). A second example comes from research in sociology that has found that many professionals evidence simultaneously “local” and “cosmopolitan” orientations (Van Maanen & Barley, 1984). From within social identity theory, Turner, Reynolds, Haslam, and Veenstra (2005) acknowledge that self-categorization theory might allow for such outcomes. Socio-cultural theory provides one avenue for theorizing multiple, simultaneous: Walker, Pressick-Kilborn, Arnold, and Sainsbury (2004) review sociocultural approaches to motivation, arguing theoretically and showing empirically that motivation can embody several forms at once, and that different types of self-construals can be operative simultaneously and can rapidly alternate as the social context changes.

In sum, we postulate that simultaneous (and/or nearly simultaneous switching between) independent and interdependent self-construals is indeed possible. If the contributing engineer sees herself as an individual, perhaps because technical challenges of her own design tasks are pressing, an independent self-construal will be salient, creativity will flourish, but coordination may suffer. If she identifies herself as a member of the broader design program, perhaps because external cost or time constraints are bearing down on the whole program, then we would expect an interdependent self-construal to become salient, coordination to become stronger, but perhaps at the expense of creativity. In well-functioning programs where LSCC is a key requirement, effective leaders ensure that contributors such as this engineer are aware simultaneously of both the personal task context and the broader program context, and thus prime simultaneous salience of contributors’ identities as individuals and as collectivity members: this would lead to a self-concept that is no longer that of a software hacker in counter-productive conflict with that of a software engineer, but now that of a creative bridge-builder. This, to return to the final point of the previous section, will be easier where the interdependence is of the low-power-distance variety. Thus:

Proposition 8. *Independent and interdependent self-construals can co-exist; the co-existence of independent and interdependent self-construals is more likely when interdependence is of the low power-distance variety than the high power-distance variety.*

Proposition 9. *Large-scale collaborative creativity will be best supported when contributors experience high salience simultaneously for independent and interdependent self-construals.*

A typology of motivational orientations

The logical implication of the propositions developed above is a 4×2 typology of motivational orientations, defined by the form of motivation (four positions along the PLOC gradient) and the subject of motivation (independent versus interdependent self-construals: for the sake of simplicity, we have left aside the relational form of interdependence and the two varieties of interdependence). Table 1 characterizes each of the corresponding cells. We use quotations from Terkel's (1972) and Bowe, Bowe, and Streeter's (2001) interviews with working people about their jobs to illustrate various motivational orientations. The following two paragraphs discuss the two cells that, according to our propositions, are of greatest significance to the LSCC challenge: the intrinsic-independent orientation, which affords the greatest likelihood of creativity, and the identified-interdependent orientation, which affords the greatest likelihood of effective large-scale coordination through formal controls.

The *independent-intrinsic* cell reflects the conventional hedonistic assumptions. Intrinsically motivated individuals engage in activities for their enjoyment value: "[I do it] because it's fun", "because I enjoy it." The independent self-construal will support high levels of creativity. However, the focus on the play-like quality of activity predicts persistence on the task only so long as it remains interesting; it is therefore not likely to support large-scale coordination, which would require willingness to subordinate personal enjoyment to collective goals and formal controls.

In contrast, the *interdependent-identified* cell extends the PLOC definition of identified motivation to reflect the internalization of collectivistic values by people with more interdependent self-construals. This leads to a sense of collective agency: "You're working together on these things, and if you're down one night, another girl can pick it up for you and you can still win." As in the independent-identified cell, individual motives are likely to have group or organizational goals as referent; but here individual actions are more likely to be informed by input from others, and thus be more amenable to coordination: "I'm doing... what I need to do to help us win. If we win as a team then it's all good." In this cell, we see the highest likelihood of effective large-scale coordination.

In practice, while some individuals may have strong preferences for one of these two cells or any of the others, other individuals are more flexible and can move fluidly between them or even occupy several cells simultaneously. Our argument has been that LSCC will be best supported if people move fluidly between and can occupy simultaneously the two cells we have just discussed.

Antecedents

This paper has aimed at better understanding the individual motivation required for effective LSCC. This section identifies potential antecedents of these motivational orientations. We address in turn individual characteristics and control system design.

Individual characteristics

Some scholars view the *form* of motivation as at least in part an individual disposition or trait (Amabile, Hill, Hennessey, & Tighe, 1994; Gottfried, 1990). Deci and Ryan (1985) invoke "general causality orientation" to distinguish individuals who tend to experience identical situations as affording more versus less autonomy. This research has shown that intrinsic versus extrinsic motivation are to some extent stable personality traits, or dispositions; so too are propensities for introjection and identification (Koestner, Losier, Vallerand, & Carducci, 1996). Organizations can aim to identify such people in their recruiting (see Gotsi et al., 2010 on new product design consultancies that aim to recruit "practical artists"). Thus:

Proposition 10. *The motivational orientation required for effective LSCC will be more likely to obtain where individuals score high simultaneously on trait measures of both intrinsic and identified motivation.*

Similarly, the *subject* of motivation is at least partly dispositional: a considerable body of cross-cultural psychology research shows that individuals' values are shaped by early childhood socialization and that as adults they are therefore disposed to specific types of self-construal. As we noted above, researchers have found that while interdependence/collectivism and independence/individualism are significantly negatively correlated, some people score high on both individualism and collectivism, and some are relatively fluid in their self-construals (as opposed to "schematics" who have relatively fixed and stable self-construals – see Markus, 1977). Organizations that are staffing groups whose primary tasks involve LSCC would benefit from selecting personnel with a fluid motivational orientation or personnel who score high simultaneously on trait measures of independent and interdependent self-construals. Thus:

Proposition 11. *The motivational orientation required for effective LSCC will be more likely to obtain where individuals score high on measures of self-construal fluidity or score high simultaneously on trait measures of independent and interdependent self-construals.*

Control system design

To the extent that the form and subject of motivation are situational rather than dispositional, control system design policies can also support the motivational orientations required for LSCC. Social influence theories and socio-cultural theories both give organizational context an important role in (re-) shaping both PLOCs and self-construals. New entrants to an organization can find their habitual "working" motivational orientations changed either through repeated situational priming of already established "stored" motivational orientations, or through adult socialization experiences in the new work setting (Van Maanen & Schein, 1979). We thus expect organizational design to influence

Table 1
A typology of motivational orientations.

		Extrinsic	Introjected	Identified	Intrinsic
Independent	Proposed items	I need the pay, so I'll try to meet any target they set, but don't expect me to go beyond that	I don't want to disappoint my boss	I value my work and I think it is important to do it well	I love the creative problem solving I get to do here. It's fun to work on problems, especially when I can define them and work on them in whatever way I think best
	Terkel (1972)	"Right now my outlook is making as much money as I possibly can. To make back what I put into the investment of buying a cab. It'll take about 4 years. . . . A cab is just a stepping stone to a car wash and then a car wash will be a means of buying my boat" – Booker Page, <i>Cabdriver</i> (p. 269)	"Do I listen in on conversations? Some girls really do. I've never had the temptation to flip the switch. I don't know why. This company is the kind who watches you all the time. The supervisor does listen to you a lot. She can push a button on this special console. Just to see if I am pleasant enough, if I talk too much to the customers, if I am charging the right amount, if I make a personal call. Ma Bell is listening. And you don't know. That is why it's smart to do the right thing most of the time. Keep your nose clean" – Heather Lamb, <i>long distance telephone operator</i> (p. 38)	"I like my work because you're not stuck in a lousy office. . . . It's a very important field. This is one industry that affects all industries. Security. It's also very helpful to the police department. We supply the police with a hell lot of information" – Anthony Ruggiero, <i>Industrial investigator</i> (pp. 201–202)	"There seems something mystic about music, about piano tuning. There's so much beauty comes out of music. So much beauty comes out of piano tuning" – Eugene Russell, <i>Piano Tuner</i> (p. 426)
Interdependent	Proposed items	We need the income, so we'll do what it takes	We don't want to bring dishonor to our group, so we work hard	We value the goals of our organization and we are committed to working toward reaching them	I love it when our team comes up with a great new idea. It's fun to work on problems we define in whatever way we think best
	Bowe et al. (2001)	"As far as I'm concerned, we're all one family here. If business is bad, I can't give you a raise. If you don't take care of my business, you can't get paid. They realize that one hand washes the other. If they do well, I do well-If I do well, they do well"- David Eng, <i>Tofu manufacturer</i> (p. 91)	"And there's this weird kind of store pride, or group pride, that forms. You know, they'll say, 'Congratulations, Natasha,' if a mystery shopper gave me good points and said nice things about my appearance or something. It locks people into this whole family mentality. You're afraid of being the bad kid, of being nasty to a customer. [Laughs] Because you know it will be posted that you screwed up. And the whole gang will know" – Natasha Werther, <i>Kinko's coworker</i> (p. 61)	"We're winning now. We're a better team. And so I'm doing now what I need to do to help us win. And I don't care because, you know, I'm all about teamwork and if we win as a team then it's all good. I do whatever I can. . . . So if I'm not having a great night or even if I'm on the bench, I want to be like, 'Come on, Nikki, you can do it – keep your stance.' Or, 'Come on, Latasha, be careful with your body!' I still want to be supportive. And I still want to be respected as a player who uplifts everybody. I don't want to get so upset I go to the end of the bench and get within myself. . . . And one thing I love about basketball is it's such a team sport. You're all working together on these things, and if you're down one night, another girl can pick it up for you and you can still win. I love that" – Ruthie Bolton-Holfield, <i>Professional basketball player</i> (pp. 334–335)	"Because that's just the way movies are. Because more than any other art form, it's this collaboration between hundreds of people. So, like, it wasn't just the studio, you have to explain things to the cinematographer, the actors, the set design people, the people moving around props in between scenes. And as a result of all these various people's interpretations, your idea changes. It mutates. There can be beautiful mutations, where you're like, 'Oh my God, that pause the actress is putting in there – the way she coughed in the middle of the scene, it's so powerful! I would have never been able to write that.' Or, 'Oh my God, the way the art director put that blue couch in the room with the shades drawn, it's so sad. It's such a beautiful scene – so much better than I wrote it" – Tamara Jenkins, <i>Film director</i> (pp. 223)

This table presents descriptors for the typology of motivations suggested by our conceptual model. In the independent self-construal panel, we first display our hypothesized descriptions and then illustrative quotations from Terkel's (1972) interviews with working people about their jobs. In the interdependent self-construal panel, we first display our hypothesized descriptions and then illustrative quotations from Bowe et al.'s (2001) interviews with working people about their jobs.

motivational orientation and thereby influence the potential for LSCC. The following paragraphs discuss in turn four propositions concerning control system design.

Levers of control

Simons (1995) propose four levers of control that managers can use to balance innovation and control: beliefs systems, boundary systems, diagnostic control systems, and interactive control systems. Simons' framework leaves unanswered the question of how these four levers of control influence employees' motivational orientations. In this section, we discuss how the use of the four levers of control can support the various aspects of LSCC.

Beliefs systems help convey an organization's overall strategy, vision, and mission. A beliefs system is "the explicit set of organizational definitions that senior managers communicate formally and reinforce systematically to provide basic values, purposes, and direction for the organization (Simons, 1995, p. 34). Beliefs systems can be established through mission statements, statements of purpose, employee credos, and management and employee meetings. As discussed above, internalization of organizational goals is critical to LSCC. By articulating and communicating the organizational goals and values to be internalized by the employees throughout the organization, beliefs systems play a vital role in fostering identified motivation and interdependent self-construals that are required for LSCC. Thus:

Proposition 12. *The use of beliefs systems will be positively associated with identified motivation and interdependent self-construals that are required for LSCC.*

Compared to beliefs systems, the effects of boundary systems and diagnostic control systems are more difficult to predict. A boundary system "delineates the acceptable domain of strategic activity for organizational participants" (Simons, 1995, p. 39) and can be established through employee credos and other formal procedures and rules. Diagnostic control systems are feedback systems that monitor organizational outcomes and correct deviations from pre-set standards of performance. Diagnostic systems include profit plans and budgets, goals and objectives systems, project monitoring systems, and strategic planning systems. Both boundary systems and diagnostic control systems are prototypically bureaucratic systems and we conjecture that their effects on employee motivation depend on whether they are used in an enabling or coercive manner (Adler & Borys, 1996).⁴

Boundary systems are essentially negative systems that set limits on the behaviors of organizational members and provide credible sanctions for violations of the prescribed rules and procedures. As such, when used in a coercive way, boundary systems are likely to elicit extrinsic and introjected motivations through guilt and anxiety rather than intrinsic or identified motivation. On the other hand, when used in an enabling way, these boundaries may be seen as appropriate to the tasks of the organization, indeed as helpful guidance concerning the organization's identity and goals, and in this way they may be internalized and may support identified motivation and interdependent self-construals.

Diagnostic control systems share this dual nature. When diagnostic control systems are used in an enabling way, they can make transparent the organization's goals and progress toward these goals, thereby fostering mutual commitment and inducing identified motivation and interdependent self-construals. An enabling use of diagnostic control systems could also promote accountability and facilitate coordination across different participants in LSCC. Finally, an enabling use of diagnostic control systems can give organizational members flexibility in how they use the system and opportunities to adapt and improve it. Such opportunities are critical for identified motivation. For example, many interview respondents in software service firms suggest that "People support what they help create", and therefore, the control systems in such firms were designed to support extensive participation (Adler, 2006, p. 215).

Several accounting studies provide empirical evidence that is broadly consistent with the benefits of an enabling use of boundary and diagnostic control systems. For example, Ahrens and Chapman (2004) apply the concept of enabling bureaucracy to analyze the role of enabling systems in a restaurant. They show that the restaurant achieved enabling bureaucracy by, for example, highlighting the formalized procedures as guidelines and stressing the need to support the creativity and commitment of employees. Wouters and Wilderom (2008) use a mixed-method, 3-year longitudinal study of the logistics department of a medium-sized firm in the beverage manufacturing company and find that experience-based process and experimentation contribute to the enabling nature of the performance measurement systems. Jorgensen and Messner (2009) draw on empirical data from interviews, participant observation, and internal documentation collected through an in-depth field study carried out in new product development in a manufacturing organization. They show how several formal rules and procedures are used to control the development process and enable engineers to work more effectively in new product development. For example, project managers and development engineers were given the autonomy to bend or break the formal rules as specified in the process manual depending on how inappropriate the rules were to the task at hand. Finally, Chapman and Kihn (2009) examine the relationship between information system integration and perceived system success and business unit performance. Using survey data from 300 business unit level senior managers from 86 industrial companies, they conclude that information system integration promotes an enabling

⁴ Enabling bureaucracy differs from coercive bureaucracy in four respects: repair, internal transparency, global transparency and flexibility. The *repair* feature refers to the extent to which organizational members are allowed to solve breakdowns and continue without further interruptions to their activities. The *internal transparency* feature refers to the extent to which users are able to see through and understand the logic of the system. The *global transparency* feature relates to the extent to which users understand the upstream and downstream implications of their work. Finally, the *flexibility* feature indicates the degree of discretion that employees have in how they use the system (Adler & Borys, 1996).

approach to management control that, in turn, increases both perceived system success and business unit performance.

On the other hand, when diagnostic control systems are used in a coercive manner, they could erode employees' identification with organizational goals by reinforcing the existing functional lines of authority and responsibility (Abernethy & Brownell, 1999; Henri, 2006). This would reinforce boundaries between participants in the LSCC project and induce an individualistic frame instead of a group frame (Rowe, 2004), or lead participants to identify with subunit goals rather than organizational goals. In addition, when used coercively, diagnostic control systems focus punitively on mistakes and negative variances, and as such, are likely to lead to introjected motivation through guilt and anxiety, which can deter creativity and innovation. Simons (1995) argues that diagnostic control systems "constrain innovation and opportunity-seeking to ensure predictable goal achievement needed for intended strategies" (p. 91). We argue that these negative outcomes result not from the use of diagnostic control systems *per se*, but from the coercive form they often take. Consistent with the latter negative effect of diagnostic controls on innovation, Henri (2006)'s survey data from 2175 Canadian manufacturing firms reveals a negative association between a diagnostic use of performance measurement system and innovativeness. The above discussion leads to the following propositions:

Proposition 13a. *An enabling use of boundary and diagnostic control systems will be positively associated with intrinsic motivation, identified motivation, and interdependent self-construals that are required for LSCC.*

Proposition 13b. *A coercive use of boundary and diagnostic control systems will be negatively associated with intrinsic motivation, identified motivation, and interdependent self-construals that are required for LSCC.*

Interactive control systems are formal control systems that managers use to facilitate ongoing communication between top managers and lower level of management as well as between organizational members (Simons, 1995). Through interactive control systems, top managers focus the attention of the entire organization on strategic uncertainties, perceived opportunities, and potential threats. Organizations use many different tools for interactive control systems. For example, one way to establish interactive control systems is to analyze data from reports that are frequently released or internally generated productions reports.

We predict that interactive control systems will lead to both identified motivation and intrinsic motivation to innovate. First, interactive control systems require regular attention from managers and employees at all levels of an organization across different functions. As such, interactive control systems serve as a powerful solidarity mechanism that dismantles the functional and hierarchical obstacles between organizational members and enhances the psychological bond among organizational members. By mitigating the functional boundaries between participants in the LSCC project, interactive control systems are expected

to induce a group frame (Rowe, 2004) and lead to greater identified motivation and interdependent self-construals. Second, interactive control systems also promote intrinsic motivation by stimulating experimentation with new ideas at all levels and fostering individuals' "innate desires to create and innovate" (Simons, 1995, p. 155). By motivating information gathering, face-to-face dialogue and debate, interactive control systems stimulate learning and encourage new ideas to emerge.

The accounting literature has provided some empirical evidence that interactive control systems foster successful innovation. For example, Simons (1995) show that interactive control systems are used more intensively in the most innovative companies than in less innovative companies. Recent empirical studies suggest that the use of interactive control systems in the areas of budgeting, balance scorecards, and project management systems is associated with greater innovation (Abernethy & Brownell, 1997, 1999; Davila, 2000; Kaplan & Norton, 1996; Kaplan & Norton, 2000; Simons, 1995; Simons, 1995). Brown and Eisenhardt (1997)'s field studies of innovative information technology (IT) companies find that the use of interactive control systems help facilitate innovation in IT companies. Abernethy and Brownell (1999) find that the relation between strategic change and performance is more positive when the style of budget use is interactive rather than diagnostic. Using survey data from 2175 Canadian manufacturing firms, Henri (2006) finds a significantly positive association between an interactive use of performance measurement system and firms' innovativeness.⁵ However, the above-mentioned studies have primarily explained the effects of interactive controls on innovation with the increased information flow between top management and subordinates. For example, Abernethy and Brownell (1999) argue that "Designing a system which encourages increased interaction between top management and subordinates facilitates increased information flows (p. 192)". Similarly, Henri (2006) argues that in uncertain circumstances, "Additional pressure is imposed on the organization's information processing capacity and more interaction between top management and subordinates is required to increase the flow of information" (p. 536). In the current study, we argue that interactive control systems can enhance innovation by fostering the appropriate motivational orientations, in addition to giving organizational members more information to draw on in their decisions. So far, there is no direct empirical evidence on the relationship between interactive control systems and the motivational orientations of individuals in innovative activities. Further empirical research is needed to investigate whether individual motivation complements information flow in explaining the effects of interactive control systems on innovative activities. The above discussion leads to our next proposition:

⁵ Bisbe and Otley (2004)'s field-based survey research did not find a direct effect of the use of interactive control systems on innovation. Instead, they found that the use of interactive control systems moderates the relationship between innovation and performance such that the relationship between innovation and performance becomes more positive with the increased use of interactive control systems.

Proposition 14a. *The use of interactive control systems will be positively associated with intrinsic motivation, identified motivation, and interdependent self-construals that are required for LSCC.*

Accounting researchers have just started to explore the tensions between diagnostic and interactive control systems. For example, Henri (2006) examines the combined use of diagnostic and interactive control systems and argues that the dynamic tension between the two may help increase the positive effects of the interactive use on innovation by stimulating organizational dialogue, enhancing creativity by leading organizational members to integrate seemingly opposite elements, and focusing organizational attention on a common goal. He argues that “The ability to reach a balance between two opposing uses of performance measurement systems which, simultaneously, try to stimulate innovation while searching for predictable achievements represents a capability that is valuable, distinctive, and imperfectly imitable” (p. 539). Specifically, Henri (2006) argues that if diagnostic control systems are used insufficiently, interactive control systems may not reach their full potential due to a lack of directions, but on the other hand, when diagnostic control systems are used excessively, they may reduce the potential benefits of interactive control systems by restricting experimentation and risk taking. Henri’s empirical results do not support an overall significant relationship between innovation and dynamic tension between diagnostic and interactive control systems, but he does find a significantly positive effect of dynamic tension on performance for firms facing high environmental uncertainty and having flexibility values. LSCC settings are characterized with high environmental uncertainty. Therefore, we expect an optimal mix of diagnostic and interactive control systems to create a healthy dynamic tension that will lead to the motivational orientations necessary for LSCC. However, further research is needed to investigate what constitutes the optimal mix of diagnostic and interactive control systems for different organizations.

Proposition 14b. *An optimal mix of diagnostic and interactive control systems will be positively associated with intrinsic motivation, identified motivation, and interdependent self-construals that are required for LSCC.*

Incentives

Since LSCC requires simultaneously high levels of intrinsic and identified motivation, incentives should be designed in such a way that both forms of motivational orientations will be induced simultaneously. The literature reviewed above suggested that the intrinsic motivational requirements of creative tasks can be sustained and even enhanced in the presence of external performance-contingent rewards so long as these latter are perceived as autonomy-supporting and informational rather than coercive and controlling. For example, in an experimental study, Eisenberg (2001) assigns 340 students to three different reward conditions: individual performance-contingent reward, group performance-contingent reward, and non-perfor-

mance-contingent reward. He finds that individual performance-contingent reward results in higher intrinsic motivation than group performance-contingent reward and non-performance-contingent reward.

Incentives designed to facilitate LSCC should also seek to enhance identified motivation. Group-based rewards are commonly used to induce identified motivation. Teasley and Robinson (2005) show that some Japanese companies make effective use of communally shared rewards to encourage creativity and innovation. In two small-group idea-generation experiments, Toubia (2006) finds that rewarding participants for a weighted average between their individual contribution and their impact on group output leads to more creative output than rewarding participants based on their individual contribution alone. Chen, Williamson, and Zhou (2010) report the results of an experiment where three-person groups develop a creative solution to an important problem. They find that group-based (intergroup) tournament pay had a positive effect and individual-based (intragroup) tournament pay had no effect on the creativity of the group solution. They also find that intergroup tournament pay leads to greater group cohesion and collaboration, which lead group members to identify to a greater extent with group objectives, which ultimately leads to a more creative group solution. Chen et al. (2010)’s results suggest that using rewards to promote identified motivation can help overcome obstacles identified by prior research that limit the effectiveness of creativity-contingent incentives.

We therefore predict that incentive systems that combine individual-based components and group-based components will facilitate LSCC by enhancing both intrinsic motivation and identified motivation:

Proposition 15. *The use of incentives that combine an individual-based component and a group-based component will be positively associated with intrinsic motivation and identified motivation that are required for LSCC.*

Generalizing beyond LSCC

Our analysis of the motivational requirements of LSCC has focused on examples where the key tasks require simultaneously high creativity and high formal coordination. It is important to consider whether our account can shed light on other types of tasks. We map the variety of tasks along the two dimensions of creativity and coordination in Table 2 and cite illustrative jobs, but with the crucial proviso that in practice, individuals and groups are typically confronted with task-sets rather than single tasks, and these task-sets are often heterogeneous, composed of tasks that are spread over more than one region of this space.

First, we reconsider the high-creativity/low-coordination region. Creativity is a matter of both novelty and usefulness, and Csikszentmihalyi’s systems theory of creativity reminds us that the usefulness dimension always implicates some form of interdependence of the creative individual with the broader social field. In the high-creativity/low-coordination region, the coordination of this

Table 2
Predominant motivational orientation requirements for six types of tasks.

Creativity demands	High	Example	Solo designer	Member of small design team	LSCC: Bridge designer
		Form of motivation	Intrinsic motivation	Intrinsic <i>and</i> identified motivation	Intrinsic <i>and</i> identified motivation
		Subject of motivation	Independent self-construal	Independent <i>and</i> relational interdependent self-construal	Independent <i>and</i> collectivist interdependent self-construal
	Low	Example	Toll-booth operator	Member of a routine production team	Assembly-line worker
		Form of motivation	Extrinsic motivation	Extrinsic <i>and</i> identified motivation	Extrinsic <i>and</i> identified motivation
		Subject of motivation	Independent self-construal	Independent <i>and</i> relational interdependent self-construal	Independent <i>and</i> dependent self-construal
		Low	Medium (small scale)	High (large scale)	
Coordination Demands					

interdependence is less salient than in the LSSC region, but it must nevertheless be successfully mastered in two “moments” of the creative process: first, in the individual’s internalization of the field’s norms and knowledge, and second, in the individual’s response to the judgments that other participants make of the usefulness of these novel ideas. Anyone can be lucky and come up with a novel idea that also proves to be useful, but Csikzentmihaly makes a convincing case that the ability to sustain creativity over a series of projects depends (inter alia) on the individual’s ability to master successfully both of these moments of the creative process.

Our theory suggests that the individual’s motivational orientation will condition this ability. Even in the case of the creative scientist or artist working in apparent solitude, we should therefore find a similar dynamic at work – one where the form of motivation is not only intrinsic but also identified, and where both individualistic and collectivist values are honored. We find considerable support for this prediction in the case study of the individual creativity of the renowned scientist, Linus Pauling (Nakamura & Csikzentmihalyim, 2001). The authors of this case study write:

Pauling liked to say that the route to creativity was having a lot of ideas and discarding the bad ones. He maintained that he had developed ‘pretty good judgment about what are good ideas and what are bad ideas’ (CLL, 1990). Furthermore, like other scientists, his internalization of the field’s standards sometimes convinced him to postpone,

even for years, presentation of ideas he deemed good while he sought more convincing support (CLL, 1990; Hager, 1995). However, Pauling was a theorist, and his inclinations were speculative, optimistic, and self-confident. Consequently, sources of evaluation intermediate between his internal standards and the field’s formal gatekeepers played a particularly important role for him in screening out bad ideas (Goertzel & Goertzel, 1995; Hager, 1995). During his career, he benefited most from the circle of students and collaborators who were both participants in the creative process (c.f. Csikzentmihalyi & Sawyer, 1995). [...] When this evaluative process was short-circuited – for example, by Pauling’s impatience – bad ideas could reach print. His incorrect DNA structure is the best-known example. (Nakamura & Csikzentmihalyim, 2001, p. 339)

Here we see on the one hand, Pauling’s individualism (his “pretty good judgment,” “self-confidence,” and occasional “impatience”) help him to generate creative, novel ideas, and on the other hand, his internalization of and identification with the scientific field’s standards and his bonds with a collective enterprise comprising “students and collaborators” play a crucial role in ensuring the usefulness of these ideas in their contribution to the larger-scale enterprise of science.

Whereas the traditional image of the creative scientist or artist operating autonomously highlights the need for an intrinsic/independent motivational orientation, our theory sensitizes us to the importance of a simultaneous

identified/interdependent orientation. In the context of LSCC, the latter orientation is a more visible requirement, with very direct effects on the individual's creativity; but Csikzentmihalyi's account suggests that even in the case of the solo scientist or artist, it plays a crucial, albeit background, role in assuring the individual's long-run creative success. Other evidence for this comes from Berliner's account of the deep engagement of jazz musicians with the jazz community required to master and continue developing their art (Berliner, 1994).

Second, we consider low-creativity/high-coordination tasks. As we argued at various points above, task interdependencies make identification an important form of motivation in both these and LSCC tasks. But does identification lead to the same kind of subject of motivation in these two types? Not quite. We need here to distinguish (following Triandis & Gelfand, 1998) "vertical" and "horizontal" forms of collectivism, based on whether they are characterized by high or low power-distance, and to distinguish in parallel what we might call "dependent" from properly interdependent forms of self-construal (Triandis, 1995 calls these respectively interdependent/different and interdependent/same). Research by Hofstede (2001) and Shane (1995) suggests that high power-distance induces conformance to authority and weakens creativity. Indeed, much of the research we cited above concerning the negative impact of collectivism on creativity assumes that this collectivism is of the high power-distance variety (an assumption that is theoretically naïve but reflects the sizable empirical correlation of collectivism with high power-distance). This in turn suggests that low-creativity/high-coordination tasks would be optimally supported by vertical collectivism and dependent self-construals. This prediction is consistent with the argument that Japanese national culture, with its characteristically high power-distance, is unusually well suited to mass-production manufacturing and its associated pattern of incremental innovation (e.g., Herbig & Palumbo, 1994). We should note, however, that in practice, such mass-production jobs sometimes include ancillary "improvement" tasks that require workers, individually and in improvement teams, to contribute creative ideas for process improvement: in such situations, the dominant task we have just been analyzing is paired with tasks that fits in the individual and small-team creativity cells of our table, yielding a highly complex constellation of motivational orientations.

The medium-coordination region of Table 2 is the space of *small-scale* teamwork, which can be either more or less creative in nature. Here interdependence is local and small in scale, and the coordination – where it is successfully achieved – can be assured by internalized standards and mutual adjustment (e.g., Caldwell & O'Reilly, 2003; Van de Ven, Delbecq, & Koenig, 1976; Wong & Campion, 1991). Here formal coordination mechanisms are not required by the scope of interdependence and an organic structure is considered optimal. In low-creativity/medium-coordination tasks, our analysis suggests the optimal forms of motivation would combine extrinsic motivation with identification with the team itself, and the corresponding self-construal would combine independence and a relational form of interdependence. The indepen-

dence element of this orientation would support the instrumental exchange implied by extrinsic controls. The key difference, then, between this and the low-creativity/high-coordination task discussed in the previous paragraph is between relational interdependence here (since the team is salient) and vertical collectivism/dependent there (where impersonal organizational controls are salient). Consistent with our argument, Eby and Dobbins (1997) showed that collectivism – measured as a preference for working with others rather than by oneself – facilitated performance in small teams performing a moderately complex but not creative task.

In high-creativity/medium-coordination tasks, central to creative teams much discussed in the innovation literature, our theory suggests that the optimal motivational orientation, as in LSCC tasks, should be a combination of intrinsic and identified, but here (as in medium-coordination/low-creativity tasks) the identification will be with the small team rather than the larger collectivity. As a result, the corresponding optimal self-construal will be a combination of independent and relational interdependence. This seems consistent with the portraits of creative teams drawn by Hackman (2002) for example. We would note, however, that such teams sometimes work within larger organizations, where formal coordination controls are exercised for reasons other than to support the team's primary task. In the absence of some identification with this larger collectivity, these controls will generate frustration and/or undermine the motivation needed for the group's main task.

The literature on organizational commitment suggests that organizational members often have multiple foci of commitment, including the organization, top management, supervisors, coworkers, professions, and unions (Becker, 1992; Reichers, 1985). Conflicts may arise from this multiplicity of commitments (e.g., Rowe, Birnberg, & Shields, 2008). Rowe et al. (2008) provide a theoretical framework suggesting that management accounting practices influence cooperative or competitive behavior of managers from different responsibility centers. For example, they predict that grouping responsibility center (RC) managers by using consolidated budgets and shared accounting reports, and by referring to a cross-functional team of RC managers using no or a single title or social category on accounting reports will induce a group frame and lead to cooperative behavior of managers from different RCs. Conversely, partitioning individual RC managers – using separate budgets and separate accounting reports, or referring to particular RC managers using different titles or social categories on accounting reports – will induce an individual frame and lead to competitive behavior of RC managers. Applying Rowe et al. (2008)'s insights to the high-creativity/medium-coordination tasks discussed above, we argue that management accounting practices should be designed to support both individual employees' identification with their immediate groups and their identification with the entire organization. Rowe et al. (2008) summarize some management accounting practice examples that are capable of achieving this objective, including creating joint project budgets, sharing process-level accounting information, open book accounting, and

labeling individuals as members of a larger collectivity. Belief systems (discussed in the above section) should also help by providing and communicating the organizational goals and values to be internalized by the employees throughout the organization. By contrast, traditional accounting practices that reinforce boundaries between different groups within an organization could potentially lead to conflicts between an individual's commitment to his/her immediate group and the commitment to the entire organization.

Conclusion

Recent management accounting literature documents the positive impact of management control systems on creativity and innovation (e.g., Abernethy & Brownell, 1997; Ahrens & Chapman, 2004; Bisbe & Otley, 2004; Brown & Eisenhardt, 1997; Cardinal, 2001; Chapman, 1998; Davila, 2000; Davila, Foster, & Li, 2009). However, extant studies have predominantly focused on organizational-level variables and have ignored individual-level variables. The present paper addresses this limitation in prior literature by highlighting the individual-level motivational challenge and identifying the individual-level motivational orientations that would enable large-scale collaborative creativity.

The dual motivational challenge of LSCC appears insurmountable if we begin with the individualistic assumptions that all external controls are coercive and that self-construals are essentially independent. We have argued that once we recognize a richer range of forms of motivation, we can acknowledge the important role that identification can play, and we can see how intrinsic and identified forms of motivation can coexist. We then argued that we also need to consider the values that are internalized in this identification process because these values shape the nature of the subject of motivation, and we showed how individualistic and collectivistic values can coexist as can the corresponding self-construals.

Much of organization design literature treats "organic" and "mechanistic" as two ideal types (e.g., Burns & Stalker, 1961; Woodman et al., 1993). This makes LSCC seem impossible: if intrinsic motivation is essential for individual creativity, and organic structures are necessary to support intrinsic motivation, then based on this ideal-type assumption it is hard to see how an organization can simultaneously implement the mechanistic structure needed to assure the control of large-scale task interdependencies. Our discussion suggests that these are really two orthogonal dimensions of organization, and through the implementation of the appropriate control systems and enabling forms of bureaucracy, these dimensions can be combined to support LSCC.

Based on the propositions developed in our study, we proposed a 4×2 typology of motivational orientations, defined by the form of motivation (four positions along the PLOC gradient) and the subject of motivation (independent versus interdependent self-construals).

Finally, we specified some antecedent conditions required for the emergence of the appropriate motivational orientations for LSCC settings. The list of antecedents dis-

cussed in our study was by no means intended to be exhaustive, but the discussion does demonstrate that the motivational orientation required for LSCC can be supported by judicious organizational policies. We also suggest that our conceptual framework can shed light on other types of tasks with moderate creativity or coordination demands.

Our study makes several contributions. First, by identifying the individual-level motivational orientations that enable large-scale collaborative creativity, we explicate the motivational effects of management control systems and contribute to a more complete understanding of the linkages between control mechanisms and the output of organizations' innovation activities. Unlike the previous accounting literature that tends to emphasize the role of control systems in inducing and directing effort, we suggest that the path from intrinsic and identified motivations to creativity and coordination does not work by inducing more effort alone. They also work in part by inducing positive affect and broadening cognition in a way that enables creativity and coordination without individuals consciously exerting effort toward these behaviors.

Second, the existing management accounting literature has provided mixed evidence on the effect of management control systems and performance on creative activities. Our study provides an additional explanation for the mixed evidence in prior literature. Specifically, to enable participants in collective creative activities to reconcile the creativity and control demands, management systems must be designed to induce intrinsic and identified motivation as well as independent and interdependent self-construals simultaneously. Variations in the success across organizations in meeting this challenge will lead to different performance outcomes.

Finally, we extend the literature on creativity and an emerging literature on the role of management control systems in creativity and innovation by identifying the motivational underpinnings of large-scale collaborative creativity. By introducing two clusters of concepts from the psychology literature, we provide new insights concerning individual motivation in collective creative activities.

Our model of individual motivation for LSCC has implications for the design of management control systems in organizations seeking to increase the effectiveness of LSCC. We argue that organizations have a significant degree of control over the antecedents of both the forms of motivation and the self-construals of their members. While more research is needed to specify the optimal mix of policies, it seems clear that management action can support the motivational orientation needed for LSCC. First, to the extent that people's motivational orientations are dispositional, managerial policies can support LSCC by fostering appropriate attraction–selection–attrition patterns so as to ensure that the organization is staffed with the appropriate personnel, specifically seeking out people with high intrinsic motivation and high identified motivation as well as people with fluid orientations. Second, insofar as individual motivation can be influenced by situational factors, several strands of theory identify organization and control system designs that support the requisite motivational

orientations and thereby increase the potential for successful LSCC.

As Davila, Foster, and Oyon (2009) note, a literature is emerging on a new control paradigm where management control systems are conceptualized not as hindrance but as a facilitator in entrepreneurship and innovation. This study adds to this literature by exploring the motivational underpinnings of this new control paradigm. Further research can extend the set of variables that can induce the motivational orientations required for LSCC settings. Follow-up research could also empirically test the propositions in this study using data from the field. In addition, new insights could emerge by combining the individual and organizational levels of analysis in empirical studies.

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