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BRINGING BOUNDED RATIONALITY BACK IN: A BEHAVIORAL APPROACH TO INCENTIVE SYSTEMS, ORGANIZATIONAL DESIGN, AND SOCIAL INTERACTIONS IN ORGANIZATIONS

PHD DISSERTATION

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PART 1

INTRODUCTION TO THE DISSERTATION

Abstract

This dissertation seeks to address research questions regarding the challenges that employees face in making sense of their work environments. As boundedly rational agents, different employees process information in different ways. This conceptualization raises a number of important questions regarding the contingencies that determine how employees interpret and react to specific organizational elements. This dissertation is thus based on a broad research question: How, and under which conditions employees (differentially) react to reward mechanisms, structural features of the organization, and social interactions in the workplace? The six studies in this dissertation span different research contexts, methodologies, and theoretical angles. Yet, they all deal with this fundamental question, and collectively contribute to a better understanding of how bounds in human rationality together with contextual and psychological contingencies drive employee behavior.

Introduction

Given bounded rationality (Simon, 1955, 1978), people perceive and make sense of the world in terms of cognitive frames that they impose on the information environment so as to give it form and meaning (Gavetti & Rivkin, 2007; Hodgkinson & Healey, 2008; Walsh, 1995; Weick, Sutcliffe & Obstfeld, 2005). The development of these frames is linked to specific socio-cultural and environmental contingencies.

For this reason, different employees may well make sense of similar scenarios in widely different ways.

Yet, almost sixty years after Simon's initial contribution on bounded rationality (Simon, 1955), management research does not fully capture the extent to which employees' limited rational capabilities determine how they perceive and react to fundamental dimensions of the organizational life. In other words, as Gavetti & Levinthal pointed out: "we still struggle with the implications of the notion of bounded rationality for our models of individuals and organizations" (2001: 213). In this dissertation, I look at these implications in the context of reward systems, structural features of the workplace, and social interactions among employees.

With regard to reward mechanisms, existing research in agency theory is based on several simplifying assumptions regarding the knowledge that individuals have of each other and how they process that knowledge (Lubatkin, Lane, Collin & Very, 2007). However, recent findings in evolutionary anthropology (Call & Tomasello, 2008), neuroscience (Gallagher & Frith, 2003) and neuro-economics (Singer & Fehr, 2005) indicate that these assumptions are particularly problematic if considered from a bounded-rationality perspective. Further, research suggests that rewards are important signals in the workplace (Connelly, Certo, Ireland & Reutzel, 2010), and that these signals may be ambiguous in terms of whether they are perceived as instruments of control or competence affirmation (Deci, Koestner & Ryan, 1999). Yet, existing research does not seem to provide indication of what decides when one of these two interpretations will be dominant. Clearly, this is problematic as different interpretations are expected to lead to different behaviors (Deci & Ryan, 2000; Ryan & Deci, 2000).

A similar logic applies to the structural factors of the organization, both in a more specific context (the design of the workplace), and in a broader sense (organizational design). Given bounded rationality, these design factors may be interpreted as instances of control or competence affirmation (Deci & Ryan, 2000; Ryan & Deci, 2000), and in turn they may induce different behavioral responses. Specifically, in the context of the workplace design, tools that separate employees from each other (partitions, walls, etc.) may be ambiguous in terms of their real function. In the context of the organizational design, specific configurations of organizational elements (organizational structure, coordination mechanisms, and contingencies) may differentially induce the boundedly rational employee to believe that the decision rights that have been delegated to him are (or are not) likely to be reneged. Existing research fails to capture the complex psychological mechanisms that are behind these sensemaking processes.

Finally, with regard to social interactions, the structuralist perspective on networks traditionally focuses on consequences of network configurations—that is, specific patterns of relationships between nodes—and de-emphasizes the importance of individual-specific characteristics and psychological processes (Borgatti & Halgin, 2011; Kilduff, Tsai & Hanke, 2006). Yet, abundant research evidence highlights that cognitive and psychological factors are fundamental drivers of human behavior (Ocasio, 1997; Ryan & Deci, 2000). In particular, considerations of bounded rationality would suggest that attentional factors are crucially important in deciding the extent to which a node can benefit from his position in the social structure. This aspect has been overlook in current research. Again, this is problematic because an imperfect understanding of these attentional constraints may provide researchers and

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practitioners alike with an inaccurate understanding of the behavioral implications of given structural (network) configurations. The papers that form this dissertation investigate all these aspects.

Contributions

The papers of this dissertation are strongly interconnected in that they complement each other by investigating from different angles the phenomenon of interest—i.e., the implications of taking a behavioral approach to incentive systems, organizational design, and social interactions in organizations. The papers use different methodologies and datasets (see Table 1).

Table 1: Type of Paper

Theoretical Papers	Empirical Papers
1. The Principal's Theory of Mind: The Role of Mentalizing for Reward Design and Management in Principal-Agent Relations	2. Motivating Knowledge Sharing when Rewards are Ambiguous: The Role of Complementary Motivators
3. Physical Separation in the Workplace: Separation Cues, Sensemaking, and Behavioral Responses	5. Network Size and Prosocial Behavior: Taking Bounded Rationality into Account
4. Organizational Design and the Credibility of Delegated Decision Rights	6. Brokerage and Creativity: A Bounded Rationality Perspective

In total, two papers are currently under review at peer-reviewed journals (*Human Resource Management, European Management Review*), three papers have been recently submitted (*Organization Studies, Journal of Management Studies, Organization Science*), one paper is awaiting submission. Five out of the six papers have been presented (have been accepted for presentation) at the 2012 (2013)

Academy of Management Meetings. Additionally, five out of the six papers have been presented in invited seminars (see Table 2).

Table 2: Overview of Presentations and Submissions

Paper	Presentations	Submission
1. The Principal's Theory of Mind: The Role of Mentalizing for Reward Design and Management in Principal-Agent Relations	1. BI Norwegian Business School (September 2012) 2. 2012 AOM Meeting (August 2012)	European Management Review, R&R (March 2013)
2. Motivating Knowledge Sharing when Rewards are Ambiguous: The Role of Complementary Motivators	1. 2012 AOM Meeting (August 2012) 2. Copenhagen Business School (June 2011)	Human Resource Management, R&R 2nd round (January 2013)
3. Physical Separation in the Workplace: Separation Cues, Sensemaking, and Behavioral Responses	1. 2012 AOM Meeting (August 2012) 2. INGENIO Institute, Valencia (March 2012)	Organization Studies, Submitted (February 2013)
4. Organizational Design and the Credibility of Delegated Decision Rights	1. 2013 AOM Meeting (accepted for presentation) 2. EURAM Conference 2013 (accepted for presentation)	Journal of Management Studies, Submitted (February 2013)
5. Network Size and Prosocial Behavior: Taking Bounded Rationality into Account	1. INGENIO Institute, Valencia (April 2013) 2. 2013 AOM Meeting (accepted for presentation)	Organization Science, Submitted (October 2012)
6. Brokerage and Creativity: A Bounded Rationality Perspective	1. INGENIO Institute, Valencia (April 2013)	

The six papers can be organized around three main groups. In the following, the six papers are briefly discussed.

Paper 1 & 2: Incentives and bounded rationality. These two papers focus on the design (Paper 1), and interpretation (Paper 2) of incentive systems given considerations of bounded rationality.

- **Paper 1** ("The Principal's Theory of Mind: The Role of Mentalizing for Reward Design and Management in Principal-Agent Relations") posits that agency theory—one of the most important foundational theories in management research—rests on tenuous cognitive assumptions. In this paper, we combine classical agency theory with a realistic theory of the intrinsically imperfect human potential for interpersonal sensemaking. This allows us to systematically show how the principal's "mentalizing" (one individual's understanding of another individual's intentions, knowledge, and beliefs) with the agent influences value creation in principal-agent relations, and to link this to organizational sensemaking instruments.

- **Paper 2** ("Motivating Knowledge Sharing when Rewards are Ambiguous: The Role of Complementary Motivators") looks at processes of rewards sensemaking in the context of knowledge sharing. Specifically, the extant literature identifies a number of antecedents of the motivation to share knowledge, implicitly suggesting that those who are exposed to such antecedents assume they are unambiguous. However, whether a reward for sharing knowledge is intended to be controlling or informational is not always clear. We posit that he presence of other potential antecedents of knowledge-sharing motivation may overcome such ambiguity. Specifically, we test for complementarities among rewards, job design, and work climate in the form of a three-way interaction among these variables with respect to their impact on knowledge-sharing motivation. Our analysis of

1,523 employees in five knowledge-intensive firms shows that employees who are exposed to ambiguous rewards for knowledge sharing experience higher levels of autonomous motivation to share when they are simultaneously exposed to a job design and work climate that support knowledge sharing. We argue that job design and work climate serve as a context for how employees experience rewards.

Paper 3 & 4: Workplace design / organizational design and bounded rationality. These two papers focus on how employees attribute meaning and, in turn, react to: 1) physical separation from their colleagues (Paper 3), and 2) instances of delegated decision rights (Paper 4) given considerations of bounded rationality.

- **Paper 3** ("Physical Separation in the Workplace: Separation Cues, Sensemaking, and Behavioral Responses") investigates how employees make sense of the physical environment in the workplace. Physical separation is pervasive in organizations, and it has powerful effects on employee behavior and organizational performance. However, research shows that workplace separation is characterized by a variety of tradeoffs, tensions, and challenges that lead to both positive and negative organizational outcomes. By developing new theory on the nature, antecedents, and consequences of separation awareness—a psychological state in which people are aware of their physical separation from others—we proffer a model of the positive and negative potential inherent in separation in the workplace. We distinguish between control and competence affirmation as psychological states that are triggered by physical separation in the workplace, and in turn reinforce controlled or autonomous motivation, thereby influencing employees' engagement in constructive and destructive behaviors.

- **Paper 4** ("Organizational Design and the Credibility of Delegated Decision Rights") looks at configurations of organizational elements that support the credible delegation of decision rights to employees. Managers delegate the right to make decisions to employees because such delegation may economize on scarce attention and may positively impact motivation, increasing organizational value creation. However, managers often renege on delegation. The withdrawal of delegated rights may have negative consequences for the motivation of organizational members. Therefore, making delegation credible is essential for sustaining the advantages that flow from delegation. We argue that organizational design—specifically, the internal fit between key organizational elements—plays a key role in making delegation credible. Our theory introduces a neglected incentive dimension to organizational design exercises, and sheds new light on the relation between organizational design, credible delegation, and value creation.

Papers 5 & 6: Networks and bounded rationality. These two papers focus on how insights on limited rationality and, in turn, attentional capabilities combine with structural features of the informal organization to predict prosocial (Paper 5) and creative (Paper 6) behaviors in the workplace.

- **Paper 5** ("Network Size and Prosocial Behavior: Taking Bounded Rationality into Account") combines structural and psychological perspectives on prosocial behaviors in organizations. Employees are expected to be more likely to engage in prosocial organizational behaviors if they have a large social network that gets them in contact with several colleagues. However, drawing on bounded rationality arguments, we argue that this effect depends on the focal employee's ability to

focus and concentrate in the workplace, and thereby give attention to the need for prosocial action. Data from 69 employees in a single firm suggest that the interaction between egocentric network size and attention has a significant and positive effect on employees' engagement in prosocial organizational behaviors.

- **Paper 6** ("Brokerage and Creativity: A Bounded Rationality Perspective") looks at how structural and attentional perspectives combine in predicting creative behaviors in organizations. Employees are expected to be more likely to be creative if they occupy a brokerage position that provides them with access to non-redundant information. However, we draw on bounded rationality arguments and propose that being exposed to diverse information also carries cognitive costs. Data from 68 employees in a single firm suggest that the relation between brokerage and creativity is curvilinear (inverted U shape), and contingent on the focal employee's ability to focus and concentrate in the workplace.

Conclusion

This dissertation advances our understanding of how, given their cognitive limitations, employees react to some of the most fundamental elements of the modern organization: reward systems, structural (design) features, and social (network) interactions with colleagues.

One important generic finding is the immense importance of sensemaking processes in driving employee behavior in directions that can also be extremely diverse (e.g., prosocial *versus* antisocial behaviors, cf. Paper 3). A second, general, finding is that sensemaking processes are contingent not only on individual-level factors (e.g., autonomous *versus* controlled motivation, cf. Paper 4; limited attentional

capabilities, cf. Paper 5 and Paper 6), but also on contextual and environmental factors (e.g., organizational identity and vision, cf. Paper 1). Finally, this dissertation's main general contribution is to highlight that the effect of several fundamental instruments that are normally used to direct employee behavior is not so straightforward as previous research may have suggested. The reason for this is interpretive in nature: the result of, say, a reward does not reside in the reward entirely, but rather on how the employee interprets that reward. And this in turn depends on several different contingencies that, given the limitations in that employee's rational capabilities, decide which cognitive frames she will apply in decoding the reward. This research suggests that similar mechanisms apply to the context of the structural (design) features of the organization, and of the relational (network) configurations that develop in the workplace. A similar logic may as well apply to other areas which have not yet been researched from a bounded rationality perspective, and this offers fascinating research avenues for the future.

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PART 2

COLLECTION OF PAPERS

THE PRINCIPAL'S THEORY OF MIND:
THE ROLE OF MENTALIZING FOR REWARD DESIGN AND
MANAGEMENT IN PRINCIPAL-AGENT RELATIONS

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THE PRINCIPAL'S THEORY OF MIND:

THE ROLE OF MENTALIZING FOR REWARD DESIGN AND

MANAGEMENT IN PRINCIPAL-AGENT RELATIONS

Abstract

Agency theory is one of the most important foundational theories in management research, but it rests on tenuous cognitive assumptions. We combine classical agency theory with a realistic theory of the intrinsically imperfect human potential for interpersonal sensemaking. This allows us to systematically show how the principal's ability to *mentalize* with the agent influences value creation in principal-agent relations, and to link this to organizational sensemaking instruments.

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INTRODUCTION

Agency theory (Gibbons, 2005; Grossman and Hart, 1983; Holmström, 1979; Jensen and Meckling, 1976; Laffont and Martimort, 2002; Prendergast, 1999) is one of the most important foundational theories in management research (see Eisenhardt, 1989; Hendry, 2002). Agency theory has found numerous applications in various streams of management research (Merchant, Van der Stede and Zheng, 2003), such as incentive management (Stroh, Brett, Baumann and Reilly, 1996), accounting (Antle and Demski, 1988; Lambert, 2001), organization theory (Abrahamson and Park, 1994; Zenger, 1994), and corporate governance and strategy (Amihud and Lev, 1999; Brush, Bromiley and Hendrickx, 2000; Coff, 1997). The theory provides fundamental insight into the roles of contracting, monitoring, organizational arrangements, and the incentives embodied therein.

Agency theory and its many applications are based on several simplifying assumptions (Lubatkin, Lane, Collin and Very, 2006). In this paper, we specifically focus on the assumptions regarding the knowledge that individuals have of each other and how they process that knowledge. In order to precisely identify and discuss these issues, we take our point of departure in the core, typically mathematical, statements of the theory (e.g., Holmström, 1979, 1982; Grossman and Hart, 1983; Laffont and Martimort, 2002) rather than in interpretations of agency theory found in the management literature (e.g., Eisenhardt, 1989).[1] The theory's formal core statements highlight the clear, albeit strong and contentious, nature of knowledge and rationality assumptions in agency theory. For example, in analyses of moral hazard, the principal is assumed to perfectly know the agent's taste for risk (Ross, 1973; Holmström, 1979). The source of such knowledge is the principal's ability to

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[1] Eisenhardt (1989) makes a distinction between formal, mathematical agency theory ("principal-agent research") and a more applied, verbal version of the theory ("positivist agency theory"). However, formal agency theory is just as "positive" (in a theory of science sense) as "positivist agency theory" and both have normative implications. The distinction is not found in contemporary agency theory.

understand key characteristics of what is in the agent's mind. When principals engage in such understanding, they "mentalize" (Singer and Fehr, 2005).

To theoretically approach and build up the mentalizing construct, we draw on new, converging insights from evolutionary anthropology (Call and Tomasello, 2008), neuroscience (Gallagher and Frith, 2003), neuro-economics (Singer and Fehr, 2005), and research on perspective-taking in psychology (Galinsky, Maddux, Gilin and White, 2008). In line with this research, we define mentalizing as one individual's understanding of another individual's intentions, knowledge, and beliefs. The relevancy of the mentalizing concept has been evidenced in both theoretical and empirical research. Such research indicates that mentalizing is a meaningful construct that it is usually imperfect, that—absent specific neurological pathologies—it varies on a continuous scale that ranges from *inaccurate* to *(imperfectly) accurate*, and that it is asymmetrically distributed across individuals. It also suggests that mentalizing processes can be deliberate or non-deliberate (i.e., automatic), and that they can be influenced by context and experience. Our unique and specific contributions consist of the introduction of this construct (the general human capacity to mentalize) into the context of agency theory, and an exploration of the value-creating implications of doing so.

In agency theory, the principal's knowledge with respect to much (but not all) of what is "inside the head" of the agent is assumed to be *perfect*. Coupled with other assumptions (such as those regarding risk preferences and the timing of the game), this assumption allows for clean predictions regarding how incentives will drive the behavior of such actors as employees, managers, and suppliers (Prendergast, 1999). However, the assumption that a principal is capable of perfectly grasping, for example, an agent's motivations seems increasingly tenuous. High personnel turnover and the increasing use of fleeting project organization in many industries, as well as the increasing prevalence of cross-national and

cross-cultural management teams and networks, make an assumption of imperfect mentalizing on the part of the principal a more adequate analytical starting point.

We examine the consequences of introducing more realistic assumptions about mentalizing for agency theory and its management applications. On the one hand, we posit that mentalizing is imperfect and that, as a result, real-world principals cannot perfectly mentalize in the manner assumed by agency theory. On the other hand, we assert that mentalizing provides access to "soft psychological information" that is not considered in agency theory. This information provides cues to the agent's type or effort. We show that novel insights into the design and management of rewards follow from this information. Specifically, we argue that mentalizing is a fundamental and cost-efficient instrument for reducing information asymmetry and raising value creation in the principal-agent setting.

The evidence suggests that incentives are often far from perfectly matched with the agents whose behavior they are meant to regulate, sometimes with detrimental consequences (Baker, Gibbons and Murphy, 1994; O'Connor, Priem, Coombs and Gilley, 2006; Zahra, Priem and Rasheed, 2005). One example was Dun and Bradstreet's practice of only paying bonuses to salespersons when customers bought a larger subscription to the firm's credit report services than they had purchased in the preceding year. This practice led to huge lawsuits based on claims that Dun and Bradstreet salespersons had fraudulently misrepresented the usage of subscriptions to lure customers into buying larger subscriptions (Roberts, 1989). One possible cause may have been imperfect mentalizing: principals may not have envisioned that their agents would react in creative, yet clearly dysfunctional, ways to the incentives. In other words, they did not grasp the intentions that the distortionary incentives might give rise to. As the example suggests, the principal's mentalizing matters because it influences the incentives he offers to the agent, and how he monitors the agent and

otherwise manages the relationship. In turn, such "incentive management" (Holmström, 1979, 1999) influences the value that principal and agent jointly create.

In order to understand this issue, we must raise and answer the following research questions: How do the design and management of incentives depend on the principal's mentalizing? How does this relation differ from the predictions of agency theory? We seek to answer these questions by developing the construct of mentalizing in the context of the agency relation. We thus contribute to the understanding of the cognitive micro-foundations of value creation (see Gavetti and Levinthal, 2001).

Most extant critical discussions of agency theory in economics, and in management and organization research have centered on the motivational assumptions of the theory (Fehr and Falk, 2002; Ferraro, Pfeffer and Sutton, 2005; Ghoshal and Moran, 1996; Lubatkin et al., 2006; Osterloh and Frey, 2000; Perrow, 1986). However, very few papers have explicitly dealt with *knowledge* and *rationality* assumptions. Papers written by Hendry (2002, 2005) are closest to this paper in terms of concerns regarding the assumptions of agency theory. Hendry's papers significantly extend standard agency theory by demonstrating that most of the theory's predictions rely on the structural properties of principal-agent relationships rather than classical assumptions about opportunistic self-seeking behavior and total competence. However, our focus differs. Hendry relaxes key assumptions of agency theory and then shows that, with only one exception, the predictions produced by the standard theory remain the same. Although we also relax assumptions, we generate new predictions about principal-agent relations by placing principal-agent relations with imperfectly mentalizing principals in a broader organizational setting.

The remainder of this article is organized as follows. First, we clarify the implicit theory of mind in agency theory, namely that the principal possesses a perfect mentalizing capability in certain key respects, but in other, equally key, respects, the principal possesses

little or no mentalizing capability. Second, we develop a more realistic conception of mentalizing capability. Third, we use this conception to develop propositions about how mentalizing capability can increase value creation. Fourth, we contextualize our reasoning in an organizational setting and discuss how the value-creation consequences of mentalizing are influenced by governance mechanisms. We close with a discussion of the implications and limitations of our analysis, and we draw up an agenda for future research on these themes.

KNOWLEDGE ASSUMPTIONS IN PRINCIPAL-AGENT THEORY

The Principal-Agent Setting and the Principal's Problem

Agency theory is based on a combination of assumptions regarding what individuals know, how they cognitively process what they know, and how they are motivated in the context of agency settings—that is, when one of (for simplicity) two individuals assumes the role of principal and delegates a task to the other individual, the agent. Specifically, agency models are mathematical representations of the situation in which an informed individual (typically the agent) trades with an uninformed individual (typically the principal) (Laffont and Martimort, 2002). The issue that the individuals are informed/uninformed about concerns what the agent does ("hidden actions," motivating models of "moral hazard") or what "type" he is ("hidden characteristics," motivating models of "adverse selection").

The principal's problem stems from a conflict between insurance and incentives (Ross, 1973; Holmström, 1979). Agency theory generally assumes that principals are risk neutral, while agents are risk averse. In this context, the risk-neutral principal should bear all of the risk. However, incentive issues complicate the situation. If the agent's action cannot be observed and there is uncertainty, incentives must be considered. Absent uncertainty, the principal could infer from observing the result which action the agent had chosen and reward him accordingly. However, the result is assumed to be influenced by a stochastic variable. While both principal and agent know how this variable is distributed (and know that the other

knows), the principal cannot observe the actual realization of the variable. He merely observes a "noisy signal" of the agent's effort. To motivate the agent, the contract will specify a reward schedule: the agent's payment from the principal is a function of the observable consequences. In general, such a contract will only be second best, as it will not realize the maximum or first-best value creation. The latter is defined as the value creation that would have arisen if the principal had been fully informed and could direct the agent to take the best action. The reason for the second-best nature of most contracts is that they give the agent incentives; this, in turn, exposes the agent to *risk*. A risk-averse agent will suffer a loss of perceived well-being ("utility") as a consequence and will demand a risk premium. Agency loss can thus be measured by the risk premium. Reducing the agency loss is the same as reducing the risk premium. In turn, one way of increasing the value created in an agency relation is to reduce the risk premium. This can, for example, be achieved by obtaining better signals about the agent's performance (Holmström, 1979). This reduces the incentives that the agent needs and, thus, the agent's perceived risk. Agency theory basically predicts that value creation cannot be lifted to the first-best level. However, efficient incentive design and management can approximate that level.

Normally, the principal's problem can be addressed in two ways: by monitoring the agent's actions (observing inputs) or by using outcome-based compensation (incentive pay). By introducing additional information systems (such as accounting) or by extracting extra information about the agent's actions in other ways, it is often possible to improve on agency relations, even though the additional information may be imperfect (Holmström, 1979). Applications of agency theory have typically considered such indicators as accounting returns, stock performance, sales growth, market share, and comparative performance, whereas psychological information, such as facial expressions and other aspects of bodily language, have not been considered. When the principal has better information about the

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actions of the agent, he no longer needs to expose the agent to such strong incentives to make him chose the best action. Thus, the agent needs to shoulder less risk and will demand a smaller risk premium. As a result, value creation in the relation increases (i.e., the agency loss is reduced). However, to maximize value creation, the principal also needs to decide *which* signals related to the agent's performance should be included in performance assessment. For example, is the performance of other agents a relevant signal? Can post-effort conversations with the agent offer additional information?

After deciding which measures to apply, the principal needs to decide which measures and incentives should be linked. For example, a decision needs to be made regarding how strong incentives should be. Certain tasks or agents may not be well aligned with strong incentives because the agent's tolerance for incentives depends on his risk aversion, or (going beyond agency theory) because such incentives can be detrimental to either the agent's intrinsic motivation (Deci and Ryan, 1985) or the special motivation that the agent may associate with working in well-functioning teams (Lindenberg and Foss, 2011). The principal also needs to make decisions on the intensity of monitoring agents. Typically, the stronger the incentives, the stronger monitoring should be. Finally, the principal needs to assess the extent to which multi-tasking occurs. The more the agent needs to multitask, the less likely it is that strong incentives will be used, as "in essence, complex jobs will typically not be evaluated through explicit contracts" (Prendergast, 1999: 9). (Later, we argue that this implies that "complex jobs" will be evaluated through mentalizing.)

Much of agency theory is about such incentive management issues, especially: 1) strategic behavior on the part of agents—agents may influence the principal by offering favors or developing friendship ties (Tirole, 1986) or they may manipulate the signals related to their performance (Holmström, 1982); 2) the "rewarding A while hoping for B" (Kerr, 1975) problems that multi-tasking may give rise to (Holmström and Milgrom, 1991); and 3)

problems of subjective performance measurement (Bakeret al., 1994; Levin, 2003)—for example, managers may shy away from critically distinguishing among employees, or they may not wish to give poor ratings to subordinates whose pay is determined by such ratings (Murphy and Cleveland, 1991).

Knowledge Assumptions in Agency Theory

Given agency theory's enormous influence and its contentious assumptions, a significant amount of literature deals critically with the theory, addressing its motivational assumptions (Donaldson and Davis, 1991; Osterloh and Frey, 2000) and its performative consequences (Ferraro et al., 2005; Ghoshal and Moran, 1996). However, although the cognitive and epistemic assumptions of the theory are arguably as contentious as the motivational assumptions, they have been subject to much less discussion, perhaps because they are less visible. These assumptions concern how individuals process knowledge (cognitive) and what knowledge they have (epistemic) (Goldman, 1978).

Cognitive assumptions. Agency theory is sometimes interpreted as resting on foundations of bounded rationality (e.g., Eisenhardt, 1989). In fact, however, agency theory does not assume bounded rationality. Rather, it assumes the "full" or "maximizing" rationality characteristic found in mainstream economics, where the principal and the agent can both be modeled as maximizing expected utility (Laffont and Martimort, 2002; see Hendry, 2002). However, work in behavioral and experimental economics, and in psychology suggests that individuals generally do not possess the cognitive apparatus needed to maximize expected utility (unless decision situations are very simple) (Camerer, 1998; Kahneman and Tversky, 2000; Simon, 1978).

Epistemic assumptions. Agency theory makes several far-reaching assumptions regarding the knowledge held by the principal and agent. The theory imports the knowledge assumptions of game theory. One such assumption is that differences in beliefs among

individuals can be completely explained by differences in information (Halpern, 2002). Another key knowledge assumption is that individuals are not only (fully) rational in the sense of being capable of maximizing expected utility, but that they also ascribe such rationality to others (Holler, 2001). In fact, the ascription of rationality takes a specific form. Player A knows that Player B is rational. Conversely, Player B knows that Player A is rational. Furthermore, the mutual knowledge goes on *ad infinitum* ("A knows that B knows that A knows that B knows … that X is the case"). This is the assumption of "common knowledge" (Lewis, 1969; Aumann, 1976), an assumption that underlies most modern game theory, including game-theoretical agency theory.

In agency theory, a number of the basic ingredients are assumed to be common knowledge in this sense. In the case of a moral hazard situation, such mutual knowledge includes knowledge of those who are involved in the relation, the actions that are available to them, the risk preferences of the agent, the assumption that both the principal and agent are rational, the agent's opportunity cost, what the task that the principal delegates to the agent entails, and so on. Of course, the knowledge of the principal is not totally congruent with the agent's, as there would not be an agency problem in such a case. Thus, the principal usually cannot observe the actions the agent chooses and the specific manifestations of uncertainty. Alternatively, he may not know the agent's characteristics (his "type"). However, in all other respects the principal knows perfectly what the agent knows (and *vice versa*).

Problematic Aspects of the Knowledge Assumptions in Agency Theory

A strong implication of the above is that a principal can perfectly read the agent's mind with respect to a number of key conditions that influence the principal-agent relation (the agent can also perfectly read the principal's mind with respect to these conditions, but here we focus mainly on the principal; see Hendry, 2002). Undoubtedly, designing and managing incentives often requires considerable agent-specific knowledge. Agency theory routinely

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assumes that the principal perfectly knows and understands the agent's degree of risk aversion and his opportunity costs. Simultaneously, the principal cannot observe the agent's effort. Therefore, with respect to the agent's effort, the principal's understanding is extremely imperfect. In real managerial practice, the principal can develop knowledge of the agent that will allow him to interpret the various behavioral clues that signal that agent's effort (e.g., is the agent's staring out of the window a signal of moral hazard or intense, productive thinking?). Thus, agency theory assumes—in a manner that does not seem empirically warranted—that the principal has a perfect theory of some parts of the agent's mind and, at the same time, a highly imperfect understanding of other parts. To address this issue, in the following we turn towards a more realistic treatment of the principal's knowledge by introducing the concept of mentalizing and linking it to agency theory.

MENTALIZING AND RELATED CONSTRUCTS

Putting Oneself in Others' Shoes

The ability to put oneself in another person's shoes has long been recognized as a crucial aspect of social interaction. In particular, this ability serves as a key mechanism for coordinating beliefs and actions. The importance of this ability is evident across the social sciences, including sociology (Schutz, 1932; Weber, 1979), and economics and game theory (Aumann and Brandenburger, 1995; Fudenberg and Tirole, 1991). Furthermore, social psychologists and marketing scholars stress that perspective taking plays a significant role in negotiations (Galinsky et al., 2008) and adaptive selling (Dietvorst, Verbeke, Bagozzi, Yoon, Smits and Van Der Lugt, 2009).

Given bounded rationality (Simon, 1955), individuals perceive, understand, and make sense of the world in terms of cognitive frames that they "impose on an information environment to give it form and meaning" (Walsh, 1995: 281; see Gavetti and Rivkin, 2007; Hodgkinson and Healey, 2008; Johnson-Laird, 1983; Weick, Sutcliffe and Obstfeld, 2005).

The development of these cognitive frames is linked to specific socio-cultural and environmental contingencies. Thus, although individuals share many cognitive frames or "typifications" as a result of socialization (Berger and Luckman, 1967; Weick, 1995), those frames have important idiosyncratic and person-specific features (see Schütz, 1932), which produce "cognitive distance"—a difference between distinct cognitive schemes (Nooteboom, 2000; Nooteboom, Van Haverbeke, Duysters, Gilsing and Van Den Oord, 2007; Wuyts, Colombo, Shantanu, and Nooteboom, 2005). In contrast, in the world of agency theory there can be no cognitive distance, as its existence is ruled out by the assumptions of common priors and common knowledge (Aumann, 1976). For real-world principals, however, cognitive distance is a crucially important factor.

Defining Mentalizing

Recent developments in evolutionary anthropology (Call and Tomasello, 2008), cognitive neuroscience (Gallagher and Frith, 2003), neuro-economics (Singer and Fehr, 2005), and social psychology (Galinsky et al., 2008) highlight the importance of one individual's understanding of another individual's intentions, knowledge, and beliefs. When an individual makes inferences about such mental states, he "mentalizes" (Singer and Fehr, 2005)—he forms conjectures about mental states that are not directly observable but are useful because they can make sense of and predict the behaviors of others. This process is particularly important for individuals' interactions with others (Premack and Woodruff, 1978).

Intentions, knowledge, and beliefs are three distinct ingredients of human psychological—and, in turn, behavioral—functioning. However, a precise representation of this functioning rests on a simultaneous understanding of these three complementary constituents of mentalizing (Call and Tomasello, 2008). An understanding of intentions— plans of action that are chosen in pursuit of a goal (Bratman, 1989; Dennett, 1987)—

represents the foundation of mentalizing. In fact, an understanding of intentions provides the first "interpretive matrix for deciding precisely what it is that someone is doing in the first place" (Tomasello, Carpenter, Call, Behne and Moll 2005: 675).

For example, suppose that a principal knows that an agent is working several extra hours, and he wants the agent to maintain this extra effort. However, the action of working extra hours may have widely different intentional connotations. An agent may be working extra because he is intrinsically motivated to deliver good performance or because he is externally motivated by the potential for a monetary bonus. While giving a monetary reward to the extrinsically motivated agent would be a proper way of encouraging that agent to keep working, giving the same reward to an intrinsically motivated agent would crowd out the motivation and diminish the agent's effort (Frey and Jegen, 2001). An understanding of the agent's intentions is, therefore, important for the principal.

This conclusion is strengthened by a consideration of the effects of incentives on extrinsic and intrinsic motivation beyond the principal-agent dyad. In a situation with multiple agents, perceptions of injustice may arise if an agent sees other agents getting a reward that he does not receive because the principal infers that he is mainly intrinsically motivated. Thus, the principal's mentalizing must also include how the agent compares himself socially and how he reacts to such comparisons.

An individual's intentions are influenced by her knowledge. The contextualization of an individual's intentions relative to an understanding of her knowledge is the second constituent of mentalizing. Contextualizing significantly refines the understanding of an individual's intentions. In terms of the above example, if the principal knows that the agent knows that the organization has, for instance, just implemented a reward system, the principal may expect the agent to work harder in order to get a bonus (rather than because the agent has an innate interest in the task).

As beliefs are, by definition, mental, the possibility of understanding someone's beliefs represents "the pinnacle of mind reading" (Tomasello et al., 2005: 675; see Kaminski, Call and Tomasello, 2008). Moreover, the ability to explain the behavior of an actor based on what that actor believes to be the case remains crucial when the actor's beliefs are wrong. In terms of the example, the principal believes that the agent is working extra hours because he knows about the recently implemented reward system. Suppose, however, that the principal also knows that the agent is ignorant about the output-based (as opposed to input-based) nature of the reward criterion—in other words, the principal knows that the agent is wrong in thinking that his extra work will automatically result in an increase in his compensation. The principal may or may not decide to let the agent know about the error in his belief.

In sum, the principal's ability to simultaneously discern what an agent wants to do (i.e., his intentions), how he regards the environment in which he operates (i.e., his knowledge), and what he deems probable (i.e., his beliefs and false beliefs about what will happen based on his information) are important parts of mentalizing. Mentalizing has been shown to form the basis for understanding how others make sense of their world and, in turn, for cooperative, deceptive, and empathetic behavior (Galinky et al., 2008; Tomasello et al., 2005).

The Mechanisms of Mentalizing

Mentalizing is a cognitive mechanism that involves the activation of deliberate and non-deliberate (i.e., automatic) processes. Neuroscience research demonstrates that humans have an innate brain system that is dedicated to mentalizing. Specific brain regions are unconsciously and effortlessly activated when people engage in non-deliberate mentalizing (i.e., "implicit mentalizing," Frith and Frith, 2003). However, mentalizing is not an exclusively automatic process. Other brain regions are activated when people deliberately engage in mentalizing processes (i.e., "explicit mentalizing," Frith and Frith, 2003; see Frith

and Frith, 1999; Gallagher and Frith, 2003). Given the mainly intentional and rational stance of classical agency theory, we take the non-deliberate and innate side of mentalizing as a given. In other words, we assume that principals effortlessly and automatically mentalize with agents to a certain extent, and we focus on the intentional and non-automatic side of mentalizing.

Since culture is the "webs of significance" (Geertz, 1973: 5) that give sense to the human experiencing of phenomena, mentalizing is intimately related to context and, more generally, to the cognitive distance that separates the mentalizer from the mentalizee. Clearly, the higher the cognitive distance, the harder mentalizing will be. For example, complex collaborative activities involving shared goals and socially coordinated intentions require a high degree of mutual understanding, which can be furthered by culturally contextualized processes (Tomasello et al., 2005), such as rituals (Chwe, 2001; Dacin, Munir and Tracey, 2010). Rituals are mechanisms that assist in the construction of shared meaning (Kunda, 1992; Meyer and Scott, 1983) by influencing how people think and make sense of situations (Van Maanen and Kunda, 1989). Rituals thus support mentalizing.

Mentalizing may result in simplistic (even wrong) conjectures or in an accurate representation of the contents of someone else's mind. Neuroscience research clearly indicates an individual's placement between the two extreme positions of being able versus being incapable of mentalizing depends on whether one possesses specific, innate neural prerequisites. Consistent with this, the absence of mentalizing has been shown to be typical of developmental or acquired disorders such as autism (Baron-Choen, Leslie and Frith, 1985; Frith and Frith, 1999). However, variations along the accuracy dimension (i.e., the continuous scale that ranges from having an inaccurate theory to an accurate theory of the other's mind) are linked to the sophistication of the aforementioned cultural and experiential mechanisms, and to the cognitive distance between mentalizer and mentalizee.

Moreover, mentalizing is not immune to problems of cognitive distortion (Kahneman and Tversky, 1979). Thus, imperfect mentalizing reflects an inability to accurately mentalize, as well as overconfidence on the part of the principal, who may believe he knows things about the agent's mind that he actually does not (see Flynn and Wiltermuth, 2010). To avoid overly complicating the argument, we abstract from the specific ways in which mentalizing may be imperfect. In addition, mentalizing greatly supports and combines with distinct psychological processes, such as information processing and memory processes. While we focus on mentalizing, we also assume that it naturally antecedes and concurs with other psychological processes in triggering the emergence of theories about others' minds.

Mentalizing may be understood as a skilled behavior. In general, a skill is a "capability for a smooth sequence of coordinated behavior that is ordinarily effective relative to its objectives given the context in which it normally occurs" (Nelson and Winter, 1982: 73). Thus, mentalizing has skill-like qualities in that it is program-like (i.e., mentalizing consists of an ordered sequence of cognitive steps); it is built upon a mixture of tacit and explicit knowledge (in fact, rarely is the mentalizer completely aware of the mechanisms that engender his having a theory of the other's mind); and it requires the making of a certain number of choices, which vary in terms of the degree of intentionality (e.g., although the decision to mentalize may be intentional, the choice of how to proceed in order to mentalize may be unintentional). Like a skill, and consistent with its context-driven components, mentalizing can also be altered by environmental cues.

Finally, it is important to note that all of the aforementioned factors (deliberate and non-deliberate components of mentalizing, the importance of context and culture, potential variations in accuracy, and the skill-like nature of the construct) do not imply that accurate mentalizing is a remote possibility. On the contrary, convergent research clearly indicates that

mentalizing is a fundamental driver of human interaction, which suggests that relatively precise degrees of mentalizing are, in fact, found in real-world scenarios.

Related Constructs

Mentalizing overlaps with two constructs that are familiar from the management research literature: transactive memory and perspective taking. However, mentalizing is not fully congruent with these concepts. Transactive memory is the shared division of cognitive labor with respect to the encoding, storing, retrieving, and communicating of knowledge from different but complementary domains (Wegner, 1986; Brandon and Hollingshead, 2004). Over time, members of a group may develop a common understanding of each other's areas of competence and expertise. Transactive memory is the group's members shared understanding of "who knows what" in the group (Brandon and Hollingshead, 2004). This type of transactive memory is similar to mentalizing in that it involves an understanding of what others know, but mentalizing has a much broader focus. Not only does it refer to the understanding of others' knowledge but also, more importantly, to the understanding of their intentions and beliefs (Tomasello et al., 2005).

Perspective taking refers to the consideration and adoption of someone else's psychological viewpoint (Davis, 1983), which activates a process of "self-other merging" (Davis, Conklin, Smith and Luce, 1996: 714). This process rests on the cognitive and emotional levels (Galinsky and Moskowitz, 2001; Galinsky and Ku, 2004). Perspective taking is similar to mentalizing, as it relates to the understanding of what others know, think, imagine, and feel. However, whereas perspective taking has both cognitive and emotional dimensions, mentalizing refers exclusively to cognitive theorizing about another individual's mental states.

Knowledge Assumptions in Agency Theory in Light of the Mentalizing Construct

Agency theory assumes that the principal has perfect access to and knowledge of certain mental states of the agent. Typically, what exactly is included under this wide-ranging knowledge assumption depends on the specific kind of agency model. For example, in moral hazard models, the principal perfectly knows the agent's attitudes regarding risk, the actions that the agent thinks of as being available, the agent's perceived opportunity costs, and so on. Of course, this is not necessarily intended as a descriptively accurate assumption, but as an assumption that eases mathematical modeling. However, in managerial practice, principals are imperfect mentalizers and mentalizing is not in unlimited supply. Managers/principals, like econometricians who work empirically with agency theory (Salanié, 2003: 462), face much "unobserved heterogeneity" with respect to the actual contents of agents' minds. In turn, their mentalizing capabilities matter with regard to reward design and value creation.

In sum, we argue that to design and manage incentives, a principal needs to build a cognitive map of the agent's cognitive categories and states. For reasons of mathematical tractability, agency theory models assume that this is unproblematic, as embodied in the assumptions of common priors and common knowledge. In contrast, we argue that mentalizing is imperfect and that it provides access to information sources that are not considered in agency theory. In the following, we address the principal's mentalizing as a crucial determinant of incentive design and management (and, hence, value creation) in the principal-agent relation.

CONSEQUENCES OF MENTALIZING IN PRINCIPAL-AGENT RELATIONS

Boundary Conditions and Research Model

Our theorizing applies to the standard principal-agent setting of a principal and an agent, and it holds wherever this setting occurs, regardless of the organizational type. To facilitate exposition, we adopt the perspective of the principal in the sense that we address the principal's mentalizing (and black box the agent's mentalizing, see Hendry, 2002). Although

cognitive, motivational, and emotional processes are intertwined (Cohen, 2005; Kruglanski, Shah, Friedman, Fishbach, Chun and Sleeth-Keppler, 2002), we follow recent research in social psychology (e.g., Galinsky et al., 2008) in that we separate these processes. We focus our attention on the cognitive level, and disregard any emphatic, emotional, or motivational processes that may accompany mentalizing. Moreover, as we focus on the interrelationship between mentalizing capability and value creation, we hold all other determinants of value creation in principal-agent relations (including the agent's risk preferences, sensitivity to incentives, etc.) constant. We assume that the principal seeks to maximize value creation in the relationship. We do not make any specific assumptions about whether the principal lets the agent share in any additional value creation. Figure 1 shows how we reason from mentalizing capability to value creation.

Insert Figure 1 here

Learning the Agent's Type and Managing Signals

We begin by examining the consistency of the mentalizing construct and key agency theory predictions. Agency theory shows that decreasing the level of asymmetry of information in the relation between principal and agent increases value creation in the relation. In other words, a better-informed principal can better ascertain an agent's type, reducing the need for costly signaling. Moreover, he is better able to infer the agent's true effort level from the signal on the agent's effort—the output—and can design his incentives more precisely. This reduces the agent's perceived risk and the risk premium, thereby increasing value creation.

Mentalizing and information asymmetry are distinct constructs. However, mentalizing can antecede the degree of information asymmetry in a principal-agent relationship.

Specifically, increased mentalizing leads to a reduction in information asymmetries. In turn, this increases value creation in the relation because improved mentalizing improves the principal's understanding of the agent's type and the signals related to the agent's actions. For example, rather than relying on knowledge of the average characteristics of a group of agents, the principal can better ascertain characteristics specific to a certain agent.

There are a number of mechanisms through which the principal's improved mentalizing leads to higher value creation. First, the principal can design a contract that better matches the specific agent in terms of striking the right tradeoff between providing the agent with insurance and offering performance incentives. Second, a principal who learns the agent's type can better match the agent with specific tasks. For example, if the agent has a high degree of risk aversion, he may dislike being exposed to an environment in which he has to handle several tasks, as this makes it more difficult for the principal to reliably measure his effort (Holmström and Milgrom, 1991). Mentalizing is the psychological mechanism that provides the principal with key information about the agent—information that agency theory assumes the principal *already* possesses. Thus, mentalizing serves as a vital mechanism for understanding real-world principal-agent relations. It may be that principals can gain such information through, for example, trial-and-error with different incentives, and infer agent characteristics from such a learning process. However, such processes are costly and lengthy, and mentalizing is a lower-cost alternative. This reasoning suggests the following proposition:

> **Proposition 1**: *Mentalizing on the part of the principal is a lower-cost way of getting to know the agent's risk preferences, disutility of effort and sensitivity to incentives. This knowledge increases value creation in the relation.*

In addition, mentalizing can provide access to soft psychological information that is not considered in agency theory. For example, mentalizing may provide insight into the agent's

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self-concept orientation—whether the agent thinks of himself mainly in individualistic, relational, or collective terms (Cooper and Thatcher, 2010). This element matters for incentive design because it influences whether the agent should be offered team, rather than individual, incentives (Lindenberg and Foss, 2011). Because mentalizing can provide access to additional information (relative to what is considered in agency theory), the principal can develop a reward design that better fits the peculiar characteristics of the agent. This increases value creation in the relation, as the agent's perceived risk is reduced, necessitating a smaller risk premium.

Mentalizing also creates value because it is geared toward interpreting signals about the agent's effort and trustworthiness (Singer and Fehr, 2005). Signaling helps to reduce information asymmetry between the two parties (Riley, 2001; Spence, 2002). This reduction depends on the reliability of the signal and on the receiver's capability to correctly interpret the signal (Connelly, Certo, Ireland and Reutzel, 2010). Clearly, the ability to distinguish honest signals from false signals—and, in turn, to recognize trustworthy agents—is important for the design of efficient reward systems. Bonus contracts that rely on fairness and trust can, in fact, be more efficient than explicit incentive contracts that are enforced by the courts (Baker et al., 1994; Fehr, Klein, and Schmidt, 2007; Fehr and List, 2004; Fehr and Schmidt, 2004). However, attributions of dishonesty are often stereotypical and inaccurate (Aavik et al., 2006). This is partially due to game playing on the side of the agent, who may adjust his conduct in social interactions so as to guide the impression that the principal forms of him (Goffman, 1990; Leary and Kowalski, 1990). The principal's ability to accurately detect dishonesty and impression management on the side of the agent is linked to the principal's ability to recognize and decode subtle (verbal and non-verbal) micro-expressions (Ekman and O'Sullivan, 1991). Given his improved understanding of the agent's mental states, a mentalizing principal is clearly better equipped to decode an agent's signals—facial gestures,

body language, communication, etc.—as clues to his trustworthiness. Thus, mentalizing leads to better comprehension of the information content and the reliability of the diffuse signals on the agent's effort and trustworthiness, and therefore to an improvement in monitoring (see Holmström, 1979). This means that the principal can better ascertain the agent's true effort level, and, if necessary, influence him to increase this level. Again, principals may be capable of gaining such information by adopting various learning theories or by experimenting with different incentives. However, we submit that mentalizing is a lower-cost alternative. Thus:

Proposition 2: *Mentalizing on the part of the principal enables him to interpret subtle clues regarding the agent's effort and trustworthiness at a lower cost, and improves his understanding of the agent's type and effort relative to what is posited in standard agency theory.*

Rewards, punishments, and even informal encouragement or criticism are signals themselves. They tell the agent something about the principal, his intentions, and his attitudes (Bénabou and Tirole, 2003). Specifically, a principal's decision to use one reward as opposed to another (or as opposed to not using a formal reward) has been proven to be an extremely strong signal for the agent (Bénabou and Tirole, 2003; and, outside of agency theory, Ryan and Deci, 2000). Agents' receptiveness to the same signals differ. Incentives may, therefore, have a substantially different impact on various agents. An important issue is for the principal "to understand in what cases they [monetary incentives] should be used with caution" (Bénabou and Tirole, 2003: 490). Simply put, the principal needs to understand what a given incentive will signal to a given agent. Such an understanding is derived from the principal's mentalizing, part of which originates deliberately. For example, if the principal is capable of mentalizing with the agent, he may understand that the agent is intrinsically interested in her task, and he may realize that a monetary reward may signal mistrust and, eventually, crowd out that agent's motivation. In this case, the principal should choose a reward that signals

trust or flexibility to the agent. In other words, high mentalizing allows the principal to make more sophisticated use of the signaling component of incentives. In particular, he can fine-tune signals to increase the agent's effort. Thus:

Proposition 3: *Mentalizing on the part of the principal enables him to design incentives so that they convey desired signals to the agent.*

The improved ability to interpret clues about the agent's effort and signal to the agent provide a novel source of value creation, as the agent's perceived risk goes down, necessitating a smaller risk premium.

Diagnosing Inefficiencies and Adjusting Incentives

We have argued that principals that are skilled in mentalizing can learn the type of the agent, interpret signals about the agent's effort, and design incentives so as to convey given signals to the agent ("incentive focus"). However, mentalizing principals are also capable of evaluating (*ex post*) the fit of incentives with the agent. In fact, by simply matching an understanding of the agent's type with the agent's reactions (i.e., signals) to a given reward, the mentalizing principal can evaluate the extent to which that reward actually fit the agent ("incentive adjustment") in a time- and, in turn, cost-efficient way. Thus:

Proposition 4: *Mentalizing on the part of the principal enables him to diagnose reward inefficiencies at an early stage and to reduce such inefficiencies in a low-cost manner by redesigning rewards.*

A principal who can gain additional insight into the characteristics, intentions, and beliefs of the agent by mentalizing can also better utilize the incentive instruments at his disposal. For example, he is better positioned to judge the best combination of fixed and variable pay components in a contract that he offers to the agent and how to use verbal recognition as a complement to (or substitute for) such incentives. Also, mentalizing improves monitoring and the sending of signals to the agent, as argued above. Principals with

more mentalizing capability will benefit more from the use of existing incentive instruments and *vice versa*. Thus, the relation between mentalizing and the principal's extant portfolio of incentive instruments is characterized by complementarity (Milgrom and Roberts, 1995).

Moreover, an improved understanding of the agent's characteristics and intentions (i.e., his type), and of the signaling potential of incentives increases the principal's motivation to explore new incentives, to build a richer and more refined reward portfolio ("expanded incentive portfolio"), *and* to adjust existing incentive instruments so that they better fit the agents with whom the principal is mentalizing ("incentive refinement"). Thus, with a low level of mentalizing, the principal will tend to choose incentives that are "at hand" and that fit the average agent. Mentalizing improves the principal's understanding of the agent's type as well as his interpretation and sending of signals, and allows him to build a richer, more refined incentive portfolio by combining incentives in novel ways and by including new kinds of incentives. We therefore suggest:

> **Proposition 5:** *Principals skilled in mentalizing will rely less on routine or habitual behaviors when choosing reward mechanisms, and they will exhibit a higher degree of creativity in their rewarding practices.*

Costly Mentalizing

Mentalizing on the part of the principal is a source of value in the principal-agent relationship. It is the mechanism through which soft psychological information is included in the principal's assessment of the agent's type and effort, and the signaling in which he engages. In a long-term relation, much mentalizing happens as a costless by-product of the main activities in the relation. However, we treat mentalizing as a deliberate mental act. Mentalizing requires mental effort (attention, information processing, etc.) that cannot be spent on other activities. Thus, mentalizing may have fixed costs. For example, a principal that is new to the culture of a firm in which he has assumed a managerial role needs to learn

about the culture of that firm to ensure that he and the firm's agents share some of the basic premises upon which mentalizing is built (Kunda, 1992). Similarly, establishing a relation with a new agent involves a certain initial investment in mentalizing with that agent. For instance, internship programs are used with increasing frequency by firms in order to get to know potential employees before deciding whether to hire them. These fixed costs of mentalizing suggest that principals will prefer agents who are similar in type, so that they can spread the fixed costs of mentalizing over many agents. There are also variable costs of mentalizing. For example, the principal may invest effort into interpreting a certain signal about the agent's effort.

Optimum mentalizing balances these costs against the benefits of mentalizing (i.e., the optimum is described by equality between the marginal benefits and the marginal costs of mentalizing). Note that there may be other benefits to learning the agent's type and managing signals in addition to those that we have already identified. For example, persons low in mentalizing may experience greater social anxiety in interpersonal contexts. In such cases, an enhancement of mentalizing may reduce psychological costs. Overall, mentalizing introduces an additional tradeoff in the principal's problem, and entails additional costs and benefits that need to be taken into consideration in understanding how value is created in principal-agent relations. From a prescriptive point of view, we need to identify: (a) the factors that cause value creation in such relations; (b) the main problems in the realization of these factors; and (c) the main instruments through which these problems can be averted or mitigated. Thus far, we have dealt with mentalizing capability as a factor that causes value creation in principal-agent relations and we have noted the costs of mentalizing. In the following section, we deal in greater detail with the obstacles, represented as a cognitive distance construct, as well as the distinctly organizational facilitators of mentalizing capability.

MENTALIZING AND VALUE CREATION: THE IMPACT OF COGNITIVE

DISTANCE AND ORGANIZATIONAL SENSEMAKING

Agency theory is "institutionally neutral" in the sense that principal-agent relations are not uniquely tied to specific governance structures or institutions. They can exist within as well as between firms (and in numerous other social arenas) (Hart, 1995). However, a significant part of principal-agent relations are embedded within firms (Eisenhardt, 1989; Shapiro, 2005).

Much research proceeds from the assumption that agency problems are endemic in organizations (Hart, 1995; Milgrom and Roberts, 1992). At the same time, organizations encompass key instruments for handling these problems. Thus, established agency theory points to rewards coupled with performance measurement (Laffont and Martimort, 2002), tournaments (Lazear, 2000), and task design (Holmström and Milgrom, 1991) as means to overcome agency problems. Hendry (2002) stresses the importance of training and instruction. Akerlof and Kranton (2005) argue that workers' identities can function as important work incentives because they encompass ideals as to how a given job should be done, which significantly reduces principal-agent problems. Lindenberg and Foss (2011) point to a specific kind of social motivation that arises in team situations and argue that firms can succeed in mobilizing such "joint production motivation," keeping agency problems at bay.

We propose a different view of how organizational instruments can mitigate agency problems. Our starting point is that mentalizing capability is functional to the extent that individuals are cognitively distant. The higher the level of cognitive distance in a relation, the more difficult it is for a principal with a given level of mentalizing capability to understand the agent's type, actions, signals, and so on. However, cognitive distance is a variable that can be influenced by organizational means. Figure 2 shows how we introduce cognitive

distance and organizational instruments into our framework (the dotted arrows and boxes represent the main parts of Figure 1).

Insert Figure 2 here

Cognitive Distance and Value Creation

By assigning attributes to the agent's intentions, knowledge, and beliefs, the principal tries to understand—and eventually look at the world through—the agent's cognitive lens. By definition, the construct of cognitive distance captures variability (Cannon-Bowers, and Salas, 2001; Hodgkinson and Healey, 2008; Nooteboom, 2000). The principal and the agent may look at the world through completely different (high distance) and quite similar (low distance) cognitive schemes. As sensemaking processes are facilitated by familiarity with the focus of attention, mentalizing is simpler when cognitive distance is limited. Thus, high cognitive distance between principal and agent has a negative impact on the accuracy of the principal's mentalizing. As the principal's mentalizing influences value creation through the mechanisms of learning the agent's type and signaling (and the improved use of incentive instruments that this gives rise to, see P1 to P5), cognitive distance indirectly influences value creation. Specifically:

> **Proposition 6:** *The positive effect of mentalizing on value creation in principal-agent relations is negatively moderated by the cognitive distance that separates principal and agent.*

Experience and Physical Proximity

Mentalizing rests on innate and cultural bases. Whereas the former are constant, the principal's experience (Gavetti and Levinthal, 2000), including his understanding of a cultural context (Kunda, 1992), and his physical proximity with the agent (Gavetti, 2005) are

important determinants of the principal's mentalizing. Principals base their decisions on evaluations of potential alternatives that can (probabilistically) lead to certain consequences (March, 1994). These evaluations can be driven by experience or cognition. While experiential evaluations depend on actual trials of alternative options, cognitive evaluations depend on mental representations of reality (Gavetti and Levinthal, 2001). Cognitive and experiential evaluative mechanisms are closely interrelated: cognition influences experiential learning, while experience effects cognitive representations (Gavetti and Levinthal, 2000; Gavetti and Rivkin, 2007). Consequently, we expect to see an interaction effect between cognitive distance and physical proximity such that the principal's experience (negatively) moderates the (negative) impact of cognitive distance on the value-creation implications of the principal's mentalizing.

In addition, a principal's mentalizing depends on his physical positioning relative to the agent. Consistent with the idea that rationality is bounded and situated (Simon, 1955; Dearborn and Simon, 1958), there is evidence that important signals of human behavior can be perceived only by direct observation of specific verbal and non-verbal micro-expressions (Ekman and O'Sullivan, 1991). This suggests that given a fixed *cognitive* distance between principal and agent, *physical* proximity between the parties eases the principal's bridging of that distance. Physical proximity allows the principal to grasp additional aspects of the agent's behavior, which leads to the making of more accurate attributions. Thus, like the principal's experience, physical proximity (negatively) influences the (negative) impact of cognitive distance on the contribution to value creation of mentalizing (i.e., P6):

> **Proposition 7:** *The negative effect of cognitive distance on the value creation arising from mentalizing is negatively moderated by the principal's experience and physical proximity to the agent.*

The Role of Organizational Sensemaking Instruments in Bridging Cognitive Distance

Evolutionary anthropologists argue that humans have been equipped by evolution to spontaneously recognize joint endeavors and see themselves as part of such endeavors. This involves definitions of roles and responsibilities, and cognitions about the relevant tasks, interdependencies, timing, and possible obstacles to coordination in the joint endeavor (Tomasello et al., 2005; Higgins and Pittman, 2008). Lindenberg and Foss (2011) argue that organizations need to nurture, mobilize, and sustain these innate, but latent, capacities for coordination if they are to overcome the cognitive distance that is inevitably produced by the organizational division of labor, as well as implications for ingroup/outgroup dynamics (Brewer, 1991), and organizational roles and their emotional and cognitive correlates. The tension between the organizational division of labor and shared cognition is generally recognized in organization theory, and many researchers emphasize the role of the organization in shaping members' beliefs, and, in effect, reducing cognitive distance (Kogut and Zander, 1996; Lindenberg and Foss, 2011; Weick, 1995; Weick and Roberts, 1993; Witt, 1998).

Research on organizational identity (Akerlof and Kranton, 2005; Brewer and Gardner, 1996; Brickson, 2005, 2007; Dutton, Roberts and Bednar, 2010; Kogut and Zander, 1996) focuses directly on how the formation of identity is intertwined with cognitive homogenization processes. The sharing of cognition that organizational identity supports may mean that "procedural rules are learned, and coordination and communication are facilitated across individuals and groups of diverse specialized competence" (Kogut and Zander, 1996: 502). An emerging stream of literature deals with shared cognition in teams (e.g., Mohammed and Dumville, 2001). In this regard, an important goal of effective team design is to assist in the sharing of cognitions (Hirschfeld, Jordan, Feild, Giles, and Armenakis, 2006; Priem, Harrison and Muir, 1995). Mathieu and Rapp (2009) argue that clarification regarding individual roles in the team and how roles are interrelated is a particularly important aspect of

team design, as are clear performance objectives, task coordination, and contingency plans for task execution. De Dreu (2007) shows that the more team members understand the interdependencies in the team, the more they engage in helping behaviors and learning, and the higher their productivity. Apparently, clearly defining and communicating task interdependencies contributes to overcoming cognitive distance because it contributes to task reflexivity, that is, "the extent to which team members overtly reflect upon the group's objectives, strategies, and processes and adapt them to current or anticipated endogenous or environmental circumstances" (West, 1996: 559). This includes more than the sharing of cognitions or mental models (or "reducing information asymmetry"), as successful adaptation at the group level also requires "cross understanding" (Huber and Lewis, 2010) in which group members understand how they differ in terms of knowledge, roles, and so on, and how such differences must be taken into account when adapting to change.

On the organizational level, the sharing of cognitions and even task reflexivity can be supported by multiple means. A clear vision and mission statement that focus on a common purpose and are consensually supported by top management support the sharing of cognitions (Ashforth and Johnson, 2001). The same is true of organizational rituals (Dacin, Munir and Tracey, 2010). Chwe (2001) argues that a key purpose of rituals is to support the formation of epistemic conditions that approximate the common knowledge conditions of game theory. Thus, organizational members who participate in rituals and who know that other organizational members participate know that all participants share the knowledge that was communicated at the ritual. Task reflexivity, which is cognitively more demanding than shared cognition, may be assisted by job rotation and cross-training, as these practices make employees familiar with other functions, roles, activities, and so on, and help them to understand how these contribute to firm goals. In summary:

Proposition 8: *Organizational identity, transparent team and task design, and the communication of shared beliefs reinforce the value-creation potential of mentalizing by reducing the cognitive distance between principals and agents.*

While organizations can be designed to reduce cognitive distance between principals and agents, complete elimination of such distance may not be desirable for reasons of variety generation (Walsh, 1995).

CONCLUDING DISCUSSION

We have argued that mentalizing is a fundamental determinant of value creation in principal-agent relations. Specifically, we have suggested that mentalizing represents one way in which a principal improves his knowledge of the agent's characteristics and efforts, as it allows him to access the kind of soft psychological information that is not considered in standard agency theory. As a result, incentive instruments can be better tailored to agents and principals can be more creative in their use of the incentive instruments that are at hand. Mentalizing thus represents a source of value creation in principal-agent relations beyond those considered in agency theory.

Our analysis proceeded through four different stages. First, we reviewed and problematized (Alvesson and Sandberg, 2011) the cognitive and epistemic assumptions of agency theory. Second, we conceptualized the mentalizing construct. Third, focusing on the context of a simple principal-agent relationship, we showed that the principal's mentalizing leads to an improved understanding of the agent's type and signaling, and in turn to higher value creation in the relation. Finally, we showed that the value creation potential of mentalizing is moderated by the cognitive distance that separates principal and agent. We discussed individual- and organization-level factors that can be used to reduce cognitive distance and moderate its impact on the value-creation consequences of mentalizing. In this

section, we close by discussing our model's contributions, practical implications, and desirable future developments.

Contribution to Theory

This paper contributes to management research in a number of ways. First, it explicitly introduces the notion of mentalizing into agency theory. Agency theory implicitly makes assumptions about mentalizing, but unrealistically assumes that mentalizing is perfect with respect to certain parameters and variables (e.g., the agent's risk preferences) and highly imperfect with respect to other variables (e.g., the agent's effort). We introduce a more realistic notion of mentalizing as generally imperfect but given to improvements (Bagozzi, Verbeke, Berg, Rietdijk, Dietvorst, and Worm, in press).

Second, we show that integrating these constructs with agency theory enriches the theory, leading to an improved understanding of the sources of value creation in principal-agent relations. Thus, a principal that is skilled at mentalizing can better learn the type of the agent, read the signals related to the agent's effort, and signal to the agent. Mentalizing thus allows for a fuller understanding of subjective performance assessment (Baker et al., 2004) and relates relational signaling (Lindenberg and Foss, 2011) to agency theory. Mentalizing creates value because it results in better estimates of the agent's effort and type, and eases the matching of agents with contracts. It also leads to greater creativity in contract design. Agents will prefer principals that are more skilled at mentalizing to principals that are less skilled because the mentalizing of the former leads to more value creation and, hence, a bigger "value pie" that can be shared by the principal and the agent.

A third contribution is the placement of agency theory into an explicit organizational context. Recent research emphasizes the importance of recognizing the institutional contexts in which principal-agent relations take place (Aguilera and Jackson, 2003; Lubatkin et al., 2007). Specifically, the incorporation of an institutional perspective into agency theory is

expected to improve our understanding of agency problems and, in turn, to allow for more accurate predictions (Wiseman, Cuevas-Rodríguez, and Gomez-Mejia, in press). We show that when organizational sensemaking instruments reduce the cognitive distance between principal and agent, the value-creation potential of the principal-agent relation is higher (given a fixed degree of mentalizing capability). In so doing, we implicitly confirm that the explanatory power of agency theory may be leveraged by placing the theory in specific organizational contexts.

Before we turn to a discussion of potential avenues for future research, we note that, to some extent, the principal's needs for mentalizing and agent-specific information are mitigated by self-selection and signaling on the part of the agent. Self-selection means that there is an endogenous matching of agents and contracts to the extent that agents choose offered contracts on the basis of their (unobserved) heterogeneity (Lazear, 2000). Agent signaling means that the agent can convey credible information about such factors as his ability to the principal. However, while self-selection and signaling make life easier for the principal, they do not eliminate the need for mentalizing. Even well-developed reward systems with a high degree of automation leave considerable room for judgment on the part of the principal regarding the interpretation of concrete signals on agent performance (Baker et al., 1994). Such judgments may be based on mentalizing. With respect to signaling, signals are often very coarse (e.g., education, grades, job history). The fact that firms conduct complicated hiring processes with multiple face-to-face interview rounds testifies to the fact that signaling is *not* a complete substitute for mentalizing. Thus, firms (principals) need to not only learn the type of an agent but also understand agent-specific characteristics. This requires mentalizing.

Future Research

The introduction into agency theory of cognitive and epistemic assumptions that are more in accord with the traditional emphasis on bounded rationality in management theory is an ambitious target toward which this paper makes but a first step. Our contribution to current theory can be further elaborated and extended in several ways. Specifically, we envision eight attractive avenues for future research.

The mentalizing construct and its antecedents. Mentalizing has been researched in evolutionary anthropology (Call and Tomasello, 2008), neuroscience (Gallagher and Frith, 2003), neuro-economics (Singer and Fehr, 2005), and psychology (Galinsky et al., 2008). We have conceptualized it in a managerial context, but we have provided a highly abstract treatment in the specific context of the agency relation. However, as monitoring (in a broad sense) employees only constitutes a subset of a manager's activities, it seems promising to extend mentalizing to other managerial activities, such as coordination (Heath and Staudenmeyer, 2000) and leadership. A useful avenue for future research would be to investigate what, specifically, may antecede intentional mentalizing in a managerial context. In other words, are there any organizational factors that may actually trigger the deliberate mentalizing potential of a low-mentalizing principal?

The agent's mentalizing. To keep our analysis manageable, we have made several simplifying assumptions. One such assumption is that we only need to consider the principal's mentalizing. Although we have "frozen" the agent's mentalizing, mentalizing is clearly an interactive process involving both principal and agent. The question is whether taking the agent's mentalizing into account will change our conclusions. On the one hand, a mentalizing agent will better understand that a mentalizing principal seeks to improve his understanding of the agent's characteristics, effort, and so on to the benefit of both. Given such reasoning, our conclusions should be strengthened by including the agent's mentalizing. On the other hand, it may be that agents who are high in mentalizing relative to principals

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may better game incentive systems to their own advantage (Tirole, 1986). This would complicate our reasoning because it would suggest that the agent's mentalizing may be value destroying. However, to the extent that principal-agent relationships are placed in competitive conditions, value-destroying relationships are not viable and the sorting process will match agents and principals that are high in mentalizing.

Empathy. Recent evidence from social psychology depicts the capacities to cognitively understand others' point of view and to emotionally connect with others as "related but distinct social competencies" (Galinsky et al., 2008: 378). This paper focuses only on the perspective-taking (i.e., cognitive) dimension of empathy. However, cognition, emotion, and motivation tend to be intertwined in human behavior (Cohen, 2005; Kruglanski et al., 2002). We did not freeze motivation *per se*; for instance, we considered the agent's motivation as key to value creation and, therefore, as a crucial target of the principal's mentalizing. Rather, we controlled for the possibility that the principal's mentalizing may trigger affective and emotional behaviors in the principal himself. In other words, a precise theory of the agent's mind might engender emotional and affective reactions in the principal that could, in turn, substantially condition the principal-agent interaction. For example, a principal who is high in mentalizing may recognize that an agent is misbehaving because of honest incompetence rather than for self-seeking reasons (Hendry, 2002). Such a principal may feel sympathy for the (incompetent) agent and decide not to use the intended sanctions. Consistent with Galinsky et al.'s (2008) analysis of the impact of empathy in negotiations, it could be argued that the emergence of strong affective and emotional feelings linked to enhanced mentalizing on the side of the principal likely influences value creation in the principal-agent relation. The effects may be negative or positive, as increased mentalizing may foster antipathy or sympathy, and both may have negative as well as positive consequences for value creation depending on the concrete situation.

Principal and agent characteristics. Principals and agents differ on multiple dimensions. To simplify the exposition, we only focused on the principal's experience and proximity to the agent. However, principals—not least in their capacities as managers—also differ on dimensions such as attitudes, information-processing styles, and leadership styles, characteristics that seem to be good candidates for additional moderators for the models depicted in Figures 1 and 2. For example, information-processing styles may moderate the relation between mentalizing capability and type learning postulated in Proposition 1. Similarly, agent characteristics need to be introduced more fully in our theorizing. A starting point may be to consider the agent's experience as a potential moderator between mentalizing and type learning. For instance, experienced agents may be better at recognizing and preventing the principal's mentalizing by means of impression management. Thus, the agent's experience may (negatively) moderate the impact of the principal's mentalizing on his understanding of the agent's type.

Variability. Although we place principal-agent relations in an organizational context, we do not discuss them in the context of an environment. Nevertheless, environments differ widely (Dess and Rasheed, 1991) and in ways that could matter to the reasoning in this paper. For example, mentalizing in fast-moving industries may be different from mentalizing in slower-moving industries. Relatedly, the extent to which the firm confronts many different environments (e.g., national firms versus multinational corporations) matters for mentalizing. One important reason why the environment matters is that different environments typically involve agents with different characteristics. Human resource management scholars use the construct of the "human resource pool" (Lepak and Snell, 1999). In analogy to this, firms confront "agent pools." These may be dimensionalized in terms of size, heterogeneity, and turnover. As firms differ widely in size, the size of their agent pools also differs widely. National firms typically confront less heterogeneous agent pools than multinational firms.

Firms in dynamic environments typically experience greater turnover than firms in less dynamic environments (Haveman, 1995). It may be hypothesized that mentalizing is more complex and costly (and its effects are weaker) when the number of agents is high, agents are heterogeneous, and the relation between principal and agent(s) is characterized by high turnaround. Specifically, in terms of the model in Figure 2, the number, heterogeneity, and turnover of the agent pool negatively moderate the (negative) effect of organizational sensemaking instruments on cognitive distance (i.e., Proposition 8).

Performance implications. Much interest has recently been devoted to understanding the micro-foundations of organizational performance in terms of both motivational (Gottschalg and Zollo, 2007; Lindenberg and Foss, 2011) and cognitive micro-foundations (Gavetti, 2005; Gavetti and Rivkin, 2007). A concern with micro-foundations naturally involves human resources, which are perhaps the "key ingredient to organizational success and failure" (Baron and Kreps, 1999: 4). The contribution to value creation made by human resources is, among things, dependent on their motivation. In this paper, we have addressed how factors related to knowledge and rationality influence the provision of incentives and, hence, the motivation of agents. We have identified three factors that influence value creation related to human resources: mentalizing, cognitive distance, and organizational sensemaking instruments. Mentalizing may be treated as resource in the sense of the resource-based view (Barney, 1991). Mentalizing, in fact, may give rise to rents when it yields improvements in value creation (net the costs required to obtain that increase) that exceed those of the competition. The costliness of imitating these rents may make rents sustainable.

Mentalizing and "envy costs." While one strength of mentalizing is that it allows for the design of fine-grained, agent-specific incentives (see Propositions 1 to 5), the implementation of "customized" incentives may raise issues of fairness and consistency in organizations. Although the aim of mentalizing is to improve the measurement of input

performance, and thus contribute to a better alignment of efforts and rewards, it is possible that the increased differentiation brought about by mentalizing may lead to perceptions of inequity and even envy among organizational members (Nickerson and Zenger, 2008). Perceived inequity relative to relevant social referents may drive attempts to restore equity in ways that are harmful to the organization (e.g., refusing to cooperate with those referents who have been "privileged"; Cropanzano, Goldman and Folger, 2003). Such "envy costs" need to be balanced against the benefits of mentalizing in a fuller, more realistic model of the costs and benefits of mentalizing.

Empirical work. Future research may also include empirical work on the ideas proposed here so as to gather additional "empirical detail about how principals and agents actually choreograph their dance" (Shapiro, 2005: 283). With the aid of increasingly sophisticated instruments and multidisciplinary techniques, researchers are developing scales for measuring individuals' capabilities to mentalize (Dietvorst et al., 2009). This makes it possible, in principle, to test our research model and propositions. However, given that empirical research on mentalizing in the context of principal-agent relations and in the organizational context is virtually non-existent, a multi-methodology approach that relies on interview, in-depth observational, and experimental methods seems preferable.

Formal Work. Economic models are deliberately kept simple for the purpose of mathematical treatment. One could fear that taking mentalizing into account in the way we have proposed may make models intractable or, at least, non-parsimonious. However, economists are busy building tractable and parsimonious models of bounded rationality (e.g., Rubinstein, 1998; Mullainathan, 2002). Moreover, the outcomes of substituting the current unrealistic cognitive and epistemic assumptions of agency theory with more realistic ones ultimately need to be examined in the context of formal models that allow for greater stringency than verbal logic.

A first stab at such a formalization could be to add a variable, say "m," that refers to the mentalizing ability of the principal (and, potentially, a second one for the agent's mentalizing ability). This variable, which would vary between 0 and 1 (0 = no mentalizing ability; 1 = full ability, i.e., the classical agency case), would then also show up in, for example, the formula for the optimal incentive intensity (Holmström, 1979), beta. Less than perfect mentalizing (i.e., $m < 1$) would lower the optimal beta, as it is more likely that the variable component of the remuneration is inappropriate given the agent's characteristics. Similar results could be derived for optimal monitoring intensity.

Coda

In recent decades, agency theory has become an important source theory in management. At the same time, the world has become increasingly globalized, the average tenure of employees has been significantly reduced, environments have become increasingly dynamic and unpredictable, and firms have increasingly made use of fleeting forms of organization and relations. These developments cast doubt on a fundamental assumption in principal-agency theory—that the principal can (in certain crucial respects) perfectly mind-read the agent.

In this paper, we have examined the consequences of making more realistic assumptions with respect to the principal's mentalizing, and we have shown how this leads to a richer, more managerially relevant theory of value creation in principal-agent relations. We believe that an understanding of the role played by the human potential for interpersonal sensemaking will not only enrich the explanatory potential of the theory, but also provide managers with refined guidance for value maximization. We trust that the analysis presented here will encourage future explorations of this new, important path towards understanding value creation in economic relations.

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FIGURE 1
Mentalizing and Value Creation in the Principal-Agent Relation
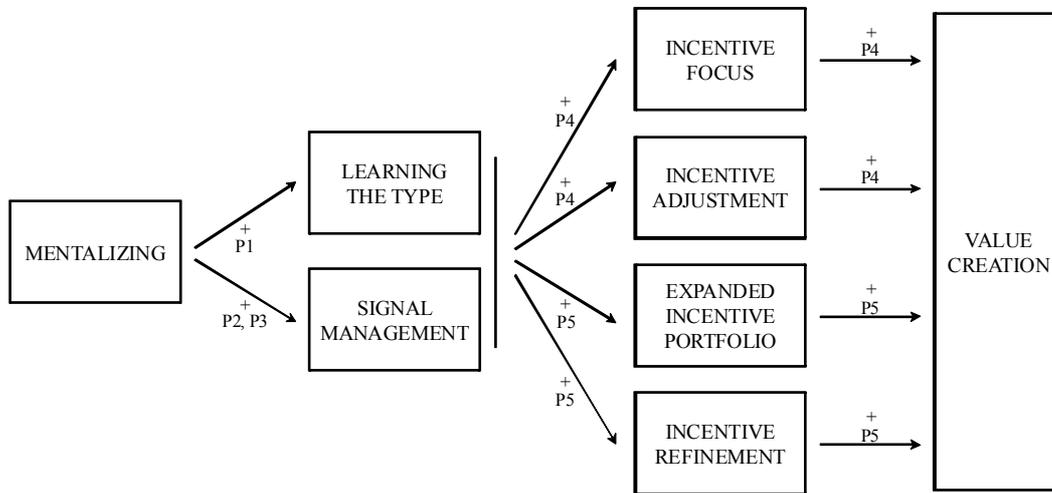
FIGURE 2
Mentalizing and Incentives: Organizational Context and Sensemaking Instruments
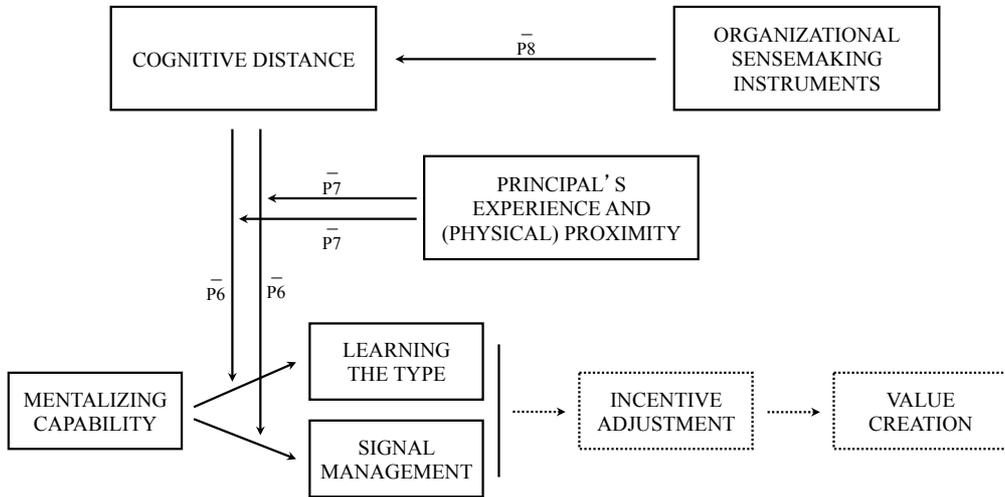
MOTIVATING KNOWLEDGE SHARING WHEN REWARDS ARE

AMBIGUOUS: THE ROLE OF COMPLEMENTARY MOTIVATORS

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MOTIVATING KNOWLEDGE SHARING WHEN REWARDS ARE

AMBIGUOUS: THE ROLE OF COMPLEMENTARY MOTIVATORS

Abstract

The extant literature identifies a number of antecedents of the motivation to share knowledge, implicitly suggesting that those who are exposed to such antecedents assume they are unambiguous. However, whether a reward for sharing knowledge is intended to be controlling or informational is not always clear. The presence of other potential antecedents of knowledge-sharing motivation may overcome such ambiguity. Specifically, we test for complementarities among rewards, job design, and work climate in the form of a three-way interaction among these variables with respect to their impact on knowledge-sharing motivation. Our analysis of 1,523 employees in five knowledge-intensive firms shows that employees who are exposed to ambiguous rewards for knowledge sharing experience higher levels of autonomous motivation to share when they are simultaneously exposed to a job design and work climate that support knowledge sharing. We argue that job design and work climate serve as a context for how employees experience rewards.

INTRODUCTION

An expanding body of research within, or closely related to, the human resource management (HRM) field addresses knowledge sharing and its antecedents. In particular, certain types of rewards (Gagné & Deci, 2005), job designs (Foss, Minbaeva, Reinholt, & Pedersen, 2009; Grant, 2007, 2008b), and work climates (Deci, Koestner, & Ryan, 1999; Ryan & Deci, 2000b) are argued to call forth the autonomous motivation that is a main driver of knowledge-sharing behaviors (Osterloh & Frey, 2000; Reinholt, Pedersen, & Foss, 2011). Extant research implicitly assumes that rewards for knowledge sharing are unambiguous in the sense individuals know whether those rewards are meant to play an informational or controlling role. However, the purpose of knowledge-sharing rewards may be far from obvious. For example, depending on the context, extrinsic rewards for knowledge sharing *may* stimulate feelings of autonomy (and not just crowd out intrinsic motivation, as is sometimes posited). Moreover, while it recognizes the importance of rewards, job design, and climate as antecedents of knowledge sharing, extant research has not shed much light on the interactions of the above predictors. Notably, we do not know whether these predictors support or even reinforce each other, and if so, why this is the case.

In this research, we argue that these issues are very closely related. Based on the idea that "it is not the reward per se, but rather its meaning to the recipient, that determines the reward's effects" (Deci et al., 1999: 658), we focus on the role of context (here job design and climate) in determining employees' responses to rewards for knowledge sharing. Such rewards may be fairly ambiguous. For example, is "recognition" intended to signal to an employee an appreciation of her competence or is it an attempt to control her? In order to answer this question, we must focus on various aspects of the context, such as the other instruments that management may use to stimulate employees' propensity to share knowledge, because doing so provides insight into the causality attributions that employees may make.

A central issue in the understanding of motivation is the perceived locus of causality, that is, an individual's self-perception of whether what causes him to engage in a specific behavior is internal or external (DeCharms, 1968; Ryan & Connell, 1989). Employees' causality attributions regarding their own engagement in knowledge sharing are important because such attributions significantly affect behavioral effort, persistence, and quality (Weinstein & Ryan, 2010). An internal perceived locus of causality is therefore a crucial driver of the efficacy of rewards aimed at triggering behaviors, such as knowledge sharing, that are mainly autonomously motivated (Deci et al., 1999). Our main argument is that employees' self-attributions are highly dependent upon the perceived consistency among different antecedents of knowledge sharing—specifically, rewards for knowledge sharing, the level of autonomy in the job design, and the work climate's support of knowledge sharing.

This argument implies that certain configurations of antecedents of autonomous motivation for knowledge sharing are complementary in the sense that the presence of one antecedent increases the effect of other antecedents on such motivation (Ennen & Richter, 2010; Meyer, Tsui, & Hinings, 1993). This idea aligns with recent contributions to the HRM field that look at how systems of practices may influence employee motivation (e.g., Gottschalg & Zollo, 2007; Foss et al., 2009; Mossholder et al., 2011). We specifically theorize that antecedents of motivation for knowledge sharing may be complementary in terms of ambiguity reduction. Thus, job design and work climate (which are relatively unambiguous in terms of control versus information) provide a background against which employees interpret informal rewards as informational or controlling. In other words, consistency is the main driver of reductions in reward ambiguity. Data from a survey of 1,523 employees in five knowledge-intensive firms suggest that the interaction between rewards, and a job design and a work climate that are supportive of knowledge sharing has a significant and positive effect on employees' autonomous motivation to share knowledge.

MOTIVATIONAL FOUNDATIONS FOR KNOWLEDGE SHARING

Fostering Autonomous Motivation for Knowledge Sharing

Knowledge sharing is a discretionary behavior that is associated with beneficial outcomes for the individuals involved and for the organization at large. Knowledge sharing matters to individuals and organizations because it fosters learning (Alavi & Leidner, 2001; Hansen, Mors, & Løvås, 2005) and other beneficial organizational outcomes, such as improved absorptive capacity, best practice transfer, and productivity (Cohen & Levinthal, 1990; Kogut & Zander, 1992; Tsai, 2001). Knowledge sharing is difficult to measure and, thus, to enforce by means of formal schemes based on extrinsic rewards (e.g., bonuses) (Osterloh & Frey, 2000). Sharing behaviors tend to rely on sentiments of fairness, loyalty, helpfulness, reciprocity, and individual initiative on the side of the individuals involved. Consistently, several studies show that *autonomous motivation* is a critical driver of employees' engagement in knowledge sharing (e.g., Foss et al., 2009; Gagné, 2009; Osterloh & Frey, 2000; Reinholt et al., 2011).

A key point in self-determination theory (SDT) (Gagné & Deci, 2005) is that motivation differs not just in level but also in kind. In particular, motivation differs in terms of the extent to which it is autonomous. An autonomously motivated individual has a perceived locus of causality that is internal, such that an autonomously motivated individual feels that she is the originator of her own behavior. This feeling also produces the impression that the specific behavior is self-endorsed, and congruent with her interests and values (Weinstein & Ryan, 2010).[1] However, autonomous motivation is not automatically maintained, but requires signals of autonomy, competence affirmation, and relatedness (as opposed to control) (Gagné & Deci, 2005). Most importantly, motivation-crowding research shows that autonomously driven behaviors may easily be compromised by situations that the individual experiences as controlling (Deci et al., 1999; Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997). For instance, research highlights that rewards (Deci et

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[1] In contrast, when an individual is motivated in a more controlled manner, the perceived locus of causality is ascribed to forces that are external to the individual. This implies that the individual does not feel that she "owns" the behavior, but feels "pressured" to undertake it—either by an external source (external pressure) or by a poorly integrated external regulation (self-imposed pressure) (Deci & Ryan, 1985)

al., 1999), communication (Ryan et al. 1983), evaluations (Harackiewicz et al., 1984), and imposed deadlines (Amabile, DeJong, & Lepper, 1976) that are perceived as controlling may undermine intrinsic motivation, the prototype of autonomous motivation (Ryan and Deci, 2000). Moreover, Deci, Eghrari, Patrick, and Leone (1994) and Grolnic and Ryan (1989) show that perceived control may also harm internalized types of extrinsic motivation, which are similarly categorized as autonomous motivation (Ryan and Deci, 2000). Thus, autonomous motivation can be compromised by instances of perceived control.

Gottschalg and Zollo (2007: 423) theorize that organizations can influence employees' motivational attitudes (and, in turn, their interest alignment) through "adjustments of the three interest alignment levers: reward system, socialization regime, and changes in the job design." Similarly, Gagné and Deci (2005) argue that an interpersonal environment—in terms of work context and the nature of the task—is the most fundamental factor that may be combined with rewards so as to support autonomy and, in turn, the development of autonomous forms of motivation. Thus, rewards, job design, and work climate have emerged in recent research as the most fundamental levers that can influence autonomous motivation and, in turn, knowledge sharing in organizations (see also Deci et al., 1999; Foss et al., 2009; Gagné, 2009). We therefore consider each lever in detail.

Rewards. Rewards are an integral part of organizational life and are widely used to motivate employees. SDT research recognizes that rewards can have an informational aspect and a controlling aspect. When a reward is informational, it conveys information to the recipient that she is competent at the focal activity (or information on how she can improve her performance in the future), which tends to enhance autonomous motivation. In contrast, when a reward is perceived as controlling, the individual feels pressured to deliver specific behavioral outcomes, which has a negative effect on autonomous motivation (Ryan, Mims & Koestner, 1983). Whether a reward is perceived as mainly

controlling or informational depends on the nature of the reward itself and on the individual's interpretation of that reward (Deci et al., 1999).

Although piece-rate rewards may come to mind as an example of controlling rewards (Deci et al., 1999; Ryan, Mims & Koestner, 1983), pay-for-performance rewards may be ambiguous in actuality, perhaps highly so (Fang & Gerhart, 2012). Furthermore, studies consistently find that rewards such as recognition and praise can have a positive effect on autonomous motivation because they strengthen the recipient's feeling of being competent at the focal activity (Deci et al., 1999). However, recognition and praise can also be used in a controlling manner (Loch, Huberman, & Stout, 2000). The same applies to other rewards, such as interesting assignments, personal and job-related development, and stimulating challenges, although these are usually argued to be most likely to enhance autonomous motivation (Deci & Ryan, 1985; Ryan & Deci, 2000a). In sum, rewards are potentially ambiguous because they can be perceived as either largely informational or largely controlling.

Job design. Job-design research shows that jobs can be designed to foster autonomous motivation (Hackman & Oldham, 1976) and knowledge sharing (Foss et al., 2009; Gagné, 2009). Two particularly important dimensions of job design with respect to autonomous motivation are job variety and autonomy. The latter refers to the extent to which a job provides the employee with freedom to decide when and how to carry out specific tasks (Hackman & Oldham, 1976). Job autonomy and variety offer employees a sense of responsibility (Fuller et al., 2006) and volition, which are essential for autonomous motivation to thrive (Gagné & Deci, 2005). Furthermore, by providing autonomy to employees, management signals confidence in their level of competence and their motivation to carry out the focal tasks (Bénabou & Tirole, 2003). In other words, a job that provides employees with autonomy and variety strengthens employees' feeling of being competent and self-determined. Such a non-controlling job design is supportive of autonomously-driven behaviors, such as knowledge sharing.

Work climate. SDT explicitly theorizes that—along with rewards and job design—work climate is essential for employees' motivation (Gagné & Deci, 2005). Work climate is a multidimensional construct (Fletcher & Nusbaum, 2009). However, we specifically argue that a work climate that values sharing and supports relatedness enhances employees' autonomous motivation because it emphasizes choice rather than control (Gagné & Deci, 2005). Mossholder, Richardson, and Settoon (2011) describe a similar type of climate, and stress the importance of a high level of mutual commitment and trust. Such a climate provides a secure social base from which employees gain a sense of being connected to others. This, in turn, is critical for the development of autonomous motivation (Deci & Ryan, 2000).

The same pattern has been found to be applicable in the context of knowledge sharing. Collins and Smith (2006) empirically show the importance of a trusting and collaborative social climate for employee engagement in knowledge sharing. Cabrera et al. (2006) find that perceived support from managers and colleagues is one of the most important determinants of knowledge sharing among employees. Other research links employees' perceptions of organizational norms regarding knowledge sharing to their intentions to engage in knowledge sharing (Bock, Zmud, Kim, & Lee, 2005). In sum, an autonomous motivation to share knowledge is stimulated by a work climate that is perceived as trusting, cooperative, and supportive of knowledge sharing.

The above identification of rewards, job design, and work climate as the principal levers for triggering autonomous motivation towards knowledge sharing has strong similarities with the self-regulatory approach (Tyler & Blader, 2005), empowerment (Conger & Kanungo, 1988), and commitment systems (Mossholder, Richardson & Settoon, 2011). These can be contrasted with the command-and-control approach, powerlessness, and compliance systems, respectively. In the following, we argue that these motivators form a configuration in the context of predicting autonomous motivation to share knowledge.

HYPOTHESIS DEVELOPMENT

Ambiguous Rewards for Knowledge Sharing

Organizational activities may exhibit varying degrees of complexity, uncertainty, and ambiguity (March & Simon, 1958; Stinchcombe, 1990; Saint-Charles & Mongeau, 2009). Knowledge-sharing behaviors are characterized by a high degree of ambiguity because of the intangible nature of knowledge, the difficulty of assessing what exactly is being shared in terms of a well-defined measurement standard, the inherent condition of the asymmetric information that is obtained through knowledge-sharing relations, and the difficulty of defining meaningful performance standards for knowledge-sharing efforts. Rewards provided in organizational contexts for carrying out activities with the above characteristics are fraught with the same problems, as they are ambiguous and difficult for employees to interpret (Lindenberg, 2000; Bénabou & Tirole, 2003). As such, a crucial determinant of the effects of knowledge-sharing rewards on motivation and, in turn, on behavior is the reduction of the ambiguity associated with those rewards.

From the perspective of SDT, the relevant process concerns whether an employee perceives a reward for knowledge sharing as controlling or informational. When an employee perceives a reward as controlling, he believes that an external source is controlling his behavior and thus feels in a position of dependence *vis-à-vis* the provider of the reward (DeCharms, 1968). A controlling reward therefore elicits the perception of an external locus of causality (Deci et al., 1999). In contrast, when a reward is perceived as informational, the locus of causality is perceived as internal because the reward triggers feelings of competence and autonomy. Rewards for knowledge sharing that are perceived as informational will therefore foster employees' autonomous motivation to engage in knowledge sharing.

Different types of rewards may differentially be perceived as informational or controlling. For example, pay-for-performance schemes have often been associated with control, whereas interesting assignments have typically been associated with perceptions of autonomy. Nevertheless, research increasingly shows that virtually all rewards may carry substantial ambiguity in terms of

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how controlling or informational they are in the perceptions of the employee. This ambiguity depends on several factors, such as the way the rewards are implemented, the narratives that accompany their implementation, the context in which they are implemented, and the extent to which they are based on subjective processes of managerial judgment (e.g., Fang & Gerhart, 2012; Loch et al., 2000). Thus, even though the nature of the reward itself may have some impact on whether that reward is more likely to be perceived as informational or controlling, other factors greatly affect the salience of the two aspects. Employees must draw information from these additional factors in order to ascertain whether a given reward is predominantly informational or controlling.

The Importance of Context and Consistency

Rewards are not provided in a vacuum. Organizations have access to many different levers, including job design, and less tangible yet highly important instruments like "culture" and "identity" (Gottschalg & Zollo, 2007). Configurational research (Meyer, Tsui, & Hinings, 1993) and research on complementarities among organizational practices (Ennen & Richter, 2010) lend credence to the notion that those levers tend to cluster in configurations (Milgrom & Roberts, 1990, 1995; Wright, 2003). More generally, this view is consistent with research demonstrating the importance of considering firms' work policies as part of a coherent system (e.g., Aral, Brynjolfsson, & Wu, 2012; Bowen & Ostroff, 2004; Huselid, 1995; Milgrom & Roberts, 1995).

Moreover, when exposed to multiple stimuli originating from the same source, employees process those stimuli in search of consistency (Connelly et al., 2010; Lindenberg, 2003). In fact, human actors actively seek consistency in their beliefs, values, and attitudes (Festinger, 1957) to such an extent that a lack of perceived consistency may make communication less effective (Connelly et al., 2010; Gao, Darroch, Mather, & MacGregor, 2008; Schlicht, 2008), and ultimately threaten individuals' motivation to initiate and persist in tasks (Thomas & Velthouse, 1990). Along the same lines, configurations that are internally consistent have been shown to be more effective than configurations that are internally inconsistent (Wiklund & Shepherd, 2005; Ennen & Richter, 2010).

Thus, the effects of the individual elements of a configuration cannot be fully understood in isolation, as they only acquire full force in the configuration (Meyer et al., 1993), that is, in the broader organizational context (Bamberger, 2008). In the case of a configuration of rewards, job design, and climate aimed at triggering knowledge sharing, we propose that these particular features of a given work environment influence employees' interpretation of rewards for knowledge sharing. In other words, the work environment plays a critical role in reducing the ambiguity that is naturally associated with those rewards.

Given the interpretive nature of the mechanisms underlying such a configuration, we expect the motivators to interact with each other in a complementary (as opposed to simply additive) fashion. We expect multiple, consistent elements to converge so as to reinforce each other in engendering a consistent view of potentially ambiguous circumstances. Consistency is particularly important in the case of autonomous motivation for knowledge sharing. In fact, while autonomous motivation is highly beneficial in terms of psychological and behavioral outcomes, it is fairly fragile and can be disrupted if non-supportive environmental conditions, such as a lack of consistency, are encountered (Ryan & Deci, 2000a).

Consistency and Ambiguity Reduction in the Context of Rewards for Knowledge Sharing

We argue that contextual factors make it easier for employees to reduce the ambiguity surrounding the motives of a given reward. Specifically, we argue that job design and work climate constitute the broader context that serves as a cognitive backdrop for an employee's causality attributions regarding rewarded behaviors. In this sense, we expect reinforcing relations among rewards for knowledge sharing, a work climate that is supportive of knowledge sharing, and a job design that—through manifestations of autonomy and variety—promotes knowledge sharing.

Employees use what they know about job design when they attempt to reduce the ambiguity (information versus control) of rewards. *Ceteris paribus*, a job design that promotes autonomy and variety strengthens feelings of competence and self-determination, and in turn supports an

informational interpretation of a causally ambiguous reward for knowledge sharing. From being granted autonomy in the job, employees know that management does not exercise excessive control, but rather trusts employees to perform tasks in the best possible way. Similarly, a work climate that is trusting, cooperative, and thus supportive of knowledge sharing is consistent with informational and non-controlling rewards. Therefore, in the context of knowledge sharing, a work climate that is supportive of knowledge sharing emphasizes the informational aspect of a causally ambiguous reward for knowledge sharing. By the same token, a job design that promotes employees' autonomy, competences, and self-determination is consistent with a work climate that is trusting and cooperative, and thus supportive of knowledge sharing.

A configuration of motivators that is consistent in being informational and supportive of autonomy will elicit perceptions of an internal locus of causality and therefore lead to high levels of autonomous motivation for knowledge sharing. However, given that autonomous motivation is easily disrupted, a configuration of motivators that is internally inconsistent (such that one or more motivators are perceived as controlling) will likely prompt a shift in the perception of the locus of causality from internal to external. In other words, a context (in terms of job design and work climate) that is internally consistent and supportive of autonomy, trust, and cooperation will lend credence to an informational interpretation of ambiguous rewards. In contrast, an inconsistent configuration of motivators will cast doubt on management's motives for rewarding knowledge sharing, and employees are therefore likely to perceive rewards as attempts to control their engagement in knowledge sharing.

In sum, the efficacy of rewards for autonomous behaviors has been shown to be conditional upon the perception of those rewards as being informational (as opposed to controlling). Therefore, we expect employees who are exposed to a knowledge-sharing-supportive climate and job design to be more likely to perceive the informational aspect of potentially ambiguous knowledge-sharing rewards as salient—and, in turn, to manifest higher levels of autonomous motivation to share

knowledge. In other words, there should be complementarities between rewards for knowledge sharing, and knowledge-sharing-supportive work climate and job design. Thus, we hypothesize the following:

Hypothesis*: There is a positive interaction effect among 1) rewards for knowledge sharing, 2) a non-controlling job design, and 3) a work climate that is supportive of knowledge sharing on the autonomous motivation to share knowledge, such that the presence of any two components of this system without the third is less effective than the presence of all three combined.*

Figure 1 summarizes the hypothesized relations.

Insert Figure 1 here

METHODS

Data Collection and Research Site

The data used in this analysis were collected from five knowledge-intensive firms that are headquartered in Denmark. The aim was to involve all of the employees in each firm (i.e., individual respondents) who could be involved in the sharing of knowledge. This approach made it possible to collect multi-source, individual-level data (e.g., Rousseau, 1985; Holmbeck, Li, Schurman, Friedman, & Coakley, 2002).

The data were collected from the following Danish firms: COWI, MAN Diesel, NNIT, Oticon, and Rambøll. Two of the firms are active in manufacturing (MAN Diesel produces diesel engines; Oticon produces hearing aids); two are active in consulting, mainly related to construction and engineering (COWI and Rambøll); and the last firm (NNIT) provides consultancy services in IT (for more descriptive data on the five firms, see Table 1).

The firms differ in terms of size. With more than 5,000 employees, Rambøll and Oticon are more than five times larger than NNIT, which has less than 1,000 employees. MAN Diesel and

COWI lie between these extremes. However, all five firms may be described as knowledge intensive in terms of their use of highly skilled employees (employees with engineering and economics degrees are particularly common in these firms), and in terms of their strong, explicit focus on knowledge creation and sharing. None of the firms are listed on the stock exchange, but three of them (COWI, Oticon, and Rambøll) are owned by foundations with a long-term orientation. The two remaining firms are owned by other companies, with MAN Diesel being part of the German company MAN and NNIT being part of the Danish company Novo Nordisk. All five firms have relatively high sales per employee, spanning from DKK 742,000 (approximately USD 141,000) in Rambøll to DKK 1,246,000 (approximately USD 237,000) in MAN Diesel.

This setting of five knowledge-intensive firms that differ on some dimensions is particularly relevant for our study of whether the determinants of autonomous motivation to share knowledge differ across firms. Table 1 provides the descriptive statistics of the sampling frame.

Insert Table 1 here

From February 2007 to April 2008, the same questionnaire was distributed to relevant employees in the five firms. In collaboration with firm representatives (typically HR representatives), the departments within each firm that were most relevant in terms of knowledge sharing were identified. The departments surveyed were characterized by team-based work, and encompassed such job functions as engineering, management consultancy, and IT consultancy. All employees from these departments were invited to participate in the survey. Typically, the survey was conducted in a condensed period of two to three weeks in each firm (Table 1 provides details on the exact time span of the survey for each firm). A total of 3,456 employees were approached across the five firms and 1,593 responses were returned, providing an overall response rate of 46% (ranging from 41% in Rambøll to 82% in NNIT; see Table 1). However, due to missing values, only 1,523 responses were

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included in the statistical test of the models. This corresponds to a highly satisfactory useable response rate of 44%.

More than half of the useable responses (51.6%) were derived from a single firm—Rambøll. The other half of the respondents were more evenly distributed across the remaining four firms (with NNIT providing the lowest share at 7% and MAN Diesel the highest share at 16% of all respondents). Although the high response rate (above 50%) makes non-response bias less of an issue, we examined the likelihood of this bias in a number of ways. First, we discussed the issue with the firm representatives within each of the five firms, who assured us that there were no visible biases between those responding to the survey invitation and the overall demographic distribution of their firms' employees. Second, we compared demographic variables (age, tenure, level of education, and gender) between the early and late respondents (wave analysis). The assumption is that the group of late respondents is closer to the non-responding group than the group of early respondents (Rogelberg & Stanton, 2007). In this regard, we conducted an ANOVA analysis of the differences in means for the two groups for the demographic variables. The hypotheses of differences in the means are all rejected (with F-values < 2). Given these results, we are confident that our data does not suffer from major problems of non-response bias.

Research Instrument

The data was collected using a web-based questionnaire, which was developed on the basis of a focused literature review. It was pre-tested with managers and management scholars to ensure that each item and the overall format were easily understood.

As the effect of rewards, job design, and climate depends on how employees interpret these elements (Deci et al., 1999), and as we are interested in employees' perceptions of locus of causality in terms of the reasons for their engagement in knowledge sharing, the independent and dependent variables in this study were operationalized through self-reports. Such measures are useful in studies of human behavior (Howard, 1994), especially in studies of motivation, which is difficult for

observers to assess (Ryan & Connell, 1989). Thus, most studies of motivations to share knowledge make use of self-reported measures (e.g., Cabrera, Collins, & Salgado, 2006; Szulanski, 1996).

However, a well-known potential limitation of self-reported measures is common method bias. We addressed this potential bias through our research design and by running appropriate statistical tests. Our questionnaire consisted of different scales, some of which were reversed. This diminishes the risk of biases (Rust & Coil, 1994). More importantly, Evans (1985) has shown that interaction effects are robust against common method bias. Furthermore, Siemsen, Roth, and Oliveira (2010: 472) highlight that "[c]ommon method bias can be effectively controlled by including other independent variables, which exhibit small bivariate correlation (< 0.3) among each other and those measures that suffer from CMV. Thus, CMV is less of a problem in OLS models with many independent variables, especially if these variables are not highly correlated." In fact, we included five continuous variables (all with a bivariate correlation below 0.3) and four categorical variables as explanatory variables in the tested models. The highest correlation of 0.21 was obtained between rewards for knowledge sharing and autonomy-promoting job design (see Table 3).

In addition, we performed a number of statistical analyses to assess the severity of common method bias. First, a Harman's one-factor test on the items indicated that common methods bias was not an issue. In other words, multiple factors were detected and the variance did not merely stem from the first factors (Podsakoff & Organ, 1986). The five continuous independent variables included in the models form three factors with an eigenvalue greater than 1, and the first two factors only capture 26% and 23% of the total variance, respectively. Furthermore, following Lindell and Whitney (2001) and Podsakoff, Mackenzie, and Podsakoff (2003), we conducted an analysis involving marker variables. While these marker variables did have separate explanatory power in some cases, they did not remove the significance of the key variables. While the statistical tests do not eliminate the threat of common method bias, they suggest that our results are not driven predominantly by common method variance. Moreover, our results are based on complex estimations

that involve multiple independent variables and interaction terms. It has been argued that it is highly unlikely that the results of such models emerge solely as a result of common methods bias (Evans, 1985; Siemsen et al., 2010).

An invitation with the link to the internet-based questionnaire was emailed via the company representatives to the agreed-upon sample. To reduce potential social desirability bias, respondents were ensured that the survey software prevented identification of individual employees. All questionnaires were returned directly to the researchers and only aggregate-level data (firm and division level) were provided to the company, which further reduces the likelihood of biased responses (Podsakoff et al., 2003).

Measures

Most measures used in this study were adapted from existing scales in the knowledge-sharing and motivation literature. Our final model included four multi-item variables: the dependent variable and three independent variables. In addition, we included two single item variables and four categorical variables as control variables. For all multi-item variables, a confirmatory factor analysis was conducted to test for reliability. In the following sections, we describe the operationalization of the variables. The exact wording of the items that form the multi-item variables is presented in Table 2. The table also includes factor loadings, t values, and R-squared values for each item, as well as the average variance extracted and construct reliability for each variable.

Insert Table 2 here

Autonomous motivation to share knowledge. Items from the Self-Regulation Questionnaire (SRQ) (Ryan & Connell, 1989) were adapted to reflect motivation for knowledge sharing. The SRQ assesses different types of motivation in specific behavioral domains. A motivation construct that reflects domain-specific motivation (a more situation-based type of motivation) was chosen.

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Specifically, in the context of the current research, "motivation" does not refer to a general, stable personality trait. Rather, the construct as used here reflects motivation towards a specific behavior across time, namely knowledge sharing.

We identified motivation for knowledge sharing by asking respondents questions about their underlying reasons for engaging in knowledge sharing. For the purpose of this research, the SRQ measures of intrinsic and identified motivation were used to estimate autonomous motivation. These motivation types have been applied when measuring autonomous motivation in previous research using the SRQ (e.g., Weinstein & Ryan, 2010; Williams, Grow, Freedman, Ryan, & Deci, 1996). More specifically, respondents were asked: "Why do you share knowledge?". Four items were used to capture employees' autonomous motivation towards knowledge sharing: "…because I enjoy it" (intrinsic), "…because I like it" (intrinsic), "…because I find it personally satisfying" (identified), and "…because I think it is an important part of my job" (identified). Answers were provided using a seven-point Likert scale ranging from "strongly disagree" to "strongly agree." The value of composite reliability is 0.81, providing strong evidence of the reliability of the construct. Furthermore, the AVE value of 0.52 is highly satisfactory. The autonomous motivation variable was calculated as the average of the four items.

Rewards for knowledge sharing. The items used for this variable were adapted from Cabrera, Collins, and Salgado (2006) and Maurer and Tarulli (1994). We asked respondents to indicate how they assessed personal outcomes of knowledge sharing. Specifically, we asked respondents to indicate the extent to which, in their experience, knowledge sharing led to: "…interesting assignments and projects," "…recognition from the head of my department," "…recognition from my colleagues," "…professional development," an "increase in salary," an "increased chance of bonus," and a "better reputation." Answers were provided using a seven-point Likert scale ranging from "very little extent" to "very large extent." The values for construct reliability and AVE for this

variable are 0.88 and 0.52, respectively, which are both highly satisfactory. The knowledge-sharing rewards variable was calculated as the average of the seven items.

Autonomy-promoting job design. Measures of job characteristics were adopted from Sims, Szilagyi, and Keller (1976), who improved on Hackman and Oldham's (1975) job characteristics instrument (the Job Characteristics Inventory), and provided evidence of the instrument's reliability and validity. We asked respondents to indicate the extent to which their current jobs were characterized by the following dimensions: "the freedom to carry out my job the way I want to," "the opportunity for independent initiative," and "the scope for variety in my job." These were measured using seven-point Likert scales ranging from "very little extent" to "very large extent." The three items form a strong variable with a construct reliability of 0.76 and an AVE of 0.51. Accordingly, the non-controlling job design variable was calculated as the average of the three items.

Knowledge-sharing-supportive climate. We derived our items for the climate variable from Husted and Michailova's (2002; Michailova & Husted, 2004) work on knowledge-sharing hostility and its determinants. Although Husted and Michailova (2002; Michailova & Husted, 2004) do not explicitly form the construct of "supportive climate," their items for constructs such as "reasons for hoarding (knowledge)" and "reasons for rejecting (knowledge)" can be used to measure the presence of an organizational climate that is supportive of knowledge sharing.

Specifically, in order to capture the respondents' assessments of the extent to which the interpersonal context encouraged knowledge sharing, we asked them to indicate (on a seven-point Likert scale) the extent to which they strongly disagreed (= 1) or strongly agreed (= 7) with four statements. All four statements were formulated negatively as "discouraging knowledge sharing." They were therefore reverse coded in the statistical analysis. The four statements are: "It is important to keep own ideas secret until one is acknowledged as the source of the idea," "Knowledge sharing reduces the incentive for others to create new knowledge," "Time spent on knowledge sharing could be spent on more important activities," and "Sharing knowledge is risky because others may

misinterpret the shared knowledge." These statements tap into the climate construct in terms of the shared perceptions of employees concerning the practices, procedures, and kinds of behaviors that are rewarded and supported in a certain setting (Schneider, 1990: 384). In particular, the inclusion of such expressions as "until one is acknowledged" suggests that the statements relate to the shared perceptions of employees. The values for construct reliability and AVE for this variable are 0.80 and 0.50, respectively, which are satisfactory. The variable was calculated as the average of the four items.

Control variables. *Job rotation* was added as a control variable because an employee who has been involved in job rotation might have a large network of colleagues with which she worked on previous occasions and with whom she feels comfortable. This is likely to influence employee motivation to engage in knowledge sharing. The variable was measured on a seven-point Likert scale indicating whether the respondent had been included in job rotation (1 = very little extent; 7 = very large extent).

A number of the respondents' personal characteristics, such as gender, tenure, age, and education, were included, as they effect autonomous motivation to share knowledge. For instance, long-tenured employees typically have large networks, but they may also be less dependent on others' knowledge. Furthermore, it has been argued that higher education goes hand-in-hand with autonomous motivation to share knowledge. *Tenure* was measured as the number of years the respondent had worked in the firm (average of 7.7 years). *Gender* was a categorical variable that took a value 0 for male and 1 for female. Females represented 27% (406) of the respondents. *Age* was a categorical variable with six intervals: "18-24 years," "25-34 years," "35-44 years," "45-54 years," "55-64 years," and "65+ years." Most of the respondents were between 25-34 years (34%) or 35-44 years (31%). *Education* was likewise measured as a categorical variable depending on the length of the respondent's education with the following categories: "high-school or below," "middle-range training," "Bachelor's degree," "Master's degree," and "PhD." The largest share of

respondents had a Master's degree (46%), while 31% had a Bachelor's degree. In addition, most of those with a Master's degree had obtained the degree in a technical area, typically engineering. The relatively high level of education among the respondents provides another indication that many of them were involved in activities for which knowledge sharing would be important.

We also included control variables for each of the five *firms*, as the level of autonomous motivation to share knowledge might vary by firm. Furthermore, as there may be a multilevel issue, we ran a random coefficient model with autonomous motivation to share knowledge as the dependent variable and the firm as the group variable. The potential multilevel effects of the firms were tested in an empty random coefficients model, i.e., a model without any covariates except for the intercept that expresses the higher-level effect on our dependent variable. The value of the intercept is 0.009 ($Z = 1.01$, $p = 0.16$), which is marginal and clearly insignificant. Accordingly, the intra-class coefficient is as low as 0.015, indicating that only 1.5% of the variation in autonomous motivation to share knowledge is explained by firm-level factors.

Descriptive statistics and zero-order correlations are provided in Table 3 for all continuous variables. Notably, the level of autonomous motivation to share knowledge is relatively high, with an average of 5.87 on the seven-point scale. In fact, one-third of the respondents indicate average values of more than 6 for autonomous motivation. Of the three independent variables, the supportive climate obtains the highest average value (5.84), while an autonomy-promoting job design and rewards for knowledge sharing reach average values of 5.52 and 3.98, respectively. All three independent variables are therefore at or above the mean of 4. The control variable of job rotation has an average value of 2.15, which is clearly below the mean of the seven-point scale.

Insert Table 3 here

RESULTS

We use hierarchical moderated regression models to investigate the proposed hypothesis.[2] As the three variables included in the interaction terms (rewards for knowledge sharing, autonomy promoting job design, and knowledge sharing supportive climate) are measured on different scales, we standardized them before creating the interaction terms. The regression results are presented in Table 4.

Insert Table 4 here

All four models on autonomous motivation to share knowledge included in Table 4 include control variables related to the individual employee's job (job rotation), personal characteristics (age, education, gender, and tenure) and firm controls. In Model 0 (Table 4), we include only the control variables. Model 1 includes all first-order associations between autonomous motivation to share knowledge and rewards for knowledge sharing, autonomy-promoting job design, and supportive climate, respectively. Model 2 adds all second-order associations. Model 3 includes the proposed three-way interaction.

Our hypothesis predicts a three-way interaction among rewards for knowledge sharing, autonomy-promoting job design, and a knowledge-sharing-supportive climate, such that the autonomous motivation to share knowledge is highest when all three variables are high. To be corroborated, the hypothesis would require a statistically significant increase in variance explained (F-test for increment in R-squared) in Model 3, as well as findings consistent with the hypothesis.

As can be seen in Table 4, the explanatory power of the control variables is limited, with an R-squared value of 0.03 in Model 0. However, by including the independent variables—which are all

[2] Although it is acceptable to have dependent variables based on Likert scales (with more than five categories, so they approximate a normal distribution) in statistical models which assumes interval data, we tested the robustness of the models by running them as ordered logit models. However, we found no differences when these results were compared to the reported results.

highly significant in Model 1—an R-squared of 0.20 is obtained. None of the second-order effects in Model 2 are significant and the F-increment test is also insignificant. However, the addition of the three-way interaction in Model 3 increases the explanatory power. Thus, Model 3 in Table 4 shows that the addition of the three-way interaction increases the overall R-squared by 0.02 compared with Model 1 and by 0.01 compared with Model 2. As such, the F-increment tests show that Model 3, which includes the interaction effect, is superior to Model 1 with only main effects and to Model 2, which includes second-order effects. This suggests that it is appropriate to examine the three-way system of complements as a whole because any two of three practices do not necessarily create complementarities without the third —i.e., there is no evidence of an interaction effect for a partial system in which only two of the three components are implemented. The R-squared for Model 3 indicates that almost one-fourth of the variation in employees' autonomous motivation to share knowledge is explained by the variables in the model. Furthermore, as hypothesized, the three-way interaction is positive and significant ($\beta = .06$, $p < .001$; Model 3, Table 4). All in all, these estimates provide evidence of complementarities between informal rewards for knowledge sharing and a context (in terms of job design and work climate) that supports these rewards.

We used the procedure outlined by Aiken and West (1991) to plot the high and low levels of each variable (one standard deviation above and below the mean). Figure 2 depicts the pattern of the moderated results related to our hypothesis. The highest level of employees' autonomous motivation to share knowledge is found when rewards for knowledge sharing, an autonomy-promoting job design, and a knowledge-sharing supportive climate are all high.

Insert Figure 2 Here

Notably, the slope is increasing in all four cases in which rewards for knowledge sharing are increasing. However, the greatest increases occur in the combination with a high degree of job

autonomy and a highly supportive climate, and in the combination with a low degree of job autonomy and a low degree of supportive climate and contextual support. In the two other cases—where either job autonomy or contextual support is low (and the other high)—the effect of rewards for knowledge sharing is more moderate. This may also explain why all second-order effects in Model 2 (Table 4) are insignificant. Together, these results provide support for our configurational argument, which suggests that the three independent variables positively amplify each other in their effect on autonomous motivation to share knowledge. Interestingly, and in line with the configurational arguments underlying the hypothesis, the amplifying effect is only obtained when all independent variables are high.

Finally, we explained the choice of autonomous motivation for knowledge sharing as our dependent variable by building on extant research that identifies autonomous motivation as a crucially important antecedent of effort and persistence in general, and knowledge sharing in particular (Lindenberg & Foss, 2011; Podsakoff et al., 2000; Weinstein & Ryan, 2010). As a robustness check, we statistically tested the relation between our dependent variable (autonomous motivation to share knowledge) and three specific behavioral variables: knowledge provision, knowledge acquisition, and knowledge sharing (the latter being framed in terms of both provision and acquisition). We did not report these results, as they are completely aligned with our previous findings. In all three cases, the relation between autonomous motivation to share knowledge and these behavioral variables was positive and highly significant.

CONCLUDING DISCUSSION

Previous research has demonstrated the presence of complementarities among reward systems, job design, and work climate (Gagné & Deci, 2005; Gottschalg & Zollo, 2007). By looking at these three levers in the context of knowledge sharing, we can examine specific, theory-driven predictions about how and why rewards for knowledge sharing combine with a job design and work climate that are

supportive of knowledge sharing to create a three-way complementary system of organizational practices.

We develop the argument that rewards for knowledge sharing and a context supportive of knowledge sharing (in terms of work context and job design) reinforce each other in the sense that the autonomous motivation for knowledge sharing is highest when all three motivators are high. Our argument is that employees rely on contextual factors when they attempt to understand whether a potentially ambiguous motivator (rewards, in our model) is mainly controlling or informational. The main finding of our study is that employees who are exposed to rewards for knowledge sharing experience higher levels of autonomous motivation to share knowledge when they are also exposed to other non-controlling, knowledge-sharing-supportive motivators.

Theoretical Implications

Our findings extend previous research by taking a configurational stance on the motivational foundations of prosocial organizational behaviors. We therefore elaborate on how our study contributes to theory and research on the antecedents of knowledge sharing, self-determination, and HR practices.

Knowledge sharing. There has been considerable interest in the knowledge-sharing literature in how rewards cause knowledge sharing. However, this interest has mainly focused on addressing the distinction between extrinsic and intrinsic rewards (Cabrera & Cabrera, 2005; Cabrera et al., 2006). The current paper introduces a different perspective in that we focus on the ambiguity of rewards—a characteristic common among all types of rewards. By highlighting the importance of consistency between instruments aimed at triggering knowledge-sharing behaviors, we shed new light on the contingencies that determine the successful implementation of rewards for knowledge sharing.

Self-determination theory. Our research also contributes to closing a gap in SDT, where the idea that contextual factors play a role in determining rewards' effects has been suggested but not

theorized or empirically examined (Deci et al., 1999). We extend and sharpen this argument by suggesting that job design and work climate constitute the context against which rewards are assessed. This process, we argue, constitutes a crucial determinant of how rewards are actually seen and, in turn, received by employees. In a broader context, this is consistent with the argument that the management of motivation is, to a large extent, the management of cognitions (Lindenberg & Foss, 2011).

More broadly, our arguments harmonize with recent research (beyond SDT) stressing the need to recognize the contexts in which incentive processing takes place (Lindenberg, 2000; Aguilera & Jackson, 2003; Benabou & Tirole, 2006; Lubatkin et al., 2007). Our research indicates that the value-creation potential of a given reward is *de facto* contingent on its processing (by the employee) together with other motivators—that is, that the same reward may trigger different responses depending on whether it is processed "in context." Thus, the understanding of reward mechanisms is improved by considering them in their specific context.

HR practices. Increasingly, HR research focuses on how HR practices can stimulate prosocial motivation and behaviors (e.g., Grant, 2007). Moreover, such research also considers how HR practices influence employee motivation by looking at these practices in systemic or configurational terms (e.g., Gottschalg & Zollo, 2007; Foss et al., 2009; Mossholder et al., 2011). For example, Mossholder et al. (2011) examine how HR systems drive relational climates that vary in terms of how well they motivate helping behaviors, while Gottschalg and Zollo (2007) propose a model in which an organic system of practices is put into place so as to trigger different motivational attitudes that, in turn, aligns employees' interests with those of the organization.

Similarly, in our research, we provide evidence that the (perceived) consistency between multiple distinct motivators contributes to the emergence of higher levels of autonomous motivation among employees to behave prosocially. Furthermore, we suggest that the mechanisms that enable these alignment processes are psychological in nature. Our research is thus relevant to the HR

context, as it confirms the importance of systems of practices and indicates the need for further investigations into the interpretive underpinnings of those systems.

Managerial Implications

Employees are increasingly interested in doing work that benefits others (Colby, Sippola, & Phelps, 2001; Grant & Berg, 2010; Turban & Greening, 1997). Providing employees with the means and opportunities to satisfy this prosocial inclination has become an increasingly important part of modern management practice (Brickson, 2005; Thompson & Bunderson, 2003). Autonomy-supportive rewards are normally used to strengthen employees' autonomous engagement in POB. However, these rewards are seldom provided in isolation, and managers need to know that these rewards may interact with other contextual factors in complex ways. More specifically, they must understand that the realization of the potential efficacy of such rewards often lies in employees' correct interpretations of rewards as authentically supportive of autonomy.

This research shows that fostering high levels of autonomous motivation to share knowledge among employees requires more than the simple implementation of autonomy-supportive reward mechanisms. If employees are not put in conditions that enable them to clearly identify and believe the informational nature of such rewards, investments in the implementation of rewards for knowledge sharing may be a suboptimal use of resources. By suggesting that employees may use job design and work climate as a context for interpreting rewards, we provide managers with a clear indication of the fundamental importance of establishing consistent systems or motivators that are supportive of autonomous motivations for prosocial behaviors in the workplace.

Limitations and Future Research

The contributions of this study should be considered in light of its limitations. First, our dependent variable—the motivation to engage in knowledge sharing—represents the motivation for only one prosocial behavior, albeit an important one. It would be desirable to consider motivations for a broader set of prosocial behaviors. In principle, the dynamics hypothesized in this paper may

take place every time an autonomously driven behavior is incentivized by means of potentially ambiguous rewards that are provided in context—that is, along with other motivators. Thus, we expect our model to be generalizable to (autonomously driven) behaviors other than knowledge sharing. However, we leave confirmation of this prediction to future research.

Second, our results do not rule out the existence of two-way complementarities between any two of the three complements we test. Our test confirms that the combination of all three elements in our system creates, on average, a greater-than-additive impact on autonomous motivation for knowledge sharing. However, pair-wise complementarities may exist, perhaps for certain sub-groups of firms or for certain industries.

Third, because we rely on cross-sectional data, the direction of causality cannot be fully ascertained. For example, it may be argued that our autonomous motivation measure could reflect pre-existing individual characteristics. In other words, people that like to share knowledge may tend to place themselves in contexts where they can do so—for example, in contexts where job design is non-controlling and where knowledge-sharing behaviors are valued. This notwithstanding, our arguments run in the direction from rewards, job design, and work climate to autonomous motivation to share knowledge because an autonomous motivation for knowledge sharing is indeed a malleable characteristic that can be influenced by environmental factors. Most research in self-determination theory (e.g., Deci & Ryan, 2000) depicts motivational states as mutually exclusive at a fixed point in time but malleable over time. In particular, it is important to note the difference between "situational" motivation and "disposition." The type of motivation that we address in this research is situational, and self-determination research highlights that the environment has an impact on situational motivation (Gagné & Deci, 2005). Therefore, additional research based on experimental or longitudinal data is needed to investigate causality in our model.

While our study extends previous literature on the motivational antecedents of POB by distinguishing between autonomous and controlled motivation, one of the main strengths of self-

determination theory is that it differentiates among several types of autonomous and controlled motivation. Theoretically, these different types of motivation have been argued to affect behavior in different ways (Gagné & Deci, 2005). Therefore, future research that looks in detail at how specific types of rewards, job designs, and work climates may be used to foster the emergence of, for example, intrinsic, identified, introjected, and external motivations to behave prosocially would be welcome.

Finally, we have proposed that employees look for consistency in their work environment in order to reduce the potential ambiguity of rewards that can be experienced as both controlling and informational. Our data do not allow us to directly analyze this mechanism. Although, we argue that our findings lend considerable credence to the existence of such a process, it would be highly desirable to collect qualitative, interview- and/or participant-based data in order to add insight into the nature of this process (as in Grant, Dutton, & Rosso, 2008). Moreover, work on this issue should also consider other possible organizational factors that may influence the dynamics under discussion. Such factors may include how authority is legitimized in an organization (i.e., in terms of fiat and power, or in terms of requirements for ongoing efficient production), whether collective goals are clear and directional, and how teams and tasks are designed (beyond the degree of job autonomy considered in this paper; e.g., role clarification, Mathieu & Rapp, 2009).

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FIGURE 1
Three-Way Interaction among Rewards, Job Design, and Work Climate
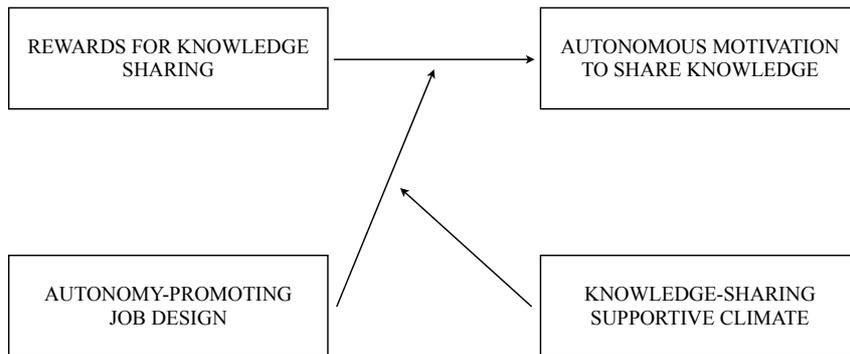
Figure 2. *Three-way interaction with autonomous motivation to share knowledge as the dependent variable*
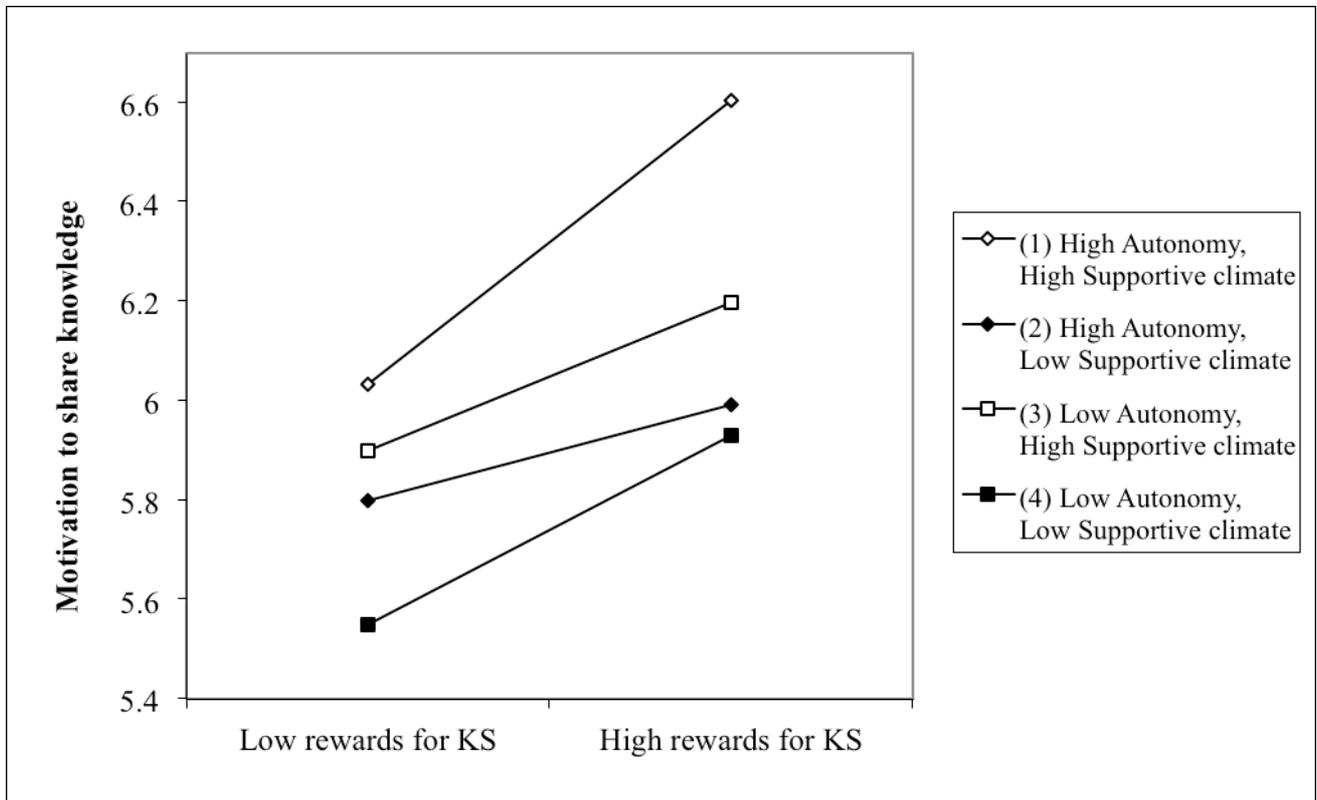
Table 1. *Descriptive data for the five firms and data on the conducted surveys*

	COWI	MAN Diesel	NNIT	Oticon	Rambøll
	Descriptive data				
Industry (NACE code and description)	711210 Consulting engineering activities within construction	281190 Manufacture of engines and turbines	620200 Computer consultancy activities	464620 Manufacture of hearing aids and supplies	711210 Consulting engineering activities within construction
Total sales (DKK billions)	3.0	3.1	1.2	5.5	4.7
Size (number of employees)	3.820	2.488	995	5.072	6.385
Sales per employee (DKK 1,000)	794	1.246	1.171	1.082	742
Return on equity	26.7%	14.4%	44.3%	269.3%	33.5%
Ownership	Foundation (83%)	Foreign group (100%)	Danish group (100%)	Foundation (58%)	Foundation (93%)
	Survey data				
Survey period	June 27-Aug. 28, 2007	Feb. 19-27, 2007	May 10-25, 2007	Feb. 12-17, 2007	April 8-28, 2008
Number of employees contacted	570	505	136	300	1996
Number of submitted questionnaires	246	263	112	148	824
Response rate	**43%**	**52%**	**82%**	**49%**	**41%**
Useable responses	238	245	108	146	786
Useable response rate	42%	49%	79%	49%	39%

Table 2: *Constructs and items*

	Factor loading	t value	R^2-square	Construct reliability	Average variance extracted
Autonomous motivation to share knowledge					
I share knowledge with others because…				0.81	0.52
1) I enjoy doing so.	0.68	23.89	0.46		
2) I think it is an important part of my job.	0.64	21.69	0.41		
3) I find it personally satisfying.	0.74	30.22	0.55		
4) I like sharing knowledge.	0.82	37.68	0.67		
Rewards for knowledge sharing					
To what extent do you experience that knowledge sharing leads to…				0.88	0.52
1) An increased chance of interesting assignments and projects?	0.74	36.02	0.55		
2) Increased recognition from the head of my department?	0.76	44.40	0.57		
3) More recognition from my colleagues?	0.78	46.16	0.61		
4) An increased chance of professional development?	0.66	26.66	0.44		
5) An increase in salary?	0.64	24.65	0.41		
6) An increased chance of a bonus?	0.61	18.41	0.37		
7) A better reputation?	0.82	57.01	0.67		
Autonomy-promoting job design					
To what extent is your current job characterized by the following?				0.76	0.51
1) The freedom to carry out my job the way I want to.	0.70	29.35	0.49		
2) The opportunity for independent initiative.	0.79	33.29	0.63		
3) The scope for variety in the job.	0.64	20.42	0.41		
Knowledge-sharing-supportive climate					
To what extent do you agree with the following statements? (all reverse coded)				0.80	0.50
1) It is important to keep own ideas secret until one is acknowledged as the source of the idea.	0.65	17.30	0.42		
2) Knowledge sharing reduces the incentive for others to create new knowledge.	0.75	21.96	0.56		
3) Time spent on knowledge sharing could be spent on more important activities.	0.70	19.54	0.49		
4) Sharing knowledge is risky because others may misinterpret the shared knowledge.	0.73	22.02	0.53		

Table 3. *Correlation matrix including all continuous variables (N = 1,523)*

	1	2	3	4	5	6
1. Autonomous motivation to share knowledge	1.00					
2. Rewards for knowledge sharing	0.31	1.00				
3. Autonomy-promoting job design	0.23	0.21	1.00			
4. Knowledge-sharing-supportive climate	0.28	0.06	0.16	1.00		
5. Job rotation	0.04	0.17	0.05	-0.06	1.00	
6. Tenure	-0.06	-0.11	0.15	-0.02	-0.01	1.00
Mean	5.87	3.98	5.52	5.84	2.15	7.66
Std. Dev	0.78	1.24	1.01	0.87	1.53	8.80
Min. values	1.25	1	1	1	1	0
Max. values	7	7	7	7	7	49

All coefficients greater than 0.05 are significant at the 5% level.

Table 4: *Hierarchical moderated regression models (N = 1,523)*

(Standard errors are listed in parentheses)[a]

	Autonomous motivation to share knowledge			
	Model 0	Model 1	Model 2	Model 3
Intercept	6.07*** (0.20)	6.07*** (0.19)	6.06*** (0.19)	6.03*** (0.19)
Rewards for knowledge sharing		0.19*** (0.02)	0.19*** (0.02)	0.18*** (0.02)
Autonomy-promoting job design		0.11*** (0.02)	0.11*** (0.02)	0.11*** (0.02)
Knowledge-sharing-supportive climate		0.20*** (0.02)	0.20*** (0.02)	0.18*** (0.02)
Rewards for knowledge sharing * Autonomy-promoting job design			0.01 (0.02)	0.01 (0.02)
Rewards for knowledge sharing * Knowledge-sharing-supportive climate			0.03 (0.02)	0.04* (0.02)
Autonomy-promoting job design * Knowledge-sharing-supportive climate			-0.03 (0.02)	-0.03 (0.02)
Rewards for knowledge sharing * Autonomy-promoting job design * Knowledge-sharing-supportive climate				0.06*** (0.01)
- Job rotation	0.05 (0.02)**	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)
- Tenure	-0.02 (0.03)	-0.03 (0.02)	-0.03 (0.02)	-0.03 (0.02)
- Gender	0.16 (0.05)***	0.12 (0.04)**	0.12 (0.04)**	0.12 (0.04)***
- Age				
18-24 years	0.05 (0.24)	0.01 (0.22)	0.02 (0.22)	0.05 (0.22)
25-34 years	0.13 (0.18)	0.03 (0.17)	0.04 (0.17)	0.05 (0.17)
35-44 years	0.19 (0.18)	0.05 (0.17)	0.06 (0.17)	0.07 (0.16)
45-54 years	0.20 (0.18)	0.02 (0.17)	0.03 (0.17)	0.04 (0.16)
55-64 years	0.19 (0.19)	0.07 (0.17)	0.09 (0.17)	0.09 (0.17)
65+ years	-	-	-	-
- Education				
High school or below	-0.42 (0.13)**	-0.18 (0.12)	-0.18 (0.12)	-0.20 (0.12)
Middle-range training	-0.33 (0.11)**	-0.13 (0.10)	-0.13 (0.10)	-0.12 (0.10)
Bachelor's degree	-0.26 (0.10)*	-0.13 (0.09)	-0.13 (0.09)	-0.11 (0.09)
Master's degree	-0.16 (0.10)	-0.13 (0.09)	-0.12 (0.09)	-0.12 (0.09)
Ph.D.	-	-	-	-
- Company				
COWI	-0.05 (0.06)	-0.04 (0.05)	-0.04 (0.05)	-0.04 (0.05)
MAN Diesel	-0.16 (0.06)*	-0.09 (0.06)	-0.09 (0.06)	-0.09 (0.06)
NNIT	0.08 (0.08)	0.01 (0.07)	0.01 (0.07)	0.02 (0.07)
Oticon	-0.01 (0.07)	-0.01 (0.06)	-0.01 (0.06)	0.01 (0.06)
Ramboll	-	-	-	-
N	1523	1523	1523	1523
F-value	3.26***	20.37***	18.48***	18.58***
R-square	0.03	0.20	0.21	0.22
F-test for increment		108.11*** (vs. model 0)	5.41 (vs. model 1)	16.59*** (vs. model 2)
				8.25** (vs. model 1)

***, **, and * indicate significance levels of 0.1%, 1%, and 5%, respectively.

[a] All continuous independent variables are standardized.

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PHYSICAL SEPARATION IN THE WORKPLACE: SEPARATION CUES, SENSEMAKING, AND BEHAVIORAL RESPONSES

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PHYSICAL SEPARATION IN THE WORKPLACE: SEPARATION CUES, SENSEMAKING, AND BEHAVIORAL RESPONSES

Abstract

Physical separation is pervasive in organizations, and it has powerful effects on employee behavior and organizational performance. However, research shows that workplace separation is characterized by a variety of tradeoffs, tensions, and challenges that lead to both positive and negative organizational outcomes. By developing new theory on the nature, antecedents, and consequences of *separation awareness*—a psychological state in which people are aware of their physical separation from others— we proffer a model of the positive and negative potential inherent in separation in the workplace. We distinguish between control and competence affirmation as psychological states that are triggered by physical separation in the workplace, and in turn reinforce controlled or autonomous motivation, thereby influencing employees' engagement in constructive and destructive behaviors.

Enclosures and barriers are among the most visually and functionally salient features of the workplace (Elsbach & Pratt, 2007). Doors, walls, partitions, cubicles, and different floors and buildings that physically separate workers are evident in virtually every organization. Research going back at least four decades demonstrates the impact of such "separation artifacts" on workers' attitudes and behaviors (Allen 2007; Brookes & Kaplan, 1972; Fayard & Weeks, 2011; Hatch, 1987; Oldham & Brass, 1979; Oldham, Kulik & Stepina 1991). Separation artifacts regulate the domains of action, influence, and information that are available to organizational members, and serve as instruments of organizational control. Given these characteristics, organizational members attribute meaning to separation artifacts (Fishbein & Ajzen, 2010). Indeed, these artifacts have consistently been found to be highly important to the functioning of organizations (Allen 1977; Davis 1984; Kelly, 1992; Laing, Craig & White, 2011).

Research shows that separation artifacts may have positive effects in that they can reduce intrusion and dissatisfaction (Cohen, 1980; Oldham, 1988); signal competence, distinctiveness, and status (Elsbach, 2003; Sundstrom, Burt, & Kamp, 1980); and increase confidentiality and meaningful interaction (Carlopio & Gardner, 1992; Hatch, 1987). At the same time, separation artifacts may prevent informal communication (Allen, 1977; Boje, 1971; Pile, 1978); inhibit collaboration (Elsbach & Pratt, 2007; Mark, 2002); and reduce perceptions of task significance, task identity, and, in turn, job satisfaction (Oldham & Rotchford, 1983; Zalesny & Farace, 1987). Extant research thus strongly suggests that the management of physical separation by means of separation artifacts can have a substantial impact on individuals' attitudes, motivations, and behaviors (Elsbach & Pratt, 2007). However, physical separation artifacts have been associated with widely different individual and organizational outcomes and, as the above suggests, "[t]heir complexity is evident in the myriad of trade-offs, tensions, and challenges inherent in their design and management" (Elsbach & Pratt, 2007: 2011). This suggests a need for a fuller, more comprehensive model of the nature and effects of separation artifacts in the workplace.

We address this need by developing a theoretical model of the nature, antecedents, and consequences of "separation awareness." We proffer "separation awareness" as an individual-level construct that mediates the relation between separation cues—that is, various manifestations of physical separation in the workplace—and individual-level outcomes, namely motivations and behaviors. This model builds on the notion that cognitions precede motivations (Lindenberg & Foss, 2011), which in turn precede behaviors (Grant, 2009). Specifically, we argue that the cuing introduced by separation artifacts in the workplace predicts organizational behaviors.

We begin by first introducing and developing the separation awareness construct. We build on the concept of the perceived locus of causality (PLOC) (Deci & Ryan, 1985; Gagné & Deci, 2005; Ryan & Connell, 1989) to distinguish between two forms of awareness—separation-as-competence-affirmation and separation-as-control—and we examine how these forms of awareness produce opposed motivational attitudes. Second, having described the dual nature of separation awareness, we move a step backwards to consider its antecedents, namely separation cues. We dimensionalize separation cues depending on their origin and strength. Then, building on sensemaking research (Weick, 1995; Weick, Sutcliffe & Obstfeld, 2005), we examine how such cues interact with an employee's perceived freedom to move and his or her work orientation so as to trigger feelings of competence affirmation or control. Third, we consider the behavioral consequences of separation awareness. Specifically, we link awareness of separation-as-competence-affirmation to organizational citizenship behaviors and awareness of separation-as-control to organizational misbehaviors. Fourth, we explore how the behavioral effects of separation awareness are moderated by contextual contingencies. Finally, we close with a discussion of our contributions, the limitations of our research, directions for future research, and practical implications.

Research highlights that an individual's satisfaction with her compensation is contingent on how her compensation compares with that of salient others (Nickerson & Zenger, 2008). We suggest that the same logic may apply to the context of separation artifacts. That is, in making sense of her

workplace separation, an employee will most likely compare her current situation with that of salient others. However, to keep the complexity of the discussion at a manageable level and to allow us to focus on our construct of separation awareness, we ground our analysis at the dyadic (manager-employee) level, and thus control for potential social comparison issues across employees (Nickerson & Zenger, 2008; Tai, Naryanan & McAllister, 2012).

Furthermore, we focus on two core classes of work behavior: organizational citizenship behaviors (OCB), which are extra-role, non-enforceable behaviors that benefit the organization (Organ, 1988), and organizational misbehaviors (OMB), which involve the violation of formal organizational roles, norms, and expectations (Vardi & Wiener, 1996). We do so for three main reasons. First, OCB and OMB can have significant destructive and constructive implications. Second, they are general drivers of several important behaviors—e.g., helping colleagues, donating, cooperating, and volunteering, as opposed to stealing company property, harassing others, sabotaging processes, or misleading customers (Organ, 1988; Vardi & Wiener, 1996). Third, these behaviors have been linked to psychological states that strongly resonate with our distinction between separation-as-competence-affirmation and separation-as-control. Although these two classes of behaviors do not cover the full panorama of outcomes that may result from separation management in the workplace, they do capture the most important and extreme outcomes in both the positive and the negative direction. As such, we do not propose separation awareness as a single, focal construct that contributes to the display of OCB and OMB, but rather as a construct that provides a solid and unifying theoretical framework that enhances our understanding of the potential functional and dysfunctional implications of separation management in the workplace.

Figure 1 shows the model of separation awareness—from its situational antecedents to its behavioral consequences—that we develop in this article.

Insert Figure 1 here

SEPARATION AWARENESS: COMPETENCE AFFIRMATION VERSUS CONTROL

We define "separation awareness" as a psychological state in which people are aware of their physical separation from others, and make assumptions about the nature of this separation that address the question, "Why am I separated from other organizational members?". Separation awareness is triggered by the feeling of severance that emerges when physical separation artifacts, such as partitions, walls, and doors, are introduced.

On the basis of the idea that the physical environment—broadly defined as the arrangement of material objects and stimuli (Elsbach & Pratt, 2007)—plays a central role in individual behavior, which in turn may influence interaction patterns and the formation of relationships, researchers have explored the role of the physical environment in organizations (Davis, 1984; Oldham & Brass, 1979). The main emphasis of this research has been on the role of physical separation—evidence suggests that separation influences attitudes, motivations, and behaviors (Elsbach & Pratt, 2007; Hatch, 1987). Objects that are used to produce physical separation among employees ("separation artifacts") convey cues of physical separation in the workplace ("separation cues") that influence how employees cognitively frame their organizational context, sense of identity, and motivation, which in turn trigger their behavioral responses (Davis, 1984). However, research on the nature of these responses is highly heterogeneous in its predictions. The management of separation in organizations has been characterized as a powerful and extremely complex activity (Elsback & Pratt, 2007).

Our key point is that these responses are contingent on how employees make sense of their separation—that is, on their *separation awareness*. By introducing this theoretical mechanism, we hope to unify the different predictions in the literature concerning the consequences of separation artifacts under a comprehensive theoretical framework.

The Bright Side of Separation

One of the main tenets of research on the impact of physical separation in organizations is that separation may limit intrusions and reduce environmental disturbances (mainly by means of better visual and acoustic isolation). This helps workers to concentrate on their tasks because, for example, the workspace is less crowded, resulting in higher levels of (perceived) privacy and overall job satisfaction (Altman, 1975; Elsbach & Pratt, 2007). Research analyzing employees' reactions to changes in office design—usually from single-office to open-office settings or vice versa—provides support for these basic propositions. For instance, Oldham (1988) finds that employees who move from an open-plan office to a low-density open-office or to a conventional (partitioned) office experience substantial improvements in privacy and satisfaction. Similarly, Sundstrom, Burt, and Kamp (1980) find an association between physical and acoustic isolation, which are inherent characteristics of partitioned offices, and reduced distraction, increased privacy, and, in turn, increased workspace and job satisfaction. Similarly, Oldham and Brass (1979) observe a sharp decline in intrinsic motivation and satisfaction when a group of employees is moved from a multicellular office to an open-plan setting. Moreover, evidence supports the thesis that separation— for example, in the form of closed offices, which facilitates private conversations—favors confidential communication (Carlopio & Gardner, 1992). Furthermore, the perception of enhanced privacy may have a positive impact on the frequency of meaningful and useful verbal interactions (Hatch, 1987). Finally, Elsbach (2003) argues that separation in the workplace is an important instrument for signaling employee status, and shows that a lack of separation may result in perceived threats to employees' workplace identities because of a reduced ability to affirm employee categorizations.

The Dark Side of Separation

Other studies paint a different picture in which the introduction of separation has detrimental consequences. Empirical research on enclosures in the workplace suggests that separation may decrease informal communication, collaboration, and group and task identity. Such research either

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points out the negative consequences of separation (Boje, 1971; Pile, 1978) or looks at the beneficial effects of openness as opposed to enclosure (Zalesny & Farace, 1987). Specifically, Allen (1977), Boje (1971), and Pile (1978) find that separation in the workplace decreases informal communication. Oldham and Rotchford (1983) demonstrate that openness has a positive impact on perceived task significance. Zalesny and Farace (1987) show that openness has a positive, significant impact on perceived task identity. Finally, by showing that cohesion and physical closeness represent some of the main drivers of top performance in specific high-pressure work situations, Mark (2002) demonstrates that separation may seriously inhibit collaboration in situations that require rapid problem solving and decision making (see also Elsbach & Pratt, 2007).

Perceived Causality: Autonomy and Control

As argued above, research on the physical environment in the workplace offers a number of predictions about the potential effects of physical separation. On the one hand, separation may trigger behavioral responses that are highly beneficial to the organization. On the other hand, separation can foster responses that are detrimental to the organization. Although these results are not in conflict, as the dependent variables (and moderators) differ across the studies we have reviewed, we lack an overarching theory that explains the circumstances under which the introduction of separation is more likely to be beneficial than detrimental. A key reason for this gap is the extant literature's lack of appreciation of the role of "separation awareness"—that is, the specific attributes a person applies to the nature of his physical separation from others.

The distinction between autonomy and control in an agent's perceived locus of causality (PLOC) (Ryan & Connell, 1989) helps us introduce two opposed, mutually exclusive psychological states that embody individuals' awareness of their separation in the workplace. This distinction derives from self-determination theory—the overarching theory that determines our modeling in this research—which posits that motivation differs not only by level but also by kind depending on the actor's degree of autonomy (Deci & Ryan, 1985; Gagné & Deci, 2005). When an individual is

autonomously motivated, the elements that give rise to effort (i.e., the perceived locus of causality) are internal. In other words, an autonomously motivated actor perceives himself as the originator of the behavior. Autonomous motivation naturally triggers behaviors that are self endorsed, and consistent with personal attitudes and values (Weinstein & Ryan, 2010). In the case of controlled motivation, on the other hand, the perceived locus of causality is external to the individual. Accordingly, the individual does not feel that she is the originator of the behavior but feels forced in some way to adopt the behavior (Deci & Ryan, 1985; Ryan & Connell, 1989).

Motivational psychology strongly suggests that autonomous and controlled motivational attitudes are mutually exclusive (but not necessarily stable across time), and highly reactive to external stimuli (depending on how stimuli are interpreted by the recipient) (Deci & Ryan, 2000; Gagné & Deci, 2005; Ryan & Deci, 2000). For example, intrinsic motivation—the prototype of autonomous motivation (Ryan & Deci, 2000)—is easily disrupted by signals of control, such as extrinsic rewards (Deci, Koestner & Ryan, 1999; Frey & Oberholzer-Gee, 1997), evaluations (Harackiewicz, Manderlink & Sansone, 1984), and imposed deadlines (Amabile, DeJong & Lepper, 1976). On the other hand, signals of trustworthiness and competence affirmation are required for autonomous motivation to emerge (Ryan & Deci, 2000). In sum, perceptions of trust and competence affirmation foster the emergence of autonomous motivation, while perceptions of mistrust and control trigger the emergence of controlled motivation.

Separation as Control versus Separation as Competence Affirmation

Depending on an agent's specific PLOC (i.e., external versus internal), a state of physical separation from others may be experienced as controlling or as indicating competence. Abundant theoretical and empirical evidence demonstrates that perceptions of autonomy and control are, in fact, opposite and mutually exclusive psychological states. More specifically, they are mutually exclusive at any fixed point in time but can vary across time (e.g., Deci & Ryan, 2000; Ryan & Deci, 2000). Consistent with self-determination research, we thus proffer *separation-as-control* and

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separation-as-competence-affirmation as distinct, mutually exclusive forms of separation awareness with distinct motivational consequences: separation-as-control strengthens controlled motivation, while separation-as-competence-affirmation strengthens autonomous motivation.

Separation-as-control describes a state of separation awareness in which individuals interpret the presence of separation artifacts as a means to limit and, thereby, to direct their behavior. For instance, an employee who is given a private office may interpret her newly introduced separation from her coworkers as a means of decreasing interpersonal interactions so as to increase her focus on personal productivity—that is, as a means to control her behavior. In support of this view, evidence indicates that the introduction of separation artifacts that increases physical separation may reduce employees' willingness to freely communicate with peers (Pile, 1971) and, in turn, to collaborate with each other (Mark, 2002). An awareness of separation as control prompts the emergence of controlled motivation, which involves a sense of pressure and a feeling of being forced to engage in a given activity (Gagné & Deci, 2005).

In contrast, separation-as-competence-affirmation describes a cognitive state of separation awareness in which individuals interpret the presence of separation artifacts as an affirmation of their competence. For instance, an employee who is given a private office may *ceteris paribus* perceive this introduction of separation in her workspace as a means to protect her from external disturbances and, therefore, as an acknowledgment of the importance of her task. Consistent with this view, separation artifacts have been found to signal the intention to protect the employee from intrusions and overstimulation (Cohen, 1980; Oldham, 1988), or to recognize an employee's status (Elsbach, 2003). An awareness of separation-as-competence-affirmation leads to the satisfaction of the basic need for competence affirmation (Ryan & Deci, 2000). This, in turn, stimulates the emergence of autonomous motivation (Gagné & Deci, 2005). This reasoning suggests the following proposition:

Proposition 1: *Separation-as-control and separation-as-competence-affirmation are distinct, mutually exclusive forms of separation awareness with different motivational consequences:*

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separation-as-control leads to controlled motivation, whereas separation-as-competence-affirmation leads to autonomous motivation.

SEPARATION AWARENESS IN THE WORKPLACE

Given that separation-as-control and separation-as-competence affirmation can exist as two distinct forms of separation awareness, it is pertinent to ask what triggers these forms of separation awareness. In the following, therefore, we move one step backwards to consider the triggers of separation awareness, which we refer to as "separation cues."

From Cues to Awareness

Numerous artifacts can be used to create separation between employees: cubicles, partitions, walls, doors, and separate floors and buildings are just a few examples (Elsbach & Pratt, 2007). All of these physical elements make employees aware of separation by transmitting separation cues—that is, manifestations of physical separation in the organization.

Signaling theory addresses the reduction of information asymmetry between parties (Riley, 2001; Spence, 2002). A first party (the sender) sends out a signal to a second party (the receiver). The reduction of information asymmetry between the parties depends on the reliability of the signal and on the receiver's capability to correctly interpret it (Connelly et al., 2010). Signaling (on the side of the sender) can be intentional or unintentional (see Feldman & March, 1981). The number of situations in which information asymmetry is reduced by means of signaling is high and, not surprisingly, signaling theory has been applied to a large number of different contexts, including labor markets (Spence, 1973), entrepreneurship (Certo, 2003), corporate governance (Zhang & Wiersema, 2003), and human resource management (Suazo, Martinez & Sandoval, 2009).

We argue that the effects of separation artifacts should be considered in the light of signaling theory. Consider the following example: a manager introduces an artifact (e.g., cubicles) to separate employees who were initially located in an open office. All of the basic elements of the classic signaling model are in place: we have (for simplicity) two parties—manager and employee—and we

have asymmetrical information about the intentions (control versus competence affirmation; see P1) behind the introduction of the separation artifact. In fact, these intentions are clear to the manager, but they are not necessarily clear to the employee. The (intentional or unintentional) signal sender is the individual who introduced the separation artifact—in this example, the manager. The signal receivers are the employees who experiences separation because of the artifact.

Manifestations of physical separation in the organization can thus be seen as separation cues that carry potentially ambiguous messages about the sender's intentions—control versus competence affirmation. To capture the variety of the organizational situations in which these cues of separation may be introduced, we dimensionalize them depending on where the cue originates and how strong it is. Figure 2 represents the core dimensions in a two-by-two diagram, which indicates their predicted impact on awareness of separation-as-competence affirmation and on awareness of separation-as-control.

Insert Figure 2 here

Origin. When the employee is exposed to a separation artifact, he will most likely ask himself: "Why did my boss introduce this partition [substitute with any separation artifact]?" Our first dimension therefore categorizes separation cues depending on the mechanisms that brought about their implementation. Thus, while we assume that separation *artifacts* are always introduced by the employer (or by an employee who ranks higher than the focal employee), we differentiate separation *cues* depending on whether they originate from artifacts that the employer introduced in a discretionary manner and on his own initiative, or in response to the employee's request, or simply because of a standard operating procedure (e.g., by default, certain types of middle managers have the "right" to an office of a certain size).

Thus, *top-down* cues originate as a consequence of managerial discretion (e.g., the boss decides to separate two employees by introducing a partition between them). In contrast, *bottom-up* cues originate from the employee (e.g., the boss separates two employees because the employees ask him to do so). *Task-related* cues are a natural consequence of standard operating procedures in the organization (e.g., a promotion that comes with a private office).

We argue that top-down cues are more likely than bottom-up and task-related cues to trigger separation awareness in terms of control and information. In organizations, power relations are highly asymmetrical (i.e., top down). As a result, employees watch for signals that reveal management's intentions (Mühlau & Lindenberg, 2003; Takeuchi, Chen, & Lepak, 2009). Thus, the informational or controlling nature of a separation cue will be more evident to employees if the cue is imposed from above. For instance, an employee who is given a private office by his boss will be more likely to perceive that move as cueing control or competence affirmation than an employee who receives a private office as a natural consequence of career advancement. In other words, top-down cues are more likely than bottom-up and task-related cues to stimulate separation awareness in the form of separation-as-control and separation-as-competence-affirmation.

Strength. When faced with a separation cue, the employee also asks himself: "Does being separated from others make a real difference for me?". If it does not, then the employee is likely to dismiss the separation artifact as negligible. In turn, he will perceive the cue that is attached to such an artifact as weak and uninteresting. In contrast, a strong separation cue—that is, a cue that originates from a separation artifact that "makes a difference" for the employee—is difficult to disregard. For example, an employee who is given a private office will appreciate his separateness more if visual and acoustic isolation strongly affect the quality of her work. In turn, she will speculate more about the intentional connotations of the cue, which will reinforce the development of one form of separation awareness. Thus, we propose that strong cues have greater potential to trigger separation awareness in terms of control and competence affirmation.

By combining the above ideas, we conclude that, in terms of awareness-generation potential, the most powerful combination is when a cue scores high in both dimensions (origin and strength). A moderately powerful combination is when one dimension scores high and the other scores low. The weakest combination is when a cue scores low in both dimensions. More specifically,

Proposition 2: *Strong cues with a top-down origin have the greatest potential for stimulating separation awareness in terms of both control and competence affirmation, while strong cues with a bottom-up or task-related origin have moderate potential for doing so. Similarly, weak cues with a bottom-up or task-related origin have the lowest potential for stimulating separation awareness in terms of both control and competence affirmation, while weak cues with a top-down origin have moderate potential for doing so.*

Making Sense of Separation Cues: The Moderating Effect of Freedom to Move and Self-Monitoring

Separation cues may lead to awareness of separation in terms of control and in terms of competence affirmation. What predicts the emergence of one kind of awareness? In line with research on organizational sensemaking (Weick et al., 2005), we argue that the development of specific types of awareness rests on cognitive simplifying mechanisms (Kaplan & Tripsas, 2008). This need for simplification derives from bounded rationality (Simon, 1955, 1978): individuals attempt to specify causal relations between complex sets of variables but are limited in doing so by the bounds on their rationality (Lant & Shapira, 2001; Hodgkison & Healey, 2008). Thus, individuals make sense of ambiguous information environments by applying mental frames that allow them to simplify and give meaning to ambiguous scenarios (Walsh, 1995; Weick et al., 2005).

As they can be perceived in terms of both control and competence affirmation, separation cues are potentially ambiguous signals. Thus, when confronted with separation artifacts, employees may ask themselves: "Has this partition, cubicle, door, etc., been introduced in order to protect me from external disturbance and let me perform my task in the best possible way (i.e., competence

affirmation), or to determine and *de facto* control my behavior?" Answering this question may be far from easy. First, simple (decontextualized) observation of the cue is insufficient in terms of enabling the employee to make accurate deductions about what the cue is intended to do. In addition, limitations in the employee's capability for rational processing impede her ability to consider all of the variables that may potentially interact so as to logically indicate the motivational nature of the cue. Thus, in line with research on sensemaking, we expect the employee to focus on some specific elements that she will use as interpretive frames in order to make sense of ambiguous cues (Hodgkison & Healey, 2008).

Research on the physical environment in organizations points to the nature of the task and social characteristics as the most important moderators between physical variations in the workspace and employees' responses to these changes. Thus, the extent to which separation artifacts (and, more generally, workplace (re-)design) influence an employee's behavior greatly depend on the employee's task characteristics and activities, as well as on social characteristics, such as her work orientation (Fayard & Weeks, 2007; Maher & Von Hippel, 2005; McElroy & Morrow, 2010).

In our model, we highlight one specific task-related element and one specific social characteristic that moderate the emergence of separation awareness. As these elements allow for the emergence of specific interpretations (control or competence affirmation) of potentially ambiguous cues, we propose that *perceived freedom to move* and *self-monitoring* are two fundamentals interpretive frames that are used to cognitively process separation cues. In introducing these moderators, we suggest that employees' sensemaking of their separation is highly contingent on person-specific orientations and on the nature of the task.

Perceived freedom to move. First, we propose that whether separation cues engender awareness of control or competence affirmation depends on what we call the employee's "perceived freedom to move"—that is, the employee's perceptions about his freedom to physically move within and even beyond (e.g., working from home) the workspace to basically decide on the location of his

own work place. High perceived freedom to move implies that the employee will think that he can avoid the separation artifact, if necessary. This, in turn, will increase the perceived informational nature of such an artifact. On the other hand, low perceived freedom to move will lead the employee to believe that she will be unable to avoid the separation artifact, which will favor an interpretation of the artifact as a controlling tool. We focus on a perceptional (rather than objective) conceptualization of freedom precisely because of the psychological, interpretive nature of the processes under analysis. Specifically, we predict that high perceived freedom to move will increase awareness of separation in terms of support and competence affirmation, and that low perceived freedom will increase awareness of separation in terms of control and pressure.

The hallmark of control is a perception of pressure to behave in a certain way (Gagné & Deci, 2005). When a separation artifact is introduced into a context in which the employee feels that he has limited possibility to move, he will believe that he cannot decide whether he wants to take advantage of his separateness. He will therefore experience an overall feeling of pressure and control in association with the cue. For instance, imagine that cubicles are introduced in a call center that was initially open spaced. Call-center workers are normally required to perform all of their tasks from their workstations and are likely to think they have limited freedom to move. As employee communication will be impaired by the introduction of the cubicles and as employees will probably feel that they cannot avoid the separation artifact, they will come to view the artifact as a controlling instrument aimed at reducing their interaction with other employees (rather than as a supportive instrument aimed at, e.g., protecting them from environmental disturbances).

When the pattern is reversed, the possibility of avoiding the separation artifact because of high perceived freedom to move gives rise to a mainly informational interpretation of separation cues. Thus, under conditions characterized by a high freedom to move, a separation artifact has limited power to affect the employee's behavior and is likely to be seen as an instrument that the employee is

free to benefit from as he wishes. To a large extent, the separation artifact becomes a tool in the hands of the employee rather than in those of the employer.

In sum, we expect separation cues to trigger a high perception of control and a low perception of competence affirmation among those employees who feel that they have limited freedom to move. Similarly, we expect separation cues to elicit a low perception of control and a high perception of competence affirmation among those employees who feel that they have considerable freedom to move.

> **Proposition 3:** *Perceived freedom to move moderates the effect of separation cues on separation awareness, such that low perceived freedom increases awareness of separation-as-control and decreases awareness of separation-as-competence-affirmation, and high perceived freedom decreases awareness of separation-as-control and increases awareness of separation-as-competence-affirmation.*

Self-monitoring. Self-monitoring is another determinant of the extent to which employees develop awareness of their separation in terms of control or competence affirmation. Specifically, we argue that individuals who engage in self-monitoring to a great extent ("high self-monitors") are more sensitive to the signaling potential of separation cues than those who engage in self-monitoring to a lesser extent ("low self-monitors"). The former will therefore develop more awareness of separation (both in terms of control and in terms of competence affirmation). In social settings, some individuals, namely "low self-monitors," behave in accordance with internal sources, such as feelings, attitudes, and beliefs. As they "march to their own drums," low self-monitors are likely to be less attentive to cues in general, and less prone to link cues to mental representations of what others think about them. In contrast, "high self-monitors" adjust their behaviors to the demands of the situation in question. In particular, they tend to read cues intensively, and to transmit numerous signals about appropriate behavior, competence, and status (Mehra, Kilduff & Brass, 2001; Snyder 1987).

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We propose that an employee's tendency toward low or high self-monitoring influences the importance that the employee attributes to a given separation cue. In other words, high and low self-monitors look at separation cues differently. Low self-monitors are not easily influenced by separation cues; they tend to exclude the possibility that their exposure to separation artifacts are instrumental to how others perceive them. In contrast, high self-monitors are intensely occupied with the cues represented by separation artifacts. For example, high self-monitors are frustrated by controlling cues, while they are highly favorable to competence-affirming cues, which imply a potential for beneficial signaling to others. Thus, a high self-monitor will be particularly pleased with a separation artifact that he interprets as competence-affirming and particularly unhappy with a separation artifact that he interprets as controlling because he believes others will interpret the cue in the same way.

> **Proposition 4:** *Self-monitoring positively moderates the effect of separation cues on separation awareness of both kinds. Specifically, for individuals that are high in self-monitoring, the moderation effect on the link between separation cues and awareness is greater. For individuals that are low in self-monitoring, the moderation effect is weak or non-existent.*

BEHAVIORAL CONSEQUENCES OF SEPARATION AWARENESS

Thus far, we have theorized that separation cues interact with perceived freedom to move and self-monitoring, such that they trigger the emergence of separation awareness in terms of control or competence affirmation. We now turn to a discussion of the behavioral consequences of these two types of awareness. We focus on two fundamental and orthogonal types of work behavior: organizational misbehavior (OMB), which refers to intentional action by members of the organization that violate formal organizational rules, norms, and expectations (Bennett & Robinson, 2000; Robinson & Bennett, 1995; Vardi & Wiener, 1996; Vardi, 2001; Vardi & Weitz, 2004), and organizational citizenship behavior (OCB), which refers to extra-role, non-enforceable behaviors that

benefit the organization to which the individual belongs (LePine, Erez & Johnson, 2002; Organ, 1988; Organ & Ryan, 1995).

Given the prevalence, importance, and constructive and destructive implications of these behaviors, there is a growing interest in understanding the mechanisms that trigger OMB and OCB. Extant theory and research clearly indicate that the emergence of OCB and OMB is contingent on employees' cognitive and affective perceptions of their work (Lee & Allen, 2002). Specifically, OMB is fueled by perceptions of exploitation and inequity, as well as feelings of dissatisfaction and frustration (Hollinger & Clark, 1982; Lee & Allen, 2002; Vardi, 2001; Vardi & Wiener, 1996). OCB, in contrast, is driven by perceptions of fairness and organizational support, as well as job satisfaction (Andreoli & Lefkowitz, 2008; Fassina, Jones & Uggerslev, 2008; George & Brief, 1992; LePine, Erez & Johnson, 2002; Konovsky & Organ, 1996; Moorman, Blakely & Niehoff, 1998; Organ, 1988).

These psychological states parallel our distinction between awareness of separation-as-control and awareness of separation-as-competence-affirmation. In the following, we link awareness of separation-as-control with OMB and awareness of separation-as-competence-affirmation with OCB. Furthermore, we introduce individual and contextual factors that moderate these relations.

Awareness of Separation-as-Control and Organizational Misbehaviors

First, we expect awareness of separation-as-control to, *ceteris paribus*, increase the likelihood of employee engagement in OMB. OMB is defined as "any intentional action by members of organizations that defies and violates (a) shared organizational norms and expectations, and/or (b) core societal values, mores and standards of proper conduct" (Vardi & Wiener, 1996: 153; see also Robinson & Bennet, 1995, and Vardi, 2001). These violations can be directed at the organization itself, at its members, or both (Bennett & Robinson, 2000). The seriousness of OMB varies, ranging

from behavior that involves a moderate waste of organizational resources to the outright stealing or sabotaging of equipment (Robinson & Bennet, 1995).[1]

We link awareness of separation-as-control to OMB *via* feelings of injustice, exploitation, and mistreatment. In fact, subjective perceptions of injustice, exploitation, and mistreatment in the workplace have been shown to significantly affect employee deviance (Hollinger & Clark, 1982; Vardi & Wiener, 1996; Vardi, 2001; Ambrose, Seabright & Schminke, 2002). OMB has consistently been depicted as behavior that reflects resentment, dissatisfaction, or protest (Vardi & Wiener, 1996; Vardi, 2001). When employees perceive a separation artifact as controlling, they are likely to experience feelings of dissatisfaction, pressure, and injustice, and react by engaging in OMB (Lee & Allen, 2002; Robinson & Bennett, 1997). Along this line, Judge and Bono (2001) find that an individual's perceived locus of control is one of the strongest predictors of job satisfaction. For example, after controlling for dispositional negative affect and work status, Fitzgerald, Haythornthwaite, Suchday, and Ewart (2003) find that the job strain induced by control leads to an OMB of directing anger at coworkers, supervisors, and customers. Similarly, research has explained employee theft and sabotage in the workplace (types of OMB) as deliberate reactions to perceived inequities (Greenberg, 1990; Greenberg & Scott, 1996; Ambrose, Seabright, & Schminke, 2002; Kelloway, Francis, Prosser & Cameron, 2010). More generally, evidence indicates that negative affect and negative behavior tend to arise from stressful conditions (Lee & Allen, 2002; Haythornwaite et al., 2003) that may be rooted in perceptions of injustice and mistreatment. In sum, we propose that the awareness of separation-as-control is linked to feelings of injustice, exploitation, and mistreatment, and that it thus fosters employees' engagement in OMB.

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[1] Vardi and Wiener's (1996) OMB construct includes three types of misbehaviors: misbehavior intended to benefit oneself, misbehavior intended to benefit the organization, and misbehavior intended to inflict damage on the organization or its members. Clearly, the second category is inconsistent with the underlying behaviors we are trying to predict in the sense that we are concerned with dysfunctional workplace behaviors. As most OMBs are, in fact, dysfunctional (Vardi, 2001), we maintain OMB as our focal construct but control for those instances in which a misbehavior actually benefits the organization.

Proposition 5: *Awareness of separation-as-control increases employees' engagement in organizational misbehaviors.*

Awareness of Separation-as-Competence-Affirmation and Organizational Citizenship Behaviors

We have proposed that awareness of separation-as-control triggers OMB. Likewise, we expect separation-as-competence-affirmation to, *ceteris paribus*, increase the likelihood of employee engagement in OCB. OCB has been conceptualized as individual, extra-role, non-enforceable behaviors that often go unrecognized by formal evaluation systems but still contribute to effective organizational functioning (LePine, Erez & Johnson, 2002; Organ, 1988, 1997; Podsakoff, MacKenzie, Paine & Bachrach, 2000; Van Dyne, Graham & Dienesh, 1994). Typical OCB-minded individuals show loyalty to the organization, help colleagues, and generally go the extra mile for the organization. OCB may increase quality (Podsakoff, Ahearne & MacKenzie, 1997), sales performance (Podsakoff & MacKenzie, 1994), coordination, organizational development, and cohesion (Organ, Podsakoff & MacKenzie, 2006).

We base our prediction that awareness of separation-as-competence-affirmation fuels OCB on evidence that links perceptions of fairness, job satisfaction, and organizational support to employees' engagement in OCB. In fact, research shows that perceived fairness, organizational support, and job satisfaction are among the most robust predictors of OCB (Andreoli & Lefkowitz, 2008; Fassina et al., 2008; Ehrhart, 2004; Organ & Lingl, 1995; Organ & Ryan, 1995; Podsakoff et al., 2000; Tepper & Taylor, 2003). Employees who perceive their work environment as generally supportive and fair develop a social exchange relationship with their employers and, in line with the norm of reciprocity (Gouldner, 1960), tend to repay the organization by engaging in OCB (Organ, 1988).

An awareness of separation-as-competence-affirmation stimulates the employee's autonomous motivation (see P1). In this regard, research based on self-determination theory has demonstrated that autonomous motivation is superior to controlled motivation in promoting increased behavioral

effort and persistence (Gagné & Deci, 2005; Ryan & Deci, 2000). The superiority of autonomous motivation is particularly pronounced when behaviors involve helping others, organizational loyalty, sportsmanship, or civic virtue (Podsakoff et al., 2000; Lindenberg & Foss, 2011). In other words, autonomous motivation is an important determinant of OCB.

In sum, we propose that awareness of separation-as-competence-affirmation is linked to feelings of fairness and satisfaction, and that it therefore fosters employees' engagement in OCB.

Proposition 6: *Awareness of separation-as-competence-affirmation increases employees' engagement in organizational citizenship behaviors.*

The Moderating Effect of Employees' Psychological Attachments to the Organization

Clearly, there are conditions under which the aforementioned relationships are likely to vary. The arguments that perceived separation-as-control triggers OMB and that perceived separation-as-competence-affirmation stimulates OCB are based on the idea that perceived control is naturally associated with feelings of dissatisfaction and perceptions of injustice, while competence affirmation is naturally associated with positive feelings and perceptions of fairness (Earley & Lind, 1987; Schat & Kelloway, 2000; Judge & Bono, 2001). However, different mechanisms influence the extent to which these psychological associations occur. Organizational identification and (affective) commitment—two fundamental dimensions of employees' psychological attachment to their organizations (Meyer, Becker & Van Dick, 2006)—play a fundamental role in this respect.

Organizational identification captures employees' self-definition in terms of organizational membership (Ashforth, Harrison & Corley, 2008; Ashforth & Mael, 1989; Mael & Ashforth, 1992). In other words, when the employee identifies with the organization, she links her organizational membership to her self-concept either cognitively (e.g., the conscious internalization of organizational values) or emotionally (e.g., an experience of pride in membership) (Riketta, 2005). In both cases, organizational identification rests on the employee's perceived oneness with the

organization (different foci of identification are possible, but are not of interest for our model; see Johnson, Morgeson, Ilgen, Meyer & Lloyd, 2006).

A related construct is organizational affective commitment. Employees can commit themselves to an organization because of necessity (continuance commitment), obligation (normative commitment), or affection (affective commitment). Organizational affective commitment captures an employee's emotional attachment to and involvement in an organization (Allen & Meyer, 1990, 1996; Meyer & Allen, 1991; Meyer, Stanley, Herscovitch & Topolnytsky, 2002). Research indicates that although organizational identification and affective commitment are similar, they are distinct constructs. Identification implies that employee and organization are not separate psychological entities (i.e., the organization is part of the individual's self-conception). Commitment, on the other hand, refers to a psychological relationship between two distinct entities (the individual and the organization) (Meyer, Becker & Van Dick, 2006; Van Knippenberg & Sleebos, 2006). All in all, identification and commitment are the main indicators of employees' psychological attachments to their organizations (Meyer, Becker & Van Dick, 2006; Van Knippenberg & Sleebos, 2006).

An employee's psychological attachment to the organization moderates the relationship between separation awareness and behavioral outcomes. This happens because a high level of psychological attachment most likely influences employees' sentiments about controlling and informational cues. Specifically, employees who are psychologically attached to the organization will perceive controlling artifacts as less arbitrary and, in turn, engage in less OMB. In fact, high attachment does not alter the perception of the separation cue *per se* but it will justify the presence of control, at least to some extent. For example, consider a call-center worker who perceives her cubicle as an instrument of control. In a situation of high attachment, the employee will think that this form of control is necessary and instrumental to the organization (to which she is emotionally attached). This in turn, will negatively moderate the likelihood of that employee's engagement in OMB. In a similar vein, employees who are psychologically attached to their organizations will perceive

informational instruments as even more credible, satisfactory, and equitable. This, in turn, will positively influence employees' propensity to engage in OCB.

It might be argued that perceptions of control could be more harmful for employees who perceive controlling policies as highly unfair because they are psychologically attached to the organization. However, psychological attachment to the organization is associated with loyalty to the organization and, as Hirschman (1970) argued, loyalty to the organization activates a "voice strategy" rather than an "exit strategy." This means that the employee will dedicate her energy to fully contributing to the organization rather than to investing in external options. In situations in which organizational members experience unfairness—such as when they are relocated from a single office to an open plan office—the loyal employee will attempt to voice her dissatisfaction rather than exit the organization. Thus, compared with a less psychologically attached employee, a more psychologically attached employee will be more likely to accept the rearrangement for the benefit of the organization.

In sum, we expect the proposed relationships between employees' awareness of separation and behavioral responses (P5 and P6) to be highly sensitive to the degree of psychological attachment among employees. Specifically, employees' attachment to their organizations (in terms of both identification and commitment) influences perceptions of fairness, exploitation, and satisfaction, such that an employee with a high level of attachment will perceive controlling instruments as less arbitrary (and, in turn, engage in less OMB) and informational instruments as more equitable and satisfactory (and, in turn, engage in more OCB). Hence,

Proposition 7: *Employees' psychological attachment to their organizations negatively moderates the effect of awareness of separation-as-control on OMB and positively moderates the effect of awareness of separation-as-competence-affirmation on OCB.*

The Moderating Effect of Perceived Inconsistency

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The proposition that awareness of separation-as-competence-affirmation leads to OCB is based on the argument that an affirmation of competence triggers the emergence of autonomous motivation (see P1), as well as feelings of fairness, support, and satisfaction (see P6). These result in OCB. However, autonomous motivation is fragile and is sensitive to various environmental factors. Specifically, motivation-crowding research demonstrates that autonomously driven behaviors are easily compromised by formal, extrinsic rewards (Deci et al., 1999; Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997), controlling communication (Ryan et al., 1983), and evaluations (Harackiewicz et al., 1984). In other words, the maintenance of autonomous motivation requires the absence of strong controlling signals (Gagné & Deci, 2005).

These findings are consistent with evidence in signaling research (Connelly et al., 2010), which stresses that employees seek consistency among multiple signals originating from the same source (Lindenberg, 2003). In fact, human actors need consistency in their beliefs, values, and attitudes (Festinger, 1957), and a lack of consistency has been proven to threaten the motivation to initiate tasks and persist in their execution (Thomas & Velthouse, 1990). Accordingly, we expect employees' (autonomous) inclination to engage in OCB to be highly sensitive to cues in and signals from the work environment that may indicate controlling attitudes towards the employee.

Proposition 8: *The positive relationship between awareness of separation-as-competence-affirmation and OCB is negatively moderated by environmental signals that are perceived as controlling (e.g., a formal, extrinsic incentive system).*

CONCLUDING DISCUSSION

The building of new theory often involves the development of new constructs. In this article, we have focused on the cognitive and motivational (as distinct from the instrumental and aesthetic; see Elsbach & Pratt, 2007) consequences of physical separation in organizations. We have organized our discussion around the novel construct of separation awareness. Although the construct has merit in its own right, in this article it helps in the development of a comprehensive model of the behavioral

consequences of separation management in organizations. Our theoretical framework clarifies and expands the understanding of the antecedents, nature, and behavioral implications of separation awareness in organizations. In highlighting the importance of awareness of separation-as-control versus separation-as-competence-affirmation, we have developed new theory that contributes to the understanding of the potentially functional and dysfunctional consequences of an organization's physical space.

Our analysis proceeded through three stages. First, we made use of self-determination research in motivational psychology to conceptualize awareness of separation in terms of control versus competence affirmation. We also linked these types of awareness to distinct motivational attitudes. Second, we moved a causal step backwards to examine the mechanisms that trigger the emergence of separation awareness in its two forms. Finally, we turned our attention to the behavioral consequences of separation awareness, arguing that individual and organizational contingencies moderate the distinct relationships that link the awareness of separation-as-control to OMB and the awareness of separation-as-competence-affirmation to OCB. In the following, we discuss the contributions and implications of our research, as well as desirable directions for future research.

Theoretical Contribution

This article contributes to management research in several ways. First, we introduce the construct of separation awareness in the context of management research on the physical environment in organizations. By highlighting the cognitions that environmental cuing gives rise to, we developed theory that significantly improves our understanding of why and how employees' relative separateness within an organization influences their motivational and behavioral inclinations. This builds on the assumption that cognition and motivations are highly intertwined and fundamental drivers of behavior (Abrahamson & Hambrick, 1997). The management of physical separation in organizations has been characterized as having great potential for both positive and negative outcomes, and as being an extremely complex practice with multiple trade-offs and challenges

(Elsbach & Pratt, 2007). Our main contribution in this regard is our model, which attempts to organize those complexities and behavioral potential into a parsimonious framework.

Second, by combining the dichotomous conceptualization of separation awareness with individual and organizational moderators, we were able to propose unique associations between separation artifacts (i.e., environmental cues) and orthogonal work behaviors (i.e., OCB and OMB). This allowed us to cast new light on a variety of findings in research on the motivational, affective, and behavioral consequences of the physical environment in organizations (see Elsbach & Pratt, 2007). Specifically, our analysis of the separation-awareness construct suggested that it is highly meaningful to distinguish between separation that employees perceive as controlling and separation that employees perceive as affirming their fundamental competences. Self-determination theory predicts widely different outcomes, which we link to OCB and OMB. These outcomes include the very different behavioral outcomes identified in the extant literature on the effects of the physical environment in organizations.

Directions for Future Research

This article's contributions can be elaborated and extended in several ways. Specifically, we envision eight interesting avenues for future research.

Individual-level heterogeneity. Research indicates that sensitivity to environmental stimulation, and the propensity to engage in OMB or OCB may differ from person to person (Maher & Von Hippel, 2005; Vardi & Wiener, 1996). Thus, individual differences may play an important role in determining the effect of a given separation cue. The overall importance of the individual is captured by our model. For instance, perceptions of freedom to move (P3), self-monitoring (P4), psychological attachment (P7), and signal inconsistency (P8) directly involve the dynamics of individual cognition. However, other aspects of the individual are black-boxed in our model. In particular, we do not theorize about the effect of individual heterogeneity in terms of, for example, personality traits.

Thus, an interesting avenue for future research would be to build individual aspects, such as values, attitudes, age, and personality traits, into the model, perhaps as moderators of the postulated relations. One way to accomplish this would be to draw on self-determination theory as it is pertains to individual heterogeneity. Notably, self-determination theory explicitly suggests that individuals differ in their need for competence, autonomy, and relatedness (Deci & Ryan, 1985). However, individuals also differ in cognitive terms, and, as we clarify below, this may influence how they perceive environmental cues, such as separation artifacts.

Level of analysis and social-comparison mechanisms. Not only do individuals differ, but they also engage in what has been termed "social comparison" (Nickerson & Zenger, 2008). Theories on social comparison assume that individuals compare their rewards—such as financial rewards or items with symbolic value—to those received by salient referents, and that people care about inequities. Whenever individuals perceive inequity, they will engage in behaviors that attenuate that perception (Nickerson & Zenger, 2008). In other words, inequity perceived in unfavorable social comparisons is painful, and can lead to envy; negative behaviors, such as social undermining (i.e., noncooperative behavior or even attempts to sabotage coworkers' productivity); and reduced organizational citizenship. For example, Tai, Narayanan, and McAllister (2012) report on what they term "office-chair envy"—an inequity based on individuals believing that a better office chair is symbolic of higher status. They find that office-chair envy may have negative behavioral consequences (at least for the organization), such as reduced organizational citizenship behavior.

In this article, our individual-level construct of "separation awareness" focuses on physical structures. In this regard, we focus on a dyadic manager-employee scenario, thereby omitting how physical structures may also be an object of social comparison across multiple employees. Future research should apply our model to the group level of analysis. In so doing, it should also address how inequity and envy moderate the main relations that we have described.

Managerial narratives. Employees' sensemaking of separation cues can be affected by the narratives (Clark & Salaman, 1998) that managers (may) use to justify the introduction of a given separation artifact. For instance, the perception of control that may be associated with a given separation artifact can be reduced if management explicitly describes that artifact as a means to protect employees from external disturbances. Similarly, the perception of competence affirmation that an employee may attach to another separation artifact may be compromised if management explicitly describes that artifact as, for instance, an instrument to measure and stimulate the employee's productivity.

Specific targets of organizational citizenship behavior and organizational misbehavior. Both OCB and OMB may have distinct targets. These behaviors can be directed towards the organization, towards individual employees, or both (e.g., Ehrhart, 2004; Lee & Allen, 2002). In our model, we treat OMB and OCB as unified and relatively consistent behaviors. Furthermore, in line with the findings of extant research, we link them to perceived control and competence affirmation. It seems possible, however, that awareness of separation may be particularly conducive to individual- versus organization-oriented OCB and OMB under certain circumstances. For instance, depending on the size of the organization, an employee who experiences separation-as-control may be more or less prone to direct his misbehavior towards his boss or towards the entire organization. An implementation of this distinction would certainly be an interesting avenue for future research.

Degrees of awareness and cue strength. Employees' cognitive processing of ambiguous scenarios can be more or less conscious (Daft & Macintosh, 1981). Our model, however, does not capture variability in the degree of consciousness in employees' interpretations of ambiguous separation cues, even though such variability may exist—some employees may be more aware of separation artifacts than other employees. Accordingly, the former would be more influenced by such artifacts than the latter. This again indicates a need to take individual-level heterogeneity more fully into account. Specifically, individual heterogeneity, as it pertains to the cognitive processing of

the cues represented by separation artifacts, matters. The cognitive schema that individuals apply for such processing are likely to be influenced by their cultural background, upbringing, education, tenure in the organization, and work experience. Furthermore, variability in awareness also exists on the level of the individual employee. For instance, a given employee may be more or less attentive to a given separation artifact at different times.

Separation management and organizational value creation. Our model suggests that separation management may have significant implications for value-generating potential in organizations. OCB and OMB have been repeatedly associated with constructive and destructive consequences. These behaviors translate rather directly into implications for organizational value creation; knowledge sharing (an example of OCB) has positive value-creation implications, while physical sabotage (an example of OMB) has negative implications. By clarifying the role of separation management, and individual and organizational contingencies in triggering these work behaviors, we significantly improve the understanding of the value-generating potential of the management of separation in organizations and, more generally, the strategic use of physical structures. However, much remains to be done to improve our understanding of this potential. Overall, the exact linkages between OCB and OMB and organizational value creation need to be more fully theorized before a satisfactory understanding of the relationship between separation management and organizational value creation can be derived.

Organizational heterogeneity. If such an enhanced understanding can be achieved, a next step would be to nuance the understanding of the organizations in which separation management is practiced. Is the relation between separation management and organizational value creation influenced by the kind of organization in which separation management is implemented? Organizations differ along multiple dimensions, and it may be hypothesized that, for example, the age and industry dimensions are highly relevant moderators of the relation between separation management and organizational value creation. In other words, variance in age and industry

introduce variance in roles, status hierarchies, how authority and expertise are linked, and a host of other dimensions that are highly relevant to our understanding of the organizational ramifications of distance tools.

Short- versus long-term effects of separation. Although control and competence affirmation are distinct and mutually exclusive psychological states (Gagné & Deci, 2005), they are not necessarily stable across time. Thus, employees may experience a shift in their awareness of separation—perhaps when they come to better understand the narratives that accompany the introduction of separation, or when they realize that others of similar status are in the same situation within or across organizations. A discussion of these short-term and long-term effects—or, more broadly, the adoption of a dynamic approach to the analysis—seems essential to the development of our theoretical model.

Conclusion

In recent decades, separation management has become an increasingly important aspect of organizational life. We believe that the introduction of a perceptual stance supports the development of a more theoretically consistent and managerially relevant understanding of the role of physical separation in organizations. We trust that the theory developed in this paper will stimulate future explorations of this fundamental research theme.

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FIGURE 1
Separation Cues, Sensemaking, and Behavioral Consequences
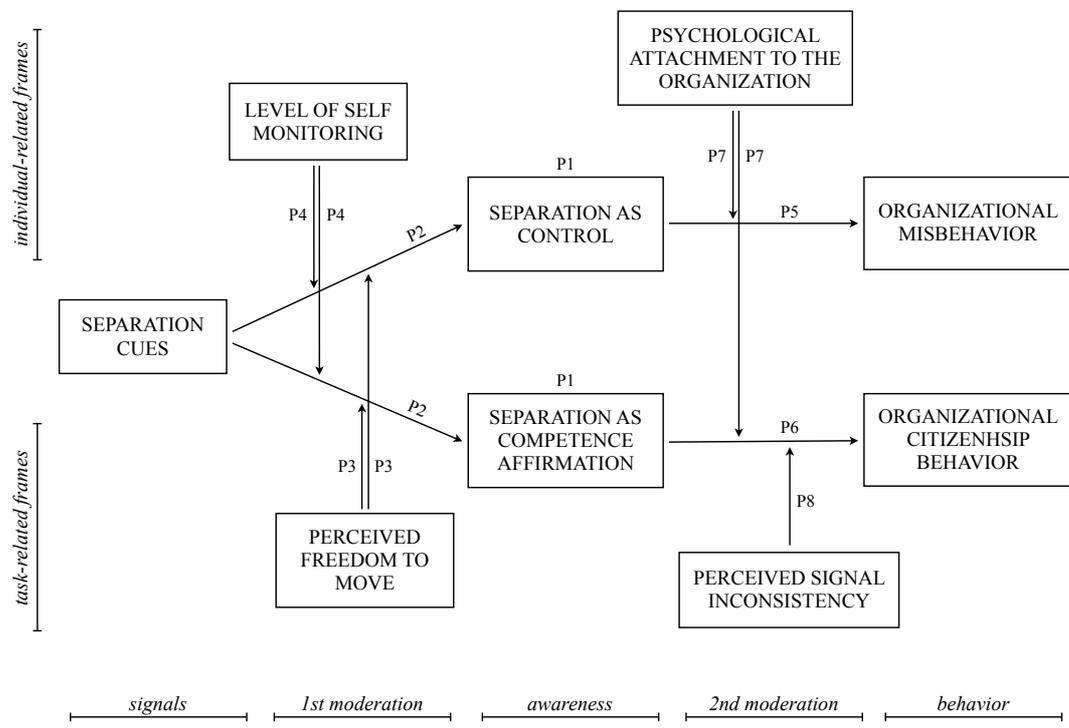
FIGURE 2
A Dimensionalization of Separation Cues

	Bottom-Up & Task-Related	Top-Down
High	**Definition**: Separation artifacts introduced in response to the employee's request, or because of standard operating procedures that "make a difference" for the employee **Impact**: Moderate separation as control *or* separation as competence affirmation	**Definition**: Separation artifacts introduced as a consequence of managerial discretion that "make a difference" for the employee **Impact**: High separation as control *or* separation as competence affirmation
Low	**Definition**: Separation artifacts introduced in response to the employee's request, or because of standard operating procedures that are realively unimportant for the employee **Impact**: Low separation as control *or* separation as competence affirmation	**Definition**: Separation artifacts introduced as a consequence of managerial discretion that are realively unimportant for the employee **Impact**: Moderate separation as control *or* separation as competence affirmation

Strength

Bottom-Up & Task-Related   *Top-Down*

Origin

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ORGANIZATIONAL DESIGN AND THE CREDIBILITY OF

DELEGATED DECISION RIGHTS

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ORGANIZATIONAL DESIGN AND THE CREDIBILITY OF

DELEGATED DECISION RIGHTS

Abstract

Managers delegate the right to make decisions to employees because such delegation may economize on scarce attention and may positively impact motivation, increasing organizational value creation. However, managers often renege on delegation. The withdrawal of delegated rights may have negative consequences for the motivation of organizational members. Therefore, making delegation *credible* is essential for sustaining the advantages that flow from delegation. We argue that organizational design—specifically, the internal fit between key organizational elements—plays a key role in making delegation credible. Our theory introduces a neglected incentive dimension to organizational design exercises, and sheds new light on the relation between organizational design, credible delegation, and value creation.

INTRODUCTION

Organizational research increasingly highlights the importance of human motivation in leveraging the value creation potential of human resources, and points to motivators such as reward systems and organizational structure and transparency (e.g., Bridoux, Coeurderoy & Durand, 2011; Coff, 1997; Gottschalg & Zollo, 2007; Lindenberg & Foss, 2011). Research has also long recognized that delegation of decision authority to employees can foster organizational value creation. For example, delegation facilitates efficient decision-making in changing and complex environments, economizing with scarce managerial attention (Galbraith, 1974; Jensen & Meckling, 1992; Radner, 1993). However, organizational value creation can also be fostered by delegation as a means to increase the autonomous motivation of employees (Thomas & Velthouse, 1990; Spreitzer, 1995) resulting in increased behavioural effort, persistence, helping behaviours, and problem-solving (Gagné & Deci, 2005; Ryan & Deci, 2000; Weinstein & Ryan, 2010).

The key question we raise and address is: What is the contribution of organizational design to create and sustain such motivation-based value creation? In posing this question, we link up with a tradition of research on employee participation, involvement, and empowerment which has long recognized that the formal organization can be designed to motivate employees by empowering them or granting them decision authority (e.g., Harley, 1999; Labianca, Gray & Brass; 2000; Liao, Toya, Lepak & Hong, 2009). The contribution of our research lies in proffering different, and more oblique, reasons why specific configurations of organizational coordination mechanisms and organizational design matter for employee motivation and, hence, overall value creation.

The basic idea is the following. When employees are delegated discretion they have the formal rights to choose which actions they prefer within specified limits. Delegation of discretion fosters feelings of competence and autonomy in employees (Bénabou & Tirole, 2003; Liao et al., 2009), and

these feelings have been shown to be supportive of autonomous motivation and, in turn, value creation (Gagné & Deci, 2005; Ryan & Deci, 2000). However, in organizations delegated decision rights are loaned, but now owned (Baker, Gibbons & Murphy, 1999). Thus, employees to whom decision rights have been delegated understand that their decisions can be overruled, and that the discretion delegated to them can be reduced (Coyle-Shapiro, Jackie & Ian Kessler, 2000; Williamson, 1996). From a motivational perspective, this potentially raises problems. Autonomous motivation is highly sensitive to perceived control (Deci & Ryan, 2000; Gagné & Deci, 2005; Ryan & Deci, 2000). Employees that think that promises to delegate discretion are non-credible will fear being controlled by means of *ex post* reductions in the level of delegation, perhaps amounting to opportunistic reneging on the part of managers. A loss of autonomous motivation may be the result, leading to smaller contributions of effort and creativity in work and problem solving. For this reason, making delegated discretion credible is highly important to sustained value creation through delegation.

The question therefore is: How can (promises to respect) delegation of discretion be made credible? That is, how can managers make it credible to employees that they will not renege on agreements to delegate discretion to those employees? Clearly, employees may have different levels of discretion across industries and organizations because distinct environmental circumstances differentially determine the level of discretion that can be delegated (Carpenter & Golden, 1997; Hambrick & Abrahamson, 1995). However, while the relation between organizational design and delegation has been widely discussed in contingency theories of organizations (Burns & Stalker, 1961; Woodward, 1965; Lawrence & Lorsch, 1967; Thompson, 1967; Mintzberg, 1983; Galbraith, 1974, 1977, 1995; Grandori 2001), little is known about the relation between organizational design and the credibility of delegation. This silence is problematic because lacking understanding of how

organizational design contributes to credible delegation of discretion deprives managers of an important instrument for protecting employee motivation that foster value creation.

We focus on cross-level influences of organizational systems (organizational design) on individual employee perceptions and behaviours associated with motivation. A key argument in contingency theory is that there is a positive relationship between organizational performance and fit configurations of organizational elements (e.g. Child, 1975; Galbraith 1977). We consider issues of credibility and delegation through multiple lenses (Okhuysen & Bonardi, 2011), and generate hypothesis regarding the fit between key organizational elements (i.e., organizational structure, coordination mechanisms, and contingencies) that reduce the probability of managerial intervention, and hence increase the credibility of delegated discretion, and in turn value creation.

In building our argument, we rely on related streams of literature. Classical contributions to the contingency theory of organizational design supply the fundamental understanding of the fit that must be created between an organization's need to coordinate the work of employees, the particular coordination mechanisms in use, the extent to which employees will be delegated discretion in the way they carry out their job functions, and the structure of the organization (Burton & Obel 1988, 2004; Galbraith, 1974, 1995; Hinnings, 1993; Lawrence & Lorsch, 1967; Meyer, Tsui &; Mintzberg, 1983; Thompson, 1967; Van de Ven & Drazin, 1985). Organizational economics offers a basic framing of the notion of credible delegation (Baker et al., 1999). Organizational behaviour research provides insights on the relation between psychological factors, work motivation, and employee effort (Gagné & Deci, 2005; Osterloh & Frey, 2000; Ryan & Deci, 2000; Rousseau, 1989). Figure 1 depicts the model of credible delegation that we propose in this article.

Insert Figure 1 here

DELEGATION, MOTIVATION, AND VALUE CREATION:

THE PROBLEM OF CREDIBILITY

Delegation of Discretion

Specialization in an organization is naturally accompanied by some degree of delegation—that is, empowering one person to act on behalf of another (Sengul, Gimeno & Dial, 2012)—because any organizational division of labour must imply the delegation of rights to use or commit organizational resources. While organizations always increase delegation when they increase specialization, they do not necessarily increase *delegation of discretion* (Caza, 2012). Organizations can delegate well-defined activities that leave hardly any discretion to employees. Thus, in principle, a completely standardized job where all the tasks are exhaustively described would imply delegation but not delegation of discretion, as in Taylorist work practices (Littler, 1978). Usually, however, more delegation implies more discretion. In sum, delegation of discretion obtains when a set of choices are left to the employee.

Two distinct theoretical perspectives—namely, contingency theory and organizational economics—offer important insights on the determinants of the discretion that is delegated to employees in organizations. Contingency theory suggests that the amount of discretion that is delegated to employees who carry out the primary functions of the firm (employees at the work flow level) is affected by the job design. For example, increasing the number of tasks in a job over which the employee can exercise discretion sacrifices specialization advantages (Blau, 1970, 1972; Mintzberg, 1983). Moreover, at the work flow level there may be no discretionary choice to make because of characteristics of the production technology (e.g., highly routine technology or highly automated work processes) (Perrow, 1967; Edwards, 1979). In short, discretion may be constrained by the very nature of the technology itself.

In addition to such fundamental factors—which are likely to be industry- and organization-specific—knowledge conditions play a key role. Thus, if an employee possesses superior knowledge, this speaks in favour of delegating decision rights to her, because she (and not the manager) will have the right knowledge about which action should optimally be taken in response to a contingency (Aghion & Tirole, 1997; Jensen & Meckling, 1992). In principle, knowledge can be communicated from the employee to the manager (divisional management, corporate headquarters, etc.), but at a cost. Part of the cost is the slowing down of decision-making that such communication inevitably implies (Casson, 1994; Radner, 1993). Thus, a classic argument in favour of delegating discretion is the high costs of making centralized decisions when a firm is facing an environment characterized by rapid and unpredictable changes (Burns & Stalker, 1961; Casson, 1994; Galbraith, 1977; Lawrence & Lorsch, 1967). The costs of transmitting information within the hierarchy, the risk of managerial overload, and the losses from lagging decision-making may become prohibitive in dynamic environments. Knowledge and information may be utilized more efficiently by letting those who possess the relevant local information make the local decisions (Jensen & Meckling, 1992).

Finally, delegation is affected by the degree of decentralization in organizations. The decentralization dimension is an important structural characteristic of organizations, which according to contingency theory depends on the size of the organization and the complexity and uncertainty of the environment (e.g., Lawrence & Lorsch, 1967). We argue that decentralization of decisions is a necessary but not sufficient condition for delegation of discretion. Whether decentralization also means delegation of discretion to employees depends on how tasks are *coordinated* at the work-flow level.

Extant research suggests several classifications of coordination mechanism (e.g., Astley, 1985; Grandori, 2001; Thompson, 1967; Van De Ven, Delbecq & Koening, 1976). However, we rely on Mintzberg (1983) who distinguishes between mutual adjustment, direct supervision, standardization of

work processes through planning, standardization of output by means of goals, and standardization of skills. Some coordination mechanisms allow for more delegation of discretion to employees than do others. For example, direct supervision, or tight planning, are consistent with little delegation of discretion. On the other hand, the use of broadly defined rules supplemented by goals and mutual adjustment allows for more delegation of discretion. Rules and regulation circumscribe employee discretion by defining legitimate boundaries of decision-making responsibility (Perrow, 1967), while goals substitute detailed descriptions of tasks or personal direction with control of the output of that task, leaving it up to the employee how to carry out the task (Astley, 1985). Finally mutual adjustment represents a delegation of discretion to those employees who hold important complementary knowledge and information allowing employees to directly consult one another and make a decision rather than confer the decision to a superior (Casson, 1994; Mintzberg, 1983). In sum, goal planning and mutual adjustment are the coordination mechanisms that allow for the highest level of delegation of discretion.

These coordination mechanisms vary with respect to the level of formalization—that is, the extent to which they are codified—leaving more or less discretion to the direct supervisors or to the administrative staff of the entire organization. For example, direct supervision, which is among the least formalized type of coordination mechanism, may be carried out on a discretionary basis by a supervisor but tends to leave little discretion to employees. Work planning is likely to be a highly formalized coordination mechanism, which leaves little room for discretion to either supervisors or employees, whereas goal planning may also be formalized but allows for much discretion to be delegated to employees and/or supervisors. Thus, the extent to which a coordination mechanism is formalized does not by itself indicate if it allows for discretion at the work-flow level. However, as we shall argue later, formalization may impact on the credibility in the delegation of discretion.

Costs of Delegation

Along with its positive implications, delegation of discretion comes with costs. For example, Jensen and Meckling (1992) postulate that organization-level costs caused by the agency problem positively depends on the degree of delegation in a firm. Agency costs rise to the extent that employees who are given more freedom also reduce the level of effort they choose or because they choose the wrong activities. Additional costs of delegated discretion include costs stemming from reduced coordination of interdependencies within the organization (Galbraith, 1974). The need for coordination—that is, a reciprocal modification of behaviour among members of an organization (Grandori, 2001)—arises because there are interdependencies between activities and actions of organizational members. For instance, interdependencies emerge when decisions call for the use of knowledge possessed by different members of the organization, when organizational members carry out work activities that are physically interconnected, and when there are complementarities among the effort levels exerted by organization members. Increased delegation of discretion may result in coordination problems, such as product cannibalization, actions that are out of sync with the actions of other employees (Roberts, 2004), overuse of common pool resources (Vining, 2003), and, more generally, reduced flexibility (Sengul et al., 2011).

Delegation of discretion makes sense as long as the organizational benefits in terms of increased and/or improved use of local knowledge and improvements in employee motivation exceed the costs in terms of agency costs, coordination costs, and costs resulting from attempts to remedy these problems. Thus, the efficient amount of delegation in a firm is determined where the (discounted) marginal costs are balanced against (discounted) marginal benefits of delegation of discretion.

Delegation of Discretion, Autonomous Motivation, and Value Creation

Discretion may be delegated for motivational reasons (e.g., Conger & Kanungo, 1988; Liao et al., 2009; Sliwka, 2001). Self-determination theory highlights that motivation differs in kind (and not just intensity), depending on its degree of autonomy (Deci & Ryan, 2000; Gagné & Deci, 2005; Ryan & Deci, 2000). Autonomously motivated agents perceive themselves as originators of their behaviour. That is, what gives rise to the behavioural effort of an autonomously motivated agent (i.e., her perceived locus of causality) is internal. For this reason, autonomously driven behaviours tend to be self-endorsed and consistent with personal values and attitudes (Weinstein & Ryan, 2010). On the other hand, controlled motivation comes with an externally perceived locus of causality, and an agent that is motivated in a controlled way does not feel as the originator of her behaviour, but rather feels pressured to engage in it (Deci & Ryan, 1985). Autonomous motivation is highly sensitive to external stimulations. Specifically, it can be disrupted by more or less overt manifestations of control such as extrinsic rewards and deadlines (Amabile, DeJong & Lepper, 1976; Deci, Koestner & Ryan, 1999; Frey & Oberholzer-Gee, 1997). Similarly, autonomous motivation can be stimulated and maintained by signals of trustiness and competence affirmation (Deci & Ryan, 2000).

Delegation of discretion stimulates an employee's (perceived) personal efficacy. By delegating discretion, the manager demonstrates his confidence in the employee—that is, he shows that he regards the employee to be competent and trustworthy enough to give her the right to make her own decisions and choices (Bénabou & Tirole, 2003; Liao et al., 2009). Perceptions of autonomy and competence affirmation are the main determinants of the emergence of autonomous motivation (Ryan & Deci, 2000). Autonomous motivation, in turn, makes it more likely that the employee exerts effort. Specifically, autonomous motivation has been repeatedly shown to be conducive to higher interest, confidence, excitement and, in turn, creativity, persistence, effort, general well-being, and, ultimately, performance

(Deci & Ryan, 2000; Gagné & Deci, 2005). This relation has been shown to be particularly significant in the context of complex tasks that require creativity in problem-solving and in the context of certain types of sharing behaviours, such as knowledge sharing (Baron & Kreps, 1999; Hill & Amabile 1993; Osterloh & Frey, 2000). It is consistent with research that argues that delegation of discretion is a strategic tool that triggers behaviours that benefit the organization (Finkelstein & Hambrick, 1990; Sengul et al., 2011).

Managerial Intervention

Managerial intervention can be directed both at increasing and reducing delegated discretion. Given the positive effect of delegation of discretion on autonomous motivation (and motivation-driven value creation), however, we are here concerned with those managerial acts that *reduce* the discretion that is delegated to an employee—that is, with those acts that may compromise employees' autonomous motivation. Such intervention may take two forms. First, it can amount to overruling employee decisions that have been made on the basis of delegated decision rights. Second, it can be a matter of reducing the level of discretion that is delegated to employees—for example, by substituting or complementing mutual adjustment and goal planning with direct supervision or detailed work plans. Both types of intervention are effectively instances of reneging on an implicit contract to delegate discretion.

Managerial intervention has been classified as taking place for "good causes" or for "bad causes" (Williamson, 1996). The former refers to intervention that is intended to benefit the organization. For instance, intervention may be exercised in an attempt to eliminate or reduce the costs that may arise from coordination failures (Foss, 2001; Malmgren, 1961). The latter refers to harmful sub-goal pursuit (Williamson, 1993). While relatively clear-cut in practice, it may often be difficult to place actual managerial practice unambiguously in one of the two categories, not the least for those employees that are subject to intervention. For example, managers may delegate substantial discretion to employees in

an attempt to rejuvenate the organization. Employees, happy with their new increased discretion, come up with profit-improving ideas, and many of these ideas are implemented. Management then decides that the organization is now fully occupied with implementing the ideas. As a consequence, the level of delegated discretion is reduced, because the need for costly idea-generation is smaller. We will argue that both "good" and "bad" intervention (cf. Williamson, 1996) introduces a problem of credibility regarding delegated discretion.

Credible Delegation

Organizational economics (Aghion & Tirole, 1997; Baker et al., 1999; Milgrom, 1988; Miller, 1992; Williamson, 1985, 1993) suggests a basic framing of the issue of credible delegation. Consider, for example, Baker et al.'s (1999) game theoretic framing. In their model, delegation of discretion gives employees the informal right to search for and initiate projects (i.e., any activity to which decisions rights may be allocated). Delegation of discretion is "informal" in the sense that the formal right to ratify remains in the hands of the manager, and cannot be allocated to the employee through a court-enforceable contract. The effort that an employee will expend on searching for and starting projects depends on his expected benefits. These benefits are influenced by the probability of being overruled. Whether overruling takes place depends on the value that employees and managers place on their reputation and on what the manager knows about the projects. Thus, the manager may have all information necessary to ratify a project, but may still decide to delegate discretion to employees, even if this is not always in the best interests of the manager (or the firm). If this promise is believed, it induces superior effort on the part of the employee with respect to searching for and starting projects. The snag, however, is that while the benefits of increased search may outweigh the costs of bad projects, the manager has the information to assess a particular project, and may be "tempted to renege on the promise by rejecting a project that is not in her (or the firm's) interest" (Baker et al., 1999: 57). In sum,

credible delegation obtains when it is a dominant strategy for a manager not to intervene in the discretion that she has delegated to the employee, and the employee knows it.

Motivational Implications of Credible Delegation

By delegating decision rights, managers strengthen employees' autonomous motivation. However, this type of motivation is easily disrupted. Specifically, perceived control has been repeatedly shown to "crowd out" autonomous motivation (Deci, Eghrari, Patrick & Leone, 1994; Frey & Jegen, 2001; Frey & Oberholzer-Gee, 1997; Grolnic & Ryan, 1989). For instance, managers may substitute broadly defined goals with a more obtrusive type of coordination mechanism such as direct supervision, thus reducing employees' delegated discretion. Reductions in an employee's delegated discretion may increase his perception of being controlled, and similarly reduce his perceived autonomy. Thus, low perceived credibility regarding delegated discretion—that is, an employee's perception that the manager may, in fact, renege on promises to delegate discretion—will (negatively) moderate the positive influence of delegation of discretion on autonomous motivation.

Much research evidence supports this line of thought. For instance, Heath et al. (1993) argue that employees develop implicit and explicit expectations to the contract governing the relationship, and particularly to the benefits that they believe they deserve under the implicit contract—that is, their "entitlements." In general, negative motivational consequences can be expected to follow from managerial intervention that interferes with employee entitlements. As the discretion that is delegated to employees becomes part of their perceived entitlements, reneging on delegation is arguably an instance of such interference. Similar conclusions may be derived from the literature on psychological contracts, which also predicts negative motivational effects of managerial intervention that is perceived as being unfair, arbitrary, and that in other ways breaks with established psychological or implicit contracts. For example, Rousseau and Parks (1993: 36) argue that "contract violation erodes trust [and] undermines the

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employment relationship yielding lower employee contributions (e.g., performance and attendance) and lower employer investments (e.g., retention, promotion)." Empirical work has reached similar conclusions (Foss, 2003; Robinson, 1996). In sum, serious organizational harm may be caused by low credibility regarding delegation of discretion to the extent that a lack of credibility reduces the positive motivational effect of delegation on overall value creation (Labianca et al., 2000; Liao et al., 2009).

Autonomous motivation is compromised whenever managerial intervention reduces the degree of delegated discretion (Gagné & Deci, 2005). Thus, even if an employee recognizes the potential intervention as being undertaken for the sake of the organization (i.e., "good" managerial intervention; cf. Williamson, 1993, 1996), we expect that she will still suffer a loss of autonomous motivation because of the concrete reduction in her autonomy.

Given the complexity of the causal chain between delegation of discretion, credibility regarding delegation, motivation, and organizational value creation, we argue that organizations that want to foster value creation *via* delegation of discretion need to make delegation credible. In fact, it is exactly because the causal connections between intervention, motivation, and value creation are complex and unpredictable that it is crucial to make delegation credible. Assume as thought experiment that management had perfect knowledge of these connections. It would then be possible to precisely assess the motivational consequences associated with any intervention, and calculate the impact of credibility on organizational value creation. Given this, only value-increasing intervention would be performed. In fact, intervention could be "fine-tuned" to reach the maximum organizational value-creation.

However, such a "first-best" situation is in general not attainable, because of the problem of predicting the effects on employee motivation of intervention. An important implication is that at least some opportunities for value-creating intervention that would obtain in a situation of full information must be forsaken; thus, some inefficiency is unavoidable. However, while the "first-best" solution

cannot be reached, organizations may aim at reaching a "second-best" solution where intervention is reduced to a level where value creation is maximized subject to the constraints represented by motivation loss and the need for adaptability. In other words, under conditions of delegated discretion, organizations that want to maximize the motivation-driven value creation potential of delegation of discretion need to safeguard employee motivation by making delegation credible.

MAKING DELEGATION CREDIBLE THROUGH ORGANIZATIONAL DESIGN

Coordination Failure and Managerial Intervention

Managers may be defined as employees that are given decision rights to take actions that support internal coordination, that is, the consistency of internal plans and actions (Coase, 1937; Barnard 1938; Simon, 1951; Malmgren, 1961). Thus, much of the rationale of management is coordination (Mintzberg, 1973). Since managers are responsible for coordination, a likely reason for them to intervene and reduce delegated discretion are coordination failures, such as suboptimal sequencing of activities, or lack of mutual compatibility among activities.[1]

Coordination failures may be rooted in delegation of discretion. For instance, the discretion that management has delegated to a given employee may turn out to be too much (e.g., because management underestimated the extent to which discretion interferes with a need for strict scheduling) or too little (e.g., to ensure smooth adaptation to changes in internal or external contingencies). Whether this results from an initial mistake or from changing circumstances, a coordination failure is the result. In order to solve the coordination failure, the manager will likely intervene by reducing (or augmenting, but this is not problematic from a motivational perspective) the discretion delegated to the employee. This suggests that there are two important means of making delegation of discretion credible: 1) to reduce the

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[1] Clearly, managers may also intervene for other reasons, such as observing that employees lack the required skills to perform their individual tasks or do not deliver the expected effort. However, we focus on managerial intervention that is aimed at solving coordination failures, as distinct from intervention that may be aimed at solving problems driven by employee-specific behaviors.

incidence of coordination failures that may result in reductions of delegated decision rights by means of the organizational design, and 2) to increase the cost of managerial intervention aimed at reducing delegated decision rights. In the first case, delegated discretion is credible because the employee knows that intervention is unlikely to be needed. In the second case, it is credible because she knows that intervention is unlikely to be a cost-efficient strategy for the manager. We discuss both options below, after having introduced the three factors that combine with a given coordination mechanism so as to make it stable or unstable—namely, interdependencies, uncertainty, and organizational structure.

Interdependencies, Uncertainty, Organizational Structure and Coordination Mechanisms

Contingency theory broadly suggests that the effectiveness of an organization depends on the achievement of a fit between the constellation of contingency factors (such as the size of the organization, the degree of environmental and task-related uncertainty), and organizational structure variables (such as the degree of specialization, formalization and decentralization). Moreover, organizational effectiveness also depends on the internal consistency among the structural elements themselves (Mintzberg, 1979, 1983; Van de Ven & Drazin, 1985; Siggelkow, 2001).

We start from the choice of coordination mechanism, which is one of the most important system elements of organization design, and asks what constellation of contingencies and structural elements are most likely to create a fit with the coordination mechanisms that allow for a great deal of delegation of discretion to employees—that is, goal planning and mutual adjustment. These mechanisms will be stable over time when they fit with other structural elements and with the contingencies that most influence the need for coordination. Creating a fit between coordination mechanism and contingencies that influence coordination needs reduces the likelihood of coordination failures, and, in turn, managerial intervention. In sum, delegation of discretion is likely to be credible if there are stable conditions under which goal planning and mutual adjustment become the most effective coordination

mechanisms.

Among the important contingencies that influence the choice of coordination mechanism are interdependencies, uncertainty, and the structural design variable of job specialization. We discuss the relationship between coordination mechanism and each of these three factors one by one.

Interdependencies. The technology contingency has been characterized and operationalized in many different ways. For example, Woodward (1965) and the Aston Group focused on the overall system level of the organization and emphasized the transformation process itself, whereas others have focused on the work flow level and emphasized the extent to which the technology must be adapted to changes in input and required output (Bell, 1967; Hage & Aiken, 1969; Mohr 1971; Perrow, 1967). However, most research considers technology an important contingency because of the different kind of interdependencies that characterize different technologies. In turn, interdependencies in decisions and activities create a need for coordination among tasks (Mintzberg, 1983).

Thompson (1967) proffers a widely used classification of interdependencies as pooled, sequential and reciprocal. *Pooled interdependencies* occur when each task can be carried out separately and with no need for interaction between tasks. The interdependency arises only because all tasks build on a common, limited pool of resources (funds, employees, equipment, etc.). *Sequential interdependencies* imply that one task needs to be finished (or a decision taken) before another one takes place. *Reciprocal interdependencies* are characterized by the fact that two or more tasks need to adjust their efforts simultaneously and/or in similar directions. Different types of interdependencies differ with respect to the extent to which they require modifications of organizational members' behaviours. Pooled interdependencies allow for independent experimentation and learning-by-doing. With sequential interdependencies, task coordination requires sequential exchange of items or information. Finally, if there are strong complementarities between tasks as in the case of reciprocal interdependencies, only

reciprocal patterns of exchange of items and information result in coordination (Milgrom & Roberts, 1990).

Coordination mechanisms differ in their capacity to solve the coordination problems that arise from different kinds of interdependencies (Thompson, 1967; Grandori, 2001). For example, the choice between direct supervision and planning one the one hand, and the use of goal planning on the other hand depends on the extent to which coordination takes place by directing the input (actions) or by setting standards for the output (goals). One factor that influences this choice is the extent to which it is possible to define measurable goals and sub-goals in a way that ensures that employees' discretionary choices result in coordination at the task level. This is easily achieved when interdependencies are pooled, as opposed to when they are complex (i.e., they are sequential or reciprocal). In sum, the use of goal planning is more likely to be effective with pooled interdependencies.

Another factor that influences the choice of coordination mechanism is the extent to which managers have relevant knowledge of the interdependencies. Extensive work planning requires that most interdependencies are relatively well known, whereas mutual adjustment only requires that employees know whom to coordinate with. Again, the type of interdependencies influences the choice of coordination mechanism. As sequential interdependencies are more easily identified than reciprocal interdependencies, the use of work planning is more likely to be effective with sequential interdependencies whereas the use of mutual adjustment is more likely to be effective with reciprocal interdependencies. Further, interdependencies also influence the amount of interaction needed in order to achieve coordination. Limited interaction is needed with pooled interdependencies, whereas substantial high degrees of interaction are needed with reciprocal interdependencies. Thus the choice of the coordination mechanism impacts on the need for interaction. Specifically, mutual adjustment can save costs of communication of information to a supervisor. Mutual adjustment may thus be preferred

when interdependencies are reciprocal because this mechanism saves communication cost as employees adjust locally. In sum, the use of mutual adjustment is more likely to be effective with reciprocal interdependencies.

Uncertainty. Task uncertainty refers to how programmable a particular work activity is and how many exceptions the work activity must handle. Uncertainty impacts the choice of mutual adjustment and direct supervision over detailed work planning or goal planning as the latter requires low task uncertainty. When task uncertainty is low—that is, when there is full knowledge of interdependencies and all sources of variation in the work process—, a complete contingent plan could, in principle, be devised. When task uncertainty is high—in the sense that most important interdependencies among activities are not well known, and there may be many exceptions to be handled—mutual adjustment and direct supervision are the more effective coordination mechanisms. Although mutual adjustment or direct supervision may be the dominant way of adjusting tasks, these mechanisms must be complemented by an overall goal for the work to be carried out in order to give direction to the adjustment processes. In short, the use of goal planning and mutual adjustment is more likely to be effective with high levels of uncertainty.

Organizational structure. Finally, the effectiveness of specific coordination mechanisms also depends on the organizational structure as defined by the criteria for specialization and grouping of activities into units. Organizations can contain functional as well as process-based units. We speak of *functional structures* when the permanent supra-units (i.e., departments) are formed on the basis of functional criteria (e.g., marketing, production, research and development) and of *process-based structures* when the permanent supra-units are based on work flow interdependencies (e.g., a team is responsible for developing, producing and marketing a new device). The grouping of activities in either functional or process-based unit influences at what level of the organization the interdependencies

emerge (Astley, 1985).

Organizations with functional units typically have fewer interdependencies *within* units than *across* units. Thus, tight rules or narrowly defined goals tend to regulate inter-unit relations, while intra-unit coordination mechanisms tend to be characterized by high degrees of discretion. In fact, intra-unit interdependencies may be pooled, allowing for much delegation of discretion. Moreover, in accordance with what Gulick (1937) termed the "principle of homogeneity," functional units tend to reduce the degree of intra-unit diversity of skills and activities so as to foster high effectiveness in the functions.

On the other hand, in process-based units employees are grouped to contain the most complex or sequential flow interdependencies, which in turn minimizes the interdependencies among different units. Thus, with most interdependencies contained within units, each unit can set general performance goals. In other words, organizations with process-based units typically have fewer interdependencies *across* units than *within* units. As a consequence, inter-unit coordination mechanisms tend to be characterized by high degrees of discretion, while direct supervision or strict plans tend to regulate intra-unit relations, depending on the technology and task uncertainty faced by the unit.

In sum, organizations with functional units are likely to have high levels of delegated discretion in inter-unit activities, and low levels of delegated discretion in intra-unit activities. Organizations with process-based units are likely to have high levels of delegated discretion in intra-unit activities, and low levels of delegated discretion in inter-unit activities.

Finally, it is worth noting that employees in process units are more likely to be delegated discretion than employees in functional units when the unit faces high task uncertainty. The reason is that process-based units can better use mutual adjustment as a coordination mechanism because they contain the main problem-solving or work flow interdependencies (Casson, 1994).

Credible Delegation through Organizational Fit

The perspective just outlined implies that the creation of fit between those coordination mechanisms that are consistent with a high degree of delegation of discretion (i.e., goal planning and mutual adjustment) and the aforementioned contingencies and structural elements (i.e., interdependencies, uncertainty, organizational structure) requires consistency among coordination mechanisms, contingencies, and the organizational elements. We now discuss the consistency requirement for goal planning and mutual adjustment. We also discuss how skill standardization complements the use of these two coordination mechanisms.

Creating a fit for goal planning. Goals may be set in terms of the kind, quality, quantity, or some other measurable attributes of outputs. In the following we discuss the use of plans that allow employees to choose how to achieve goals (where the resources needed to fulfill the goals do not strictly limit employees' choice of actions).

The contingencies that support delegation of discretion to employees through the use of goal planning consists of a technology characterized by pooled interdependencies and task uncertainty. Task uncertainty makes it costly to specify the input needed in the work processes. Given uncertainty, goal planning is particularly consistent with delegation of discretion in organizations that are characterized by pooled interdependencies at the work flow level of the organization. This happens because—within the limits defined by the goal—employees are free to select their actions, to experiment, and learn as coordination is achieved as long as goals are met. Pooled interdependencies at the unit level depend on such factors as the scale of the technology used and the job specialization among employees. These are factors that managers can influence. When the technology can be operated by a single employee who can perform all the relevant tasks of a particular job, there will be no negative spillovers among employees as long as each of them adheres to his or her goals. Furthermore, over time employees are likely to learn how to best meet goals, and this is likely to increase the asymmetry of information

between employees and superiors. This raises managers' expected benefit from not intervening, and in turn the credibility of delegated discretion. Thus:

Proposition 1: *Delegation of discretion by means of goal planning is likely to be credible in an organization that is simultaneously characterized by pooled interdependencies and task uncertainty at the work flow level of the organization.*

When firms make extensive use of goal planning, it is important that there is congruency between both inter- and intra-unit goals, as goal incongruences create incentives for managers to intervene and change goals. For example, incongruence between a product development unit's goal of optimizing product design, and a purchase unit's goal of reducing costs may seem to require a redefinition of the goal of at least one of the units *via* managerial intervention. The incongruence appears because of the interdependency between the two units' overall performance target. In classical contingency theory, interdependencies are perceived of as given, but they may appear at different levels of the organization depending on whether the firm groups activities into functional or process-based units. Thus, a way for reducing inter-unit goal incongruence is to group activities in process-based units rather than in functional units.

Interdependency, however, is a variable that firms can influence. For example, Thompson (1967) argued that organizations influence the interdependency between the environmental and the production core by creating buffers (for example, stocks or other type of organizational slack resources). Moreover, some scholars have argued that firms can create modular organizations where interdependencies are reduced both at the unit and the system level of the organization. For example, organizations can set goal levels, create buffers, invest in small scale equipment and specify interface standards between organizational units in a way that allows unit to pursue individual goals without scarifying too much of the benefits from exploiting inter-unit synergies and scale advantages (Sanchez & Mahoney, 1996).

Many of these measures require sunk cost investments. Managers incentive to intervene in the discretion delegated to the unit level will be curbed by the presence of high sunk costs investments, and low degrees of coordination failures due to the pooled interdependencies between units (Ghemawat, 1991). The creation of pooled interdependencies at the inter-unit level is most likely to take place in process-based organizations.

In functional organizations managers' incentives to intervene can be reduced by the presence of congruency among goals of highly complementary units, so that goals cannot be changed independently of other goals. Complementarity implies that managers would need to consider many constraints in order to identify the feasible set of changes in organizational goals. This reduces the expected benefits from intervention, increasing the credibility of delegated discretion. This reasoning yields the following proposition:

> **Proposition 2**: *Delegation of discretion by means of goal planning is more credible in organizations with process-based structures where inter-unit interdependencies are pooled, or in organizations with functional structures where inter-unit interdependencies are characterized by strong complementarities among congruent goals.*

> ***Creating a fit for mutual adjustment.*** Mutual adjustment is a coordination mechanism where employees consult one another before making a decision on actions, or resource commitments. For example, employees may search for new projects or evaluate projects based on a joint set of criteria. This differs from direct supervision, where employees communicate their information or decision criteria to a manger who decides on actions or resource commitments (Casson, 1994; Mintzberg, 1983). Clearly, mutual adjustment leads to higher levels of delegation of discretion precisely because employees are left to autonomously decide, or search for new projects. Similar to goal planning, mutual adjustment can imply more or less discretion to employees—for example, employees can be delegated

rights to make decisions only on a very narrow and well-defined set of activities, or their decisions may be limited by lack of access to resources. In the following, we discuss mutual adjustment where employees have a real choice of actions.

The contingencies that support delegation of discretion to employees through mutual adjustment consists of a technology characterized by reciprocal interdependencies and task uncertainty. Given task uncertainty, mutual adjustment is particularly likely to support delegation of discretion in organizations where reciprocal interdependencies at the work flow level of the organization creates informational asymmetries with supervisors. Managers can create those conditions by defining jobs in ways that make coordination contingent on the information possessed by more than one person—that is, by creating reciprocal interdependencies.

Managers may be tempted to substitute mutual adjustment with direct supervision if they believe they have more decision-relevant knowledge and know more about the relevant interdependencies. At the unit level it is possible to create informational and knowledge distances between managers and employees through staffing processes (e.g., selecting supervisors without relevant knowledge and low degrees of experience with the work activities of the unit). Moreover, the implementation of mutual adjustment as a coordination mechanism is likely to result in increased information asymmetry between managers and employees as employees learn about the important work-flow interdependencies through their direct involvement in the coordination processes. Informational overload due to reciprocal interdependencies and lack of relevant knowledge raises managers' expected benefit from not substituting mutual adjustment with direct supervision. This increases the credibility of delegated discretion. Thus:

Proposition 3: *Delegation of discretion by means of mutual adjustment is likely to be credible in an organization that is simultaneously characterized by reciprocal interdependencies and task uncertainty at the work-flow level of the organization.*

Mutual adjustment processes are notoriously costly in terms of time and sacrificed specialization in decisions (Miller, 1992). These costs may be reduced by adopting a process-based structure, where departments are based on workflow interdependencies (as opposed to functional criteria). Such a structure, in fact, reduces employee search costs to the extent that information and/or workflow interdependencies are contained within relatively small units. Mutual adjustment is also eased when organization use standardization of skills as a coordination mechanisms within a unit because coordination among employees with same knowledge and training is eased.

At the system level, managers' knowledge of interdependencies among units may create a temptation to either overrule decision at the unit level, or to directly supervise that unit. Thus, mutual adjustment at the unit level is credible when inter-unit interdependencies are pooled, such that system knowledge becomes less important. Again, this condition is most easily met in organizations with a process-based structure. If all the relevant interdependencies cannot be contained within units, the basic organizational structure can be supplemented with lateral relationships such as temporary teams with members from different units who are responsible for solving inter-unit coordination problems. When such teams (or other forms of lateral coordination mechanisms) are set up, they make it less costly to make use of mutual adjustment processes among units. Implementing a process organization and setting up lateral coordination mechanisms, represent large sunk costs investments. Again, large sunk cost investments create a situation in which mutual adjustment is the preferred coordination mechanism, making delegated discretion credible.

Proposition 4: *Delegation of discretion by means of mutual adjustment is likely to be credible in organizations with process-based structures with pooled interdependencies at the system level, or where interdependencies are handled through formal lateral coordination mechanisms among units.*

Credible Delegation Through Increased Costs of Intervention

As suggested earlier, delegation of discretion can also be made credible by simply increasing managers' costs of intervention. Of relevance here are specific decision procedures and information structures. These design variables are to some extent complementary to the choice of organization structure and coordination mechanism, because the efficiency with which they can be utilized depends on these factors.

Formal decision procedures. Defining formal decision procedures that allow employees to influence decisions can be an important means of supporting credible delegation of discretion. For instance, creating formal *liaison* roles, committees and procedures that allow employees to influence the planning and control processes (Milgrom, 1988) may make decisions to be considered legitimate by the employees because they are seen as procedurally just. To the extent that employees care about procedural justice, it becomes more costly for managers to circumvent these processes in order to implement new projects—that is to overrule or renege on delegated decision rights. This reduces the managers' incentives to intervene. In other words:

Proposition 5: *The more an organization makes use of formal decision procedures that involve employees in decisions, the more delegation of discretion is likely to be credible.*

Informational distance. Managers' information about the need for coordination and about the solution to coordination problems is also a factor that influences their incentives to intervene. In other words, the design of the information and reporting procedures in the organization impacts on the

managerial perceived need for intervention. Reporting systems can be designed to create informational distance between managers and the employees to whom discretion has been delegated. If, because of informational distance, a manager is not in a position to rationally decide whether to overrule or not, he will likely not overrule (Aghion & Tirole, 1997). Informational distance can be created by having reporting systems that only allow managers to gain access to limited information, by having information pass multiple hierarchical layers, or by increasing the span of control (i.e., the number of employees in a unit for which a unit manager is responsible). If the span of control is sufficiently large, detailed supervision will create a heavy work overload for the manager. This is particularly so when there are intensive interdependencies within the unit, many different specialities, and where each member of the unit carries out different activities (Galbraith, 1995). These are the same conditions under which mutual adjustment processes are effective in achieving coordination. Thus, under such conditions credible delegation of discretion is reinforced by informational distance.

Proposition 6: *The more an organization has created a large informational distance in the hierarchy the more delegation of discretion is likely to be credible.*

CONCLUDING DISCUSSION

Autonomous motivation is a fundamental determinant of value creation that can emerge from the delegation of decision rights to employees. This type of motivation, however, is fragile, and needs to be protected by adding credibility to delegated discretion. Thus, the very fact of giving credibility to delegated discretion represents an additional source of value creation that applies under conditions of delegated discretion. The strategic effects of credible delegation are very relevant for both theory and practice. Many strategically important decisions are taken by employees to whom decision rights have been delegated. By focusing specifically on organizational-level determinants of credible discretion, we

developed novel theory on how organizations are to be designed so as to give credibility to delegated decision rights, and in turn foster value creation.

Our analysis proceeded through three different stages. First, we explained why delegation of discretion fosters employee autonomous motivation, and in turn value creation. Second, we clarified the idea of credible delegation of discretion, and conceptualized credibility as a fundamental moderator of the relation between delegation of discretion and autonomous motivation. Third, we theorized that particular constellations of contingencies and organizational structural variables give credibility to delegated discretion. We close by discussing our model's contributions, implications, and potential future developments.

Contribution to Theory

This article contributes to management research in a number of ways. Our main contribution is to indicate that by designing organizations in specific ways, management can foster value creation by making the promise of delegation look credible to the eyes of the employee. We focused on managerial reneging on promises, and on how the temptation to renege can be controlled, preserving employee motivation. Research suggests that it is inherent in the nature of firm organization that a promise to delegate discretion from managers to employees is not in itself credible (Baker et al., 1999; Williamson, 1996). For this reason firms that want to protect employee motivation ought to be designed in ways that add credibility to the promise to delegate discretion.

Second, the analysis in this article implies that in general, some of the opportunities for value-creating intervention that would obtain in a situation of full information must be forsaken, because the effects of managerial intervention on employee motivation are partly unpredictable. The resulting hands-off recommendation implies that inefficiencies are unavoidable, and this adds a new dimension to Williamson's (1985, 1996) argument that efficient "selective intervention" is in general not attainable.

Third, Baker et al. (1999) analyze credible delegation in terms of self-enforcing, relational contracts. However, their treatment is very abstract. In particular, it is not obvious to which organizational phenomena such contracts relate, and how they can be influenced by managers. In this article we proffer two alternative, and arguably more operational ways of making delegation of discretion credible. The first one is to create a stable configuration of coordination mechanisms, contingencies, and organization structure. Such a configuration reduces coordination failure in the organization, and diminishes the incentives of managers to intervene. The second one is to choose design variables such as information structure, and decision procedures so that the managerial cost of (and resistance of employees to) intervention is increased. All in all, our research provides concrete indications of how firms can manipulate organizational design variables so as to reduce the negative externalities and increase the benefits to the firm of employee discretionary activities.

Limitations and Future Research

Individual-specific factors and perceived discretion. For simplicity, we decided not to include individual-specific factors in our model. Consistently, and in line with self-determination theory (Gagné & Deci, 2005), we argued that any constraints placed on an employee's discretion lessen her autonomous motivation. However, research suggests that subject-specific, and situational characteristics may interact to affect the discretion that employees perceive themselves to possess (Carpenter & Golden, 1997). Furthermore, some employees may actually want or need some form of boundary on their discretion—e.g., so that they can clearly define their work roles, appropriately structure their daily activities, or establish an identity at work. Such arguments are prevalent in role theory, and in work on empowerment climates—a key dimension of which has been defined as "autonomy through boundaries" (Seibert, Silver & Randolph, 2004). This suggests that—under person- and context-specific circumstances—some degree of managerial intervention might be harmless, or even appropriate relative

to motivation. For instance, employees who do not perceive that they have discretion in the first place (regardless of what their managers or the organization might say) cannot feel that it has been overruled (although they might be unhappy that they have never been given any discretion). Those who believe they have, and should have substantial discretion will be more sensitive to that discretion being overruled. Future research should incorporate an analysis of how much discretion specific employees may expect, and how they differentially interpret that discretion and reductions in it.

Sub-domains of discretion. In line with standard empirical definition of discretion, we have treated the construct as a single domain encompassing multiple aspects of an individual's work (cf. Finkelstein & Boyd, 1998; Karasek, 1979; Morgeson, Delaney-Klinger & Hemmingway, 2005; Spreitzer, 1995). Recent research, however, suggests that specific sub-domains of discretion—i.e., specific aspects of work with respect to which an employee may have discretion, such as effort, goals, staffing, etc.—may have unique relationships with some antecedents and consequences, and should thus be distinguished (Caza, 2012). Consequently, our model may be further developed by considering whether organizational design differentially impacts on the credibility of specific subdomains of discretion.

The process perspective. This work is not a comprehensive analysis of all relevant aspects of making delegation of discretion credible. Our focus has been on some salient characteristics of an organization in which delegated discretion is credible. In contrast, the process by which an organization reaches such a state—including issues of management rhetoric and how employees perceive the process of persuasion they are subject to—has been suppressed. A limitation is that we have neglected the *way* in which an intervention is motivated and communicated to employees. Instead of refraining from intervention, it is conceivable that managers can motivate and communicate an act of intervention to employees in such a manner that loss of motivation may be lessened.

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This notwithstanding, our model has also implications for a process perspective. The analysis implies that, when firms make delegation credible at a certain level of the organization, it becomes much more costly for managers at higher levels to reallocate discretion to different levels. This has implications for the ability of firms to react to changes in their environment. For example, sudden changes in the environment may call for top-down coordination of many activities simultaneously. When discretion has been made credible at low levels of the organization, firms will not only loose motivation from such top down coordination, they will also face high costs in terms of, for example, greater employee resistance to the intervention, costs of re-designing the organization, etc. Similarly, the analysis here also harmonizes with process analyses of the growth strategies of firms in terms of engaging in mergers and acquisitions. Often, firms need to make great alterations in business practices and in organizational structure in order to realize the potential synergies in mergers and acquisitions. Firms that have invested in making delegation credible may find it more costly to engage in such activities.

Empirical work. There is as yet no empirical work on the model that we have presented. However, empirical evidence speaks to some of the causal mechanisms we have postulated. For example, there is evidence for the negative impact that managerial intervention has on employee motivation (Robinson, 1996; Rousseau, 1989). The perhaps most directly relevant empirical work is Foss et al. (2006). They show that delegation improves motivation, that managerial intervention harms overall firm performance, but that mechanisms such as managers staking their personal reputation, employees controlling important assets and strong trade unions can keep managerial proclivities to intervene at bay. However, they concentrate less on organizational design. We take this to be first indications that the line of inquiry that has been pursued in this article is a promising one.

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FIGURE 1

Making Delagation Credible *via* Organizational Design

200
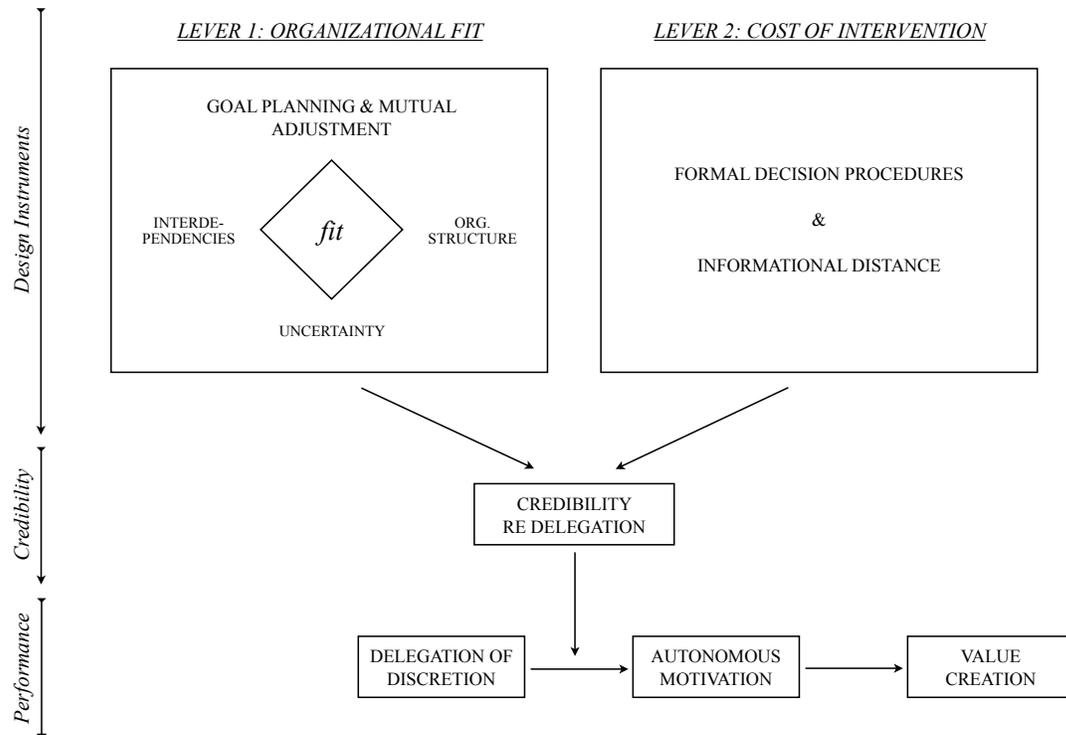
NETWORK SIZE AND PROSOCIAL BEHAVIOR:

TAKING BOUNDED RATIONALITY INTO ACCOUNT

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NETWORK SIZE AND PROSOCIAL BEHAVIOR:

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Abstract

We combine structural and psychological perspectives on prosocial behaviors in organizations. Employees are expected to be more likely to engage in prosocial organizational behaviors if they have a large social network that gets them in contact with several colleagues. However, drawing on bounded rationality arguments, we argue that this effect depends on the focal employee's ability to focus and concentrate in the workplace, and thereby give attention to the need for prosocial action. Data from 69 employees in a single firm suggest that the interaction between egocentric network size and attention has a significant and positive effect on employees' engagement in prosocial organizational behaviors.

INTRODUCTION

Within an organization, employees can decide to engage in behaviors that are intended to help or benefit other employees, groups of employees, or the entire organization. Prosocial organizational behaviors—such as helping colleagues, donating, cooperating, volunteering, or showing loyalty to the organization—are crucially important for the organization's effective functioning. Such behaviors are clearly desirable, but often cannot be called forth by overt means, such as rewards. Specifically, prosocial organizational behaviors are associated with higher job performance and satisfaction, improved interorganizational communication and coordination, and overall organizational efficiency (Brief and Motowidlo, 1986; Penner, Dovidio, Piliavin and Schroeder, 2005; Weinstein and Ryan, 2010). Yet, prosocial organizational behaviors are discretionary, are normally not triggered by formal extrinsic incentives and motivators, and are mostly unrecognized by formal evaluations systems (Frey and Jegen, 2001; Gagné, 2003; Weinstein and Ryan, 2010).

Prior research has suggested that employees' engagement in prosocial organizational behaviors is partly determined by structural factors that characterize the informal organization. Specifically, a large egocentric network enables the focal individual to access numerous others (Freeman, 1979; Tsai, 2000; Wasserman and Faust, 1994). Contact with others has been established as an important antecedent of prosocial motivation (Grant, 2007; Kilduff and Brass, 2010) and behaviors (Baer, Goldman and Juhnke, 1977; Goldman and Fordyce, 1983). In turn, employees with large egocentric networks are expected to be more likely to engage in prosocial organizational behaviors than individuals with small networks (Amato, 1990; Tong, Hung and Yuen 2011; Wilson 2000; Wilson and Musick, 1998). In other words, research considering the relational antecedents of prosocial behaviors has used specific network configurations to explain prosocial behaviors in the organizational setting.

However, this approach has drawn critique in recent contributions to network research where a given network position has been depicted as providing potential opportunities from which the focal actor may differentially benefit from depending on characteristics specific to the individual, such as her personality, motivation, or ability (Adler and Kwon, 2002; Anderson, 2008; Emirbayer and Goodwin, 1994; Kilduff and Krackhardt, 1994; Mehra, Kilduff and Brass, 2001, Reinholt, Pedersen and Foss, 2011; Stevenson and Greenberg, 2000). However, in the context of prosocial organizational behaviors, very little attention has been dedicated to researching the psychological contingencies that influence whether having a large network may, or may not result in an employee's engagement in prosocial behaviors.

Employees with a large egocentric network have many ties through which they can access information and other resources. However, bounded rational agents have limited attention resources to allocate across their many contacts and to dedicate to the behaviors they engage in (Simon, 1947; Ocasio, 1997). Thus, a large egocentric network already pushes the bounded rationality of the focal employee in terms of how many individuals she can deal with in terms of engaging in prosocial behaviors relative to those individuals. Furthermore, factors that limit the ability of an employee to concentrate on the task at hand diminish that employee's ability to engage in prosocial tasks as oppurtunities to help colleagues may go unnoticed. Therefore, while large egocentric networks may generally provide the focal employee with opportunities for conducting prosocial behaviors, this relation is moderated by the cognitive and psychological limitations that characterize boundedly rational actors.

In this research, we examine how social structuralist perspectives and psychological insights on limited attention combine to predict prosocial organizational behaviors. We consider an interaction model of the effects of attention and social network characteristics on employees' engagement in prosocial behaviors. Although large networks may allow centrally positioned

employees to engage in more prosocial behaviors, this effect is contingent on the focal employee's ability to focus in her workplace. Data from a survey of 69 employees in one single firm suggest that the interaction between network size and attention has a significant and positive effect on employees' engagement in prosocial organizational behaviors.

STRUCTURAL AND ATTENTION-BASED ANTECEDENTS OF PROSOCIAL ORGANIZATIONAL BEHAVIORS

Prosocial organizational behaviors are positive social acts that an organization member may carry out with the intention of benefitting her peers, a part of the organization, such as a team or a department, or the entire organization (Brief and Motowidlo, 1986; Penner et al., 2005). A growing literature conceptualizes the organizational context as one of network relations where employees or units are represented by nodes that are linked to one another by relational ties (e.g., Brass, Galaskiewicz, Greve and Tsai 2004; Cross and Cummings, 2004; Tsai, 2001). Research has revealed specific associations between network characteristics and several important outcomes, such as productivity (Hansen, 2002; Reagans and Zuckerman, 2001), creativity (Burt, 2004; Fleming, Mingo and Chen 2007) innovation (Tsai, 2001; Tsai and Ghoshal 1998), and job performance (Cross and Cummings, 2004). Lately, the explanatory logic that underlies network studies of organizations has been applied to the context of prosocial organizational behaviors. Different network positions link ego and alters in different ways, and this results in different opportunities to engage in prosocial behaviors. Specifically, the size of a network has been theorized and shown to be positively associated with prosocial behaviors such as volunteering (Tong et al., 2011; Wilson, 2000; Wilson and Musick, 1998), and helping (Amato 1990).

The idea that attention and rationality are bounded (Dearborn and Simon, 1958; Ocasio, 1997; Simon, 1947, 1955), however, suggests that employees are also exposed to the cognitive costs that come from having large, egocentric networks. The higher the number of ties, the higher

the amount of information transferred through those ties, and, in turn, the more the attention required for cognitively processing that information (Simon, 1947).

Combining structural and psychological perspectives on prosocial behaviors in organizations, we consider two important constructs—*actual network size* and *attention*—that both influence an employee's engagement in prosocial organizational behaviors. Actual network size (also called "degree centrality," cf. Anderson, 2008)—that is, the number of contacts of an employee in a network (Freeman, 1979; Tsai, 2000; Wasserman and Faust, 1994)—describes that employee's access to other employees, and in turn, the employee's opportunity to establish a contact with potential beneficiaries of her prosocial actions. Attention, the "focused mental engagement on a particular item of information" (Davenport and Beck, 2001: 20) is a proxy for an employee's capacity for recognizing the need for her prosocial action. Employees that occupy different positions within a network may differentially allocate attention to the need for prosocial action. In turn, they may engage in different levels of prosocial behaviors. An important reason is that employees are exposed to different levels of noise and disruption which directly influences their available attention and how it is allocated (Davies and Jones, 1975; Jones, 1990; Smith, 1991). Specifically, noise and disruption influence the attention that employees can allocate to noticing the need for prosocial action and engaging in prosocial behaviors. As a result, employees that are exposed to different levels of noise and disruption (and have different capabilities for reacting to such noise and disruption) are not equally efficient with respect to attending to the need for prosocial action, whether this need is something they figure out on their own, or something that is communicated to them by other members of their networks. Our key argument is that this will influence employees' actual prosocial organizational behaviors.

Network Size

Given the prevalence, importance, and potentially constructive implications of prosocial behaviors in organizations, prior research has investigated the drivers of such behaviors, highlighting that both individual (e.g., emphaty, neuroticism, educational level, and mood) and contextual factors (e.g., work environment, group cohesiveness, organizational climate, leadership style) may impact on employees' engagement in prosocial behaviors (Brief and Motowidlo, 1986; Weinstein and Ryan, 2010). Notably, research highlights as important predictors of prosocial behaviors the focal employee's motivational intentions (Gagné, 2003; Grant, 2007, 2008; Weinstein, and Ryan, 2010) as well as her position within the social structure (Amato, 1990; Tong et al., 2011; Wilson, 2000; Wilson and Musick, 1998). According to the network perspective, different network structures link actors in different ways, and this provides them with different opportunities to engage in prosocial behaviors (Amato, 1990; Tong, et al. 2011).

The size of an employee's network is a widely researched structural characteristic (Sparrowe, Liden and Kraimer, 2001). The actors that, because of their network position, have privileged access to information (Wasserman and Faust, 1994) are often argued to be the most prominent and active ones in the network, and to represent major channels of information. Employees that occupy central network positions and have many ties—that is, those that have large egocentric networks (Wasserman and Faust, 1994)—are in "the thick of things" and are focal points of communication (Freeman, 1979). *Actual network size*, also called "degree centrality," counts the number of contacts that an actor has (Anderson, 2008; Freeman, 1979).

Because of her many network ties, a centrally located employee with a large network (high degree centrality) has a substantially higher degree of contact with her coworkers than an employee with a small network (low degree centrality). Research highlights that providing an employee with contact with the beneficiaries of her work strengthens that employee's prosocial attitudes and behaviors (Baer et al., 1977, Goldman and Fordyce, 1983; Grant, 2007; Grant et al., 2007; Guéguen

and Fisher-Lokou, 2003). Building on this logic, research has proposed actual network size as an important predictor of prosocial behavior. Employees that have access to several others have more opportunities for both establishing contact with coworkers, and for recognizing the need for prosocial interventions. Since contact is an important driver of prosocial action, and large egocentric networks provide the focal employee with more contact with coworkers, employees with large egocentric networks are more likely to engage in prosocial organizational behaviors than employees with small networks (Amato, 1990; Tong et al., 2011; Wilson, 2000; Wilson and Musick, 1998; cf. Reinholt et al., 2011).

Attention

Organizational actors also differ in their ability to attend to relevant stimuli that originate from external sources. Attention is not in unlimited supply, and boundedly rational actors can only allocate a certain amount of attention to a certain number of activities (Ocasio, 2007). As Simon observes, information "consumes the attention of its recipients" (1971: 40, 1947, 1955). Thus, overabundance of information tends to be associated with overall scarcity of attention. Further, limited attention hinders accurate information processing (Ocasio, 1997; Simon, 1955). Centrally positioned employees with large networks are exposed to high volumes of information. As a result, it is particularly important for employees with large egocentric networks to avoid factors that may weaken their ability to attentively process the information that flows through their many network ties.

Individual attention is influenced by a firm's activities and procedures (March and Olsen, 1976; Ocasio, 1997). Thus, aside from differences due to person-specific capabilities, an employee's attention is determined by environmental contingencies, and channeled by the organization's socio-cultural structures (Cialdini, Reno and Kallgren 1990; Fiske and Taylor, 1991; Ocasio, 1997). Specifically, instances of environmental disturbance in the workplace such as noise

or disruption have been shown to negatively influence attentional ability, and in turn performance (Boggs and Simon, 1968; Davies and Jones, 1975; Jones, 1990; Smith, 1991).

Interaction between Network Size and Attention

The above arguments indicate that attention moderates the relation between actual network size (degree centrality) and prosocial behavior. Although high degree centrality provides the focal actor with contact with, and information about several others, its impact on that actor's engagement in prosocial behaviors depends on the extent to which she can carefully attend to, and process that information. A large egocentric network may give the focal employee access to relevant information from her coworkers, but she will likely not engage in prosocial actions if she fails to recognize a need for prosocial intervention.

When employees are high in degree centrality, their many network ties provide the opportunity to interact with many different colleagues (Burt, 1992). In order to benefit from this potentially valuable structural asset, however, the focal employee needs to be able to process the information that can originate from such a large pool of people. Employees differ in their ability to do so. Specifically, they vary in their ability to attend to information because the extent to which they can focus on tasks varies.

The more ties an employee has in her network, the more attention she needs to dedicate to the processing of the information that flows through those ties. An employee with a large egocentric network can access new information from many other employees. Some of that information may signal a need for prosocial action on the part of the focal employee. However, such a network configuration will have a positive impact on the focal employee's engagement in prosocial behavior only if that employee can accurately process the information that flows through her contacts. The interaction between actual network size and attention is thus critical to prosocial organizational behaviors. Without a simultaneous consideration of her network size and attention, an employee

with a large egocentric network may encounter a bounded-rationality driven problem where she fails to fruitfully process the information that she can access through her network. Thus, the larger the size of an employee's egocentric network, the more information sources that employee has, and the higher the attention needed to cognitively process that information to recognize the need for prosocial organizational behavior. In other words, network size and attention represent a fundamental combination of structural and psychological factors that predict high levels of prosocial behaviors in the workplace. Hence,

> **Hypothesis**: *The size of an employee's network is positively related to her engagement*
>
> *in prosocial organizational behaviors when the employee also has high attention.*

METHODS

Data Collection and Research Site

The data used in this analysis were collected in a single firm in order to keep constant external factors and firm-varying factors that might affect prosocial behaviors. This research design means that we can avoid the influence of factors like firm culture or growth, the attractiveness of the industry, etc. that might all affect prosocial behavior, as these are kept constant by design for all respondents in our study (Siggelkow, 2007). This implies that the variation we observe in prosocial behaviors can only be explained at lower level of disaggregation than the firm-level, for example, at the level of the individual, the relationship or the department.

The firm that formed the site for our data collection is FeF Chemicals, a 120 employees, highly specialized, international chemical firm that focuses on manufacturing and supply of Quaternary Ammonium Compounds (Quats) for pharmaceutical and personal care products. It is a highly vertically integrated firm that covers large parts of the value chain, including Research and Development, Quality Assurance, Regulatory Affairs, Production and Environment, and Sales and Customer Service. However, all activities are co-located on the same site. Though manufacturing,

laboratories and service activities are in separate buildings, they are placed in very close vicinity (generally, all buildings are within 3 minutes of walking distance). The close vicinity of the activities is seen as central to the firm, because it puts strong emphasis on creating the best possible conditions for promoting creativity, knowledge sharing and prosocial behaviors among employees.

The data collection was conducted in close collaboration with the firm. At the time of data collection effort (early 2012), FeF Chemical was planning a major re-organization, and was interested in learning more about the determinants of knowledge sharing, creativity and prosocial behaviors in the firm in order to factor this insight into the reorganization of the firm. The firm provided full access to all employees and managers for the purposes of the surveys, as well as access to employees and managers for the purpose of conducting interviews.

Preliminary interviews with the management team provided us with detailed information on how managers aim at promoting prosocial behaviors—for example, through the design of the physical workspace and the creation of a more collegial environment. The HR-director was our main point of contact in the firm, but we also conducted a number of interviews with employees, middle-managers and top-managers of the firm, both before submitting the questionnaire, and after conducting the survey. As part of the ongoing dialogue with the firm we pretested and adjusted the questionnaire to ensure that each item was easily understood and that the wording made sense within the firm.

In March 2012, a questionnaire was distributed to all 120 employees using a web-based questionnaire developed on the basis of a focused literature review. The invitation to respond to the questionnaire was uploaded on the front-page of the intra-net of the firm with a link to the used survey-instrument. In addition, all employees in the firm received a personal email from the CEO and HR Director urging them to respond to the questionnaire. After one week a reminder was submitted to all employees that had not responded at that time and they were given one more week

to respond to the questionnaire before closing the survey. A total of 80 employees answered and returned the questionnaire, which corresponds to a response rate of 67 percent. However, because of missing values (in particular, on the network-related questions), the sample size was further reduced: 69 responses were used in the final data analysis (i.e., a final response rate of 58 percent).

In addition to the questionnaire submitted individually to all employees we also submitted a shorter version of the questionnaire to all managers in the firm that had employees referring directly to them. The managers were asked to assess the behavioral variables including creativity, knowledge sharing, prosocial behavior of each employee that refers to them. 15 managers were approached and 12 responded and provided information on their assessment of behavior for a total of 87 employees (i.e., 73 percent of all employees in the firm). For 45 employees we received both the individual self-assessment and the manager's assessments of the same employee.

Although we thus have a high response rate (of 58 percent), we examined the risk of nonresponse bias in different ways. We discussed the results and demographic breakdown of respondents (e.g., on age, education, tenure, gender) with firm representatives that assured us that there were no visible biases differentiating those responding to the survey from the overall distribution of employees in terms of demography. Furthermore, we conducted a wave analysis in terms of comparing the demographic variables for early (1st week respondents) and late respondents (2nd week respondents) (Rogelberg and Stanton, 2007). The assumption here is that the group of late respondents will be more similar to the nonresponding group than the group of early respondents. However, an analysis of variance (ANOVA) of the difference in means for the two groups for the demographic variables showed that the hypotheses of differences in the means can all be rejected (F-values < 2). The combination of the high response rate and the additional test makes us confident that our data do not suffer from major problems of nonresponse bias.

Measures

The survey data includes both individual employee's self-reported perceptions and self-assessment of behavior and their manager's assessment of their behavior. Each employee provided demographic information and perceptual responses on a number of items related to collaborative climate, satisfaction with own office, etc., as well as a self-assessment of their (prosocial) behavior. For the latter type of questions (i.e., those that assess behaviors), managers provided their assessment of each employee in terms of behavior for some key items.

All the applied variables in our model were operationalized through the self-reported employee survey in order to maximize the number of included observations. Although such measures have well-known weaknesses—for example, that individuals may have biased perceptions and a somewhat biased view on their actual behavior—they remain the accepted way of capturing perceptions and behaviors among employees (Howard, 1994).

Common method bias is an obvious limitation of such measures. However, the questionnaire consisted of different scales and some of them were reversed, which diminishes the risk of biases. In addition, we performed a number of statistical analyses to assess the severity of common method bias. In particularly, a Harman's one-factor test on the items indicated that common methods bias was not an issue. That is, multiple factors were detected and the variance did not merely stem from the first factors (Podsakoff and Organ, 1986). In fact, the items included in the model form several factors with an eigenvalue > 1, and the first two factors only capture 18 percent and 13 percent of the total variance, respectively. In addition, we ran a confirmatory factor analysis where all 32 items loaded on the same factor (a Single Factor Model). The assumption is that the existence of a single factor that is the common denominator across all items reflects the presence of a common method bias (Podsakoff et. al, 2003). However, in our case the goodness-of-fit statistics is highly unsatisfactory for the Single Factor Model capturing the common method bias, which indicates that we do not have a major problem of common method bias in the data.

Furthermore, the fact that we have data from both employees and managers on the assessment of employees' behaviors allows us to test for inter-rater reliability and to assess the potential bias, as we for the dependent variable, namely prosocial behavior, can match individual employee self-assessments with the manager's assessment of prosocial behavior for the same individuals. When conducting this type inter-rater reliability tests we obtain high and satisfactory values for the Kappa-coefficient which is a measure of the agreement between the two raters (Gwet, 2010). This comparison further indicates that our data does not suffer from common methods bias. The statistical tests do not eliminate the threat of common method bias; however, they suggest that our results are not driven predominantly by common method variance. Moreover, our results are based on complex estimations that involve multiple independent variables and interaction terms. It has been argued that it is highly unlikely that the results of such models emerge solely as a result of common methods bias (Evans, 1985; Siemsen et al., 2010).

While management urged employees to respond to the questionnaire in order to reduce potential social desirability bias, respondents were ensured that the survey software prevented identification of the individual employee. The applied survey instrument, surveyXact, and the server was located outside the firm, and all questionnaires were returned directly to the researchers. Only aggregate-level data was reported back to the firm. The employees knowledge of this further reduces the likelihood of biased responses (Podsakoff et al., 2003).

Most measures used in this study were adapted from existing scales and for all multi-item variables, a confirmatory factor analysis was conducted to test for reliability. In all the multi-item latent variables respondents was asked to respond on a 7-point Likert scale that had the following values and accompanying text: 1=completely disagree, 2=disagree, 3=partly disagree, 4=neutral, 5=partly agree, 6=agree and 7=fully agree.

Dependent Variable

Prosocial behavior is a multi-item measure that is based on the employees self-assessment of their prosocial behavior. The individual employee was asked to indicate on a 7-point Likert scale (with the values listed above) their assessment concerning the following questions on interpersonal helping (scale adapted from Van Der Vegt, Bunderson and Oosterhof, 2006; cf. Grant and Gino, 2010; Grant, 2007): "I often help colleagues with work-related issues", "I am happy to help colleagues to reduce their workload when they have been absent" and "I am willing to help others, that have a substantial workload." The obtained Cronbach alpha-value for this construct was 0.74, and in the confirmatory factor analysis the construct obtained strong reliability, with values of 0.81 for composite reliability and 0.58 for average variance extracted (AVE) as shown in Table 1. All these measures indicate that the construct is highly reliable and characterized by convergent validity.

In addition, managers have been asked to assess each employee on the same 7-point Likert scale for two of the above listed items, namely: "The employee often helps collogues with work-related issues" and "The employee is willing to help others with a substantial workload". For 45 employees we could match the responses from employees and managers and when conducting the inter-rater reliability analysis on these two items we found a Kappa-coefficient of 0.58 and 0.65, respectively, which is highly satisfactory (Gwet, 2010).

Independent Variables

Network size. Each individual was asked to point to maximum ten colleagues (giving their name and department) in FeF with whom they had communicated on work-related issues in the last year. On average respondents listed 9 network relations providing us with a total of 953 relationships. Based on this information we created a matrix on the network relations (relation or nor = 1/0) among the 105 employees that have either responded themselves or been listed by others. We include the undirected ties (i.e. both the ties mentioned by the focal respondent itself and the ties to the focal respondent mentioned by others) as all ties might be vehicles for prosocial behavior.

The total number of ties varies between 2 and 22. Network size is then calculated in UCINET for each employee as the number of ties that a node has when corrected for the potential number of ties—this measure is denoted "degree centrality" or "actual network size" (Anderson, 2008; Freeman, 1979).

Attention is a multi-item measure capturing the employees' perception of their ability to give attention to work-related tasks. The individual employees were asked to indicate on a 7-point Likert scale (with the values listed above) their assessment on the following items (scale adapted from Lee and Brand, 2005): "It is possible for me to concentrate in my office", "I have sufficient possibilities for avoiding disturbances in my office" and "There is only limited noise in my office". The obtained Cronbach alpha-value for this construct was 0.88, and in the confirmatory factor analysis the construct obtained strong reliability, with values of 0.91 for composite reliability and 0.77 for average variance extracted (AVE). All these measures indicate that the construct is highly reliable and characterized by convergent validity.

Insert Table 1 here

Control Variables

We include a number of control variables (the items and exact wording are listed in the Appendix). The first group of control variables captures the perceptions of the respondents in terms of *autonomous motivation*, *collaborative climate,* and *satisfaction with the office*. Self-determination theory (Deci and Ryan, 2000; Ryan and Deci, 2000) posits that motivation differs in terms of how autonomous it is. Autonomously motivated individuals have the feeling that their behavior is self-endorsed and congruent with their own interests and values (Weinstein and Ryan, 2010). On the other hand, individuals can also be motivated in a controlled way. When this is the

case, the feeling is one of pressure, and tasks are performed because of some external end (Deci and Ryan, 1985). Autonomous motivation leads to higher behavioral effort and persistence (Ryan and Deci, 2000), and is an important driver of prosocial behaviors (Gagné, 2003; Weinstein and Ryan, 2010). Research also highlights that organizational context and work environment impact on employees' engagement in prosocial organizational behaviors. Specifically, a work environment where communication, cooperation and mutual respect are promoted may reinforce feelings of reciprocity and cohesiveness which in turn may facilitate prosocial behaviors (Brief and Motowidlo, 1986). Similarly, feelings of satisfaction have been highlighted as another potentially important antecedent of prosocial organizational behaviors (Brief and Motowidlo, 1986). The variable of autonomous motivation is based on five items (scale from Ryan and Connell, 1989; Gagné, Forest, Gilbert, Aube, Morin and Malorni, 2010) that form a strong construct (CR=0.91, AVE=0.67). The same is the case for the variable "satisfaction with the office" that is also a five item construct (scale adapted from Brennan, Chugh and Kline, 2002) with very good properties (CR=0.87, AVE=0.59). Collaborative climate consists of three items (scale from Ramaswami, 1996) that also perform very well in forming a construct for collaborative climate (CR=0.90, AVE=0.74). These perceptually oriented variables control out the effect on prosocial behavior that stems from the respondents' own motivation, positive attitude, and awareness of what is appreciated.

The second group of control variables is based on relationships between employees, specifically on each employee's self-reporting of relationships. For each relationship respondents were asked five additional questions characterizing the individual relationships. The five characteristics of the relationships included: the *frequency*, *closeness*, and *duration* of relationship, as well as the *tacitness* of knowledge exchanged and the extent of *written communication* in the relationship. For each individual respondent that have listed more than one relationship we take the average of the listed relationships for each of these five relationship-based variables. Relational

factors, such as the frequency of interactions, as well as the closeness and duration of relationships also matter in terms of facilitating cohesiveness within the group (Burt, 1997)—and in turn engagement in prosocial behaviors (Brief and Motowidlo, 1986). Thus, these five variables control out the effect that the specific relationship might have on prosocial behavior—for instance, close relations with a long duration might be more conducive to prosocial behavior than recent and distant relationships.

Research on volunteering—an important type of prosocial behavior (Brief and Motowidlo 1986, Penner et al. 2005; Wilson, 2000)—also highlights education, age, gender, occupational status and expertise as important predictors of volunteering (Grant 2011, Hofmann et al. 2009, Penner et al. 2005, Wilson and Musick 1998). Thus, the last group of control variables includes more demographic variables like *age*, *gender*, *education* and *tenure* that tease out the variation in prosocial behavior that may emerge from these characteristics. In addition, two more control variables are added. One indicates whether the respondent has a leadership role or not, and controls for the fact that leaders typically conduct more prosocial behavior *qua* their position of having responsibility for managing people. The other is the betweenness centrality which is an alternative network measure (to the network size) that puts more weight on the non-redundancy part of the network than the sheer size of the network. In that sense, the betweenness centrality controls for the employees network benefits in terms of knowledge search and contacts.

Statistical Model

The proposed model was tested using a PLS analysis. PLS is a type of structural equation modeling (SEM) that applies regression-based calculation methods and not the maximum likelihood estimation methods used in other SEMs (like LISREL). PLS is a causal modeling approach aimed at maximizing the explained variance (R-square) of the dependent latent construct—in our case prosocial behavior. The advantage of PLS is that it requires fewer data assumptions (especially the

multivariate normality assumptions), it provides more accurate coefficient results with smaller sample size than other SEM methods, and it is better suited for more complex models (Hair et. al, 2011; Hulland, 1999). All these features make the PLS-analysis highly suitable for testing our model. As can be seen in the Appendix, our models include many single-item measures and two control variables—namely, gender and leadership role—that are binary and therefore violate the normality assumption. However, these variables can be included in the PLS-model (unlike covariance based SEMs) that do not require the variables to be normally distributed. The other key feature of PLS also speaks to our analysis as with relatively few observations (69) we are able to obtain accurate coefficients in PLS.

PLS allows developing complex models with latent variables that cannot be directly measured, such as attention, motivation and satisfaction, but must be analyzed through indirect means. PLS uses manifest variables, such as a respondent's answer to a set of questions on the manifestation of the underlying construct, to estimate a given latent variable (Fornell and Larcker, 1981). The latent variable estimators can then be used to analyze relationship between various hypothesized constructs. This may include complex models with moderated relationships like in this case.

RESULTS

The proposed model (shown in Figure 1) was analyzed using SmartPLS – version 2.0. SmartPLS assesses the properties of the measurement model and estimates the coefficients of the structural model taking into account the moderating latent constructs (Ringle et. al, 2005). The first step is to establish confidence in our measures (the measurement model) as these forms the basis of the structural model where our hypothesis is tested. Our model includes twelwe single item constructs and five multi-item constructs. To ensure reliability and validity of our measures used for the various multi-item constructs, we calculated composite reliabilities and report them in Table 1. The

Cronbach alpha and composite reliability measures both provide information on how well the manifest variables measure the latent variables. For examining measure adequacy, these metrics should both be higher than 0.70 for reliable scales (Fornell and Larcker, 1981). As can be seen in Table 1, all the listed values for Cronbach alpha and composite reliability are above 0.70. The AVE-score on the other hand provides evidence concerning whether a set of manifest variables is a reasonable representation of the underlying latent construct. When the AVE score is greater than 0.50, there is a reasonable amount of confidence that the manifest variables are doing a good job in measuring the latent variable (Fornell and Larcker, 1981). In our case all five constructs have AVE-scores well above 0.50.

To confirm that there is adequate discriminant validity among the various latent variables, the correlations among all the variables included in the model is reported in Table 2. None of the binary correlations are above 0.5 and only few are above 0.4 like the correlation between satisfaction and attention and the correlation between age and tenure, which are as expected. The fact that the correlation coefficients are small or moderate indicates that the latent variables have adequate discriminant validity. In the diagonal element of Table 2, we show the square root of the AVE-score for each of the five multi-item constructs (Fornell and Larcker criterion). As can be seen from Table 2, the square root of the AVE-score by each latent variable is much higher than the correlation between the latent variable and all other latent variables. This demonstrates that the different multi-item variables extract a higher share of variances from their own items than from other latent variables.

Insert Table 2 here

After having reached at a satisfactory measurement model, we can proceed to evaluate the structural model including the model path coefficients. Model path coefficients are equivalent to standardized regression coefficients, and can be interpreted in the same way. A one-unit increase in an independent variable will be expected to cause an increase in the dependent variable equal to the path coefficient.

Standard errors of the path coefficients are obtained by bootstrapping the sample 5,000 times (Hair et. al, 2011; Hulland, 1999). The model converge after only 8 iterations and the R-square for predicting prosocial behavior is as high as 0.42-0.45 (see Table 3) indicating that almost half of the variation in the prosocial behavior are explained in our model. In addition, the cross-validated redundancy measure (Q^2 scores) were positive for all constructs (Hair et. al, 2011). Based on the results, the model appears to be an adequate fit to the data.

Insert Table 3 here

The PLS results with the path coefficients of the structural model are reported in Table 3. Two models are presented where Model 1 includes the main effects of all variables, while the interaction effect between network size and attention is added in Model 2 in order to test for the moderation effect. In Model 1 neither network size (β= 0.14, p > 0.10) nor attention (β= -0.09, p > 0.10) come out significant, indicating that in themselves they are not having a strong impact on prosocial behaviors. However, in Model 2 the interaction term between network size and attention (β= 0.32, p = 0.03) becomes significantly positive, while the main effects remains insignificant. As such, the PLS results support out hypothesis of a moderating effect between the size of the network and the attention to work-related tasks.

It is noticeable that some of the control variables that turns out to affect the prosocial behavior positive and significant are autonomous motivation, closeness of relationship and collaborative climate. These results are fully consistent with research in self-determination theory, where autonomy, relatedness, and social-contextual factors have been identified as drivers of self-endorsed behaviors in general (Gagné and Deci, 2005), and prosocial behaviors in particular (Gagné 2003, Weinstein and Ryan, 2010). A few factors also have a significant negative impact hindering prosocial behavior like betweenness centrality (5% level of significance), age and if the communication in the relationship is mainly based on tacit knowledge (10% level of significance).

CONCLUDING DISCUSSION

What antecedes employees' engagement in prosocial organizational behaviors? Our research suggests that contacts with coworkers together with the possibility to focus and concentrate in the workplace are critical parts of an answer to this question.

Contact with the beneficiaries of an employee's work has been shown to strengthen that employee's prosocial attitudes and behaviors (Baer et al., 1977; Goldman and Fordyce, 1983; Grant, 2007; Grant et al., 2007; Guéguen and Fisher-Lokou, 2003). Employees with large egocentric networks have access to several coworkers (Wasserman and Faust, 1994), thus they are likely to have knowledge of more coworkers with specific needs and problems. In sum, centrally located employees with large networks are ideally positioned for engaging in prosocial behaviors towards their colleagues. This research, however, does not show a significant association between network size and prosocial behaviors in the workplace. This finding is consistent with the argument that, because of bounds in human rationality, the benefit of having access to high volumes of information can be outweighed by the costs associated with the cognitive burden of processing that information. Although a large egocentric network gives to the focal employee a better opportunity for recognizing the need for her prosocial action, this opportunity requires cognitive processing in order

to be realized. Given the prevalence and importance of prosocial behaviors in organizations (Brief and Motowidlo, 1986; Weinstein and Ryan, 2010) it is important to better understand the impact of psychological processes on the relation between network size and prosocial behaviors.

In line with research taking an attention-based perspective on organizational behavior (March and Simon, 1958), we proposed attention as a fundamental factor that determines the extent to which an employee with a large egocentric network can process, and benefit from the information that flows through her network ties. We find that the interaction between actual network size and attention significantly affects engagement in prosocial organizational behaviors. Specifically, actual network size predicts engagement in prosocial behaviors only when it is combined with the possibility to focus and concentrate in the workplace. This finding is interesting, given that previous research on the structural antecedents of prosocial behaviors has looked at the direct effect of the network structure in explaining prosocial behavior only, without addressing the extent to which this effect depends on employees' cognitive bounds (e.g., Amato, 1990).

The main insight of this research is that, in terms of facilitating employees' engagement in prosocial organizational behaviors, the better an employee can access her coworkers, the more crucial it becomes that the employee can also dedicate attention to the processing of the information that flows through her social ties. With our finding, we contribute to two different areas of research. First, by investigating how structural and attentional factors interact in anteceding prosocial behaviors, we confirm and support Adler and Kwon's insight that: "The mere fact of a tie implies little about the likelihood that social capital effects will materialize" (2002: 25), and contribute to the trend in network research that emphasizes the importance of looking at patterns of social relationships in conjunction with individual characterisitcs and psychological processes (e.g., Adler and Kwon 2002, Anderson 2008, Emirbayer and Goodwin 1994, Mehra et al. 2001). Second, we contribute to research on predictors of prosocial behaviors in organizations (e.g., Grant 2007, Grant

and Gino 2010, Weinstein and Ryan 2010). Controlling for factors that have already been shown to be conducive to prosocial behaviors such as work motivation and climate, we highlight that structural factors are important when they are considered jointly with psychological factors.

The contributions of this study should be considered in the light of its limitations. Attention allocation has been described as a multilevel process that is co-determined by individual, organizational, and environmental factors (Ocasio 1997). Further, attentional processes focus energy and mindfulness on a limited number of elements at any given time. Focused attention facilitates perception and action towards those issues and activities being attended to, and hinders action towards those that are not (Kahneman 1973). For this reason, an employee that is selectively focusing her attention on potential opportunities for prosocial intervention may be able to benefit from a large egocentric network even in the presence of a relatively low level of attention. While our model controls for individual-specific, organizational and environmental factors that may impact on an employee's ability to dedicate attention to tasks, we do not look at mechanisms of selective attention allocation. In other words, we assume that a decrease in overall attention leads to a proportional decrease in attention that is dedicated to recognizing opportunities for prosocial behavior in the workplace.

Because we rely on cross-sectional data, the direction of causality in our model cannot be fully substantiated. While our arguments run in the direction from network size and attention to prosocial organizational behaviors, it is also possible to derive alternative causal explanations. For example, employees that behave prosocially may be more likely to be perceived as accessible or trustworthy. Thus, they may be more likely to be approached by colleagues in need of help (Hofmann et al. 2009), and in turn, to develop large egocentric networks. Further research based on experimental or longitudinal data is needed to investigate the direction of causality that we propose in this research.

Our results also carry important practical implications. Our framework suggests that, in order to foster prosocial behaviors in organizations, managers need to do more than merely encourage social interactions among employees. Engagement in prosocial behaviors requires not only establishing more social ties, but also nurturing employees's attention in the workplace. This defines an important role for the design of the lay-out of the office space, the way communication is carried out within the firm (e.g., some firms adopt policies that restrict the use of e-mails for certain periods during the work day), the scheduling of meetings that may interrupt the normal workflow, and numerous other factors that influence the attention that employees allocate to their tasks and behaviors, including those prosocial behaviors that are vital to the functioning of virtually any organization. A better understanding of how structural and attentional factors combine in triggering prosocial organizational behaviors not only enriches our theoretical understanding of these fundamental behaviors, but also provides managers with refined guidance for value maximization. Prosocial behaviors positively affect the organizational functioning, as well as the well-being of both helpers and help recipients (Weinstein and Ryan, 2010). We trust that the analysis presented here will encourage future explorations of this important path towards organizational helping, well-being, and performance.

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FIGURE 1
Interaction between Network Size, Attention, and Prosocial Behavior
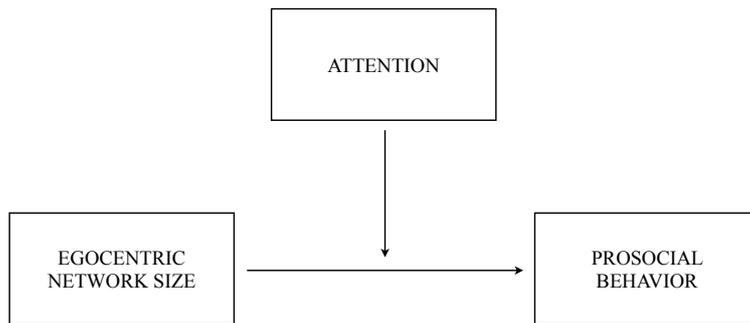
**Table 1:** *Assessment of the applied multi-item constructs*

	Average Variance Extracted	Cronbach's Alpha	Composite Reliability
Prosocial Behavior	0.58	0.74	0.81
Attention	0.77	0.88	0.91
Autonomous motivation	0.67	0.88	0.91
Satisfaction with office	0.59	0.88	0.87
Collaborative climate	0.74	0.83	0.90

Table 2: *Latent variable correlations (n=69)*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1) Prosocial Behavior	*0.76*															
2) Attention	0.07	*0.88*														
3) Network size	0.03	0.11	1.00													
4) Autonomous motivation	0.45	-0.05	-0.02	*0.82*												
5) Satisfaction with office	-0.25	0.48	-0.19	-0.27	*0.77*											
6) Collaborative climate	0.30	0.01	0.01	0.37	-0.20	*0.86*										
7) Frequency of interaction	0.09	0.09	0.34	0.20	-0.09	0.01	1.00									
8) Closeness of relationship	0.14	0.02	-0.19	-0.08	-0.07	0.01	-0.32	1.00								
9) Duration of relationship	-0.04	0.09	0.05	-0.09	0.13	-0.01	-0.07	-0.11	1.00							
10) Tacitness of knowledge	-0.11	0.08	-0.19	-0.05	0.21	-0.05	-0.16	0.34	-0.07	1.00						
11) Written communication	0.29	-0.02	-0.04	0.45	-0.10	0.29	0.24	-0.04	0.05	0.02	1.00					
12) Age	-0.22	-0.02	-0.06	-0.17	0.18	0.15	-0.14	-0.01	0.30	0.09	0.01	1.00				
13) Gender	-0.06	-0.09	0.01	-0.02	-0.01	-0.16	-0.07	0.04	0.11	0.11	0.04	-0.15	1.00			
14) Education	-0.03	0.08	0.36	-0.01	0.06	-0.02	0.24	-0.04	-0.03	0.16	-0.04	0.08	0.01	1.00		
15) Tenure	-0.12	-0.03	-0.07	-0.19	0.11	0.03	-0.04	-0.10	0.55	-0.11	0.06	0.42	-0.13	-0.05	1.00	
16) Leadership role	0.03	0.12	0.37	0.03	0.09	0.10	0.18	0.05	0.06	-0.09	0.06	-0.11	0.02	0.42	0.04	1.00
17) Betweenness centrality	-0.09	0.02	0.58	0.04	-0.18	-0.04	0.37	-0.24	-0.09	-0.14	-0.04	-0.11	0.01	0.27	-0.14	0.32

Table 3: *Structural path coefficients (standard error in parentheses)*

	Model 1	Model 2
Network size	0.14 (0.08)	-0.08 (0.09)
Attention	-0.09 (0.06)	-0.11 (0.08)
Network size* Attention		0.32** (0.10)
Control variables		
Autonomous motivation	0.49*** (0.08)	0.54*** (0.08)
Satisfied with own office	0.03 (0.12)	0.01 (0.13)
Collaborative climate	0.13* (0.05)	0.12* (0.06)
Frequency of interaction	0.07 (0.06)	0.07 (0.06)
Closeness of relationship	0.23*** (0.06)	0.19** (0.06)
Duration of relationship	0.09 (0.09)	0.11 (0.09)
Extent of tacitness	-0.12† (0.07)	-0.12† (0.07)
Extent of written communication	-0.02 (0.06)	-0.07 (0.06)
Age	-0.18† (0.09)	-0.15† (0.09)
Gender	-0.07 (0.06)	-0.11† (0.07)
Education	0.01 (0.09)	0.04 (0.09)
Tenure	-0.03 (0.09)	-0.05 (0.09)
Leadership role	-0.01 (0.05)	-0.03 (0.06)
Betweenness centrality	-0.22* (0.10)	-0.21* (0.11)
N	69	69
R-square	0.42	0.45

†, *, ** and *** indicates a level of significance of 10%, 5%, 1% and 0.1%, respectively

Appendix – Wording and operationalization of control variables

Perceptual variables

All measured on a 7-point Likert scale with the following values and text:

1=completely disagree, 2=disagree, 3=partly disagree, 4=neutral, 5=partly disagree, 6=agree and 7=fully agree.

Autonomous motivation

Why do you perform in your job?
1. Because the tasks I work on is exciting
2. Because my job is interesting
3. Because I find it personally satisfactory
4. Because I feel good when I conduct my work
5. Because I like to conduct my work

Satisfaction

To what extent do you agree with the following statements on your own office:
1. I have sufficient space in my office
2. In my office it is easy to conduct conversations with others
3. I can easily have a guest in my office
4. I have sufficient storage space in my office
5. I have the possibility for personalizing my office

Collaborative climate

To what extent do you agree with the following statements on the work climate:
1. Managers invites for collaboration among employees
2. Managers invites for climate where employees respect each other
3. Managers invites for work-related discussions

Tie based variables

All variables are calculated as the average over the listed ties for each respondents

Frequency of interaction

How often do you communicate with this colleague? (1=never, 9=many times in a day)

Closeness of relationship

How close is your relationship with this colleague? (1=distant, 7=very close)

Duration of relationship

How many years have you known this colleague? (1= < half year, 6= > 10 years)

Tacitness of knowledge exchange

To what extent is the conversation with this colleague on simple information (=1) or critical knowhow (=7) ?

Written communication

To what extent is the conversation with this colleague face-to-face (=1) or through written or electronic medias (=7) ?

Demographic variables

Age. The age of respondent in years

Gender. Take the value 0 for male and 1 for female

Education. Take the value 1 for below university level, 2=bachelor-level and 3=master level and above

Tenure. The age of employment at FeF in years

Leadership role. Is coded 1 if respondent has a leadership role and 0 if not

Betweenness centrality. Calculated in UCINET based on the network matrix of relations

BROKERAGE AND CREATIVITY:

A BOUNDED RATIONALITY PERSPECTIVE

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BROKERAGE AND CREATIVITY:

A BOUNDED RATIONALITY PERSPECTIVE

Abstract

We combine structural and psychological perspectives on creativity in organizations. Employees are expected to be more likely to be creative if they occupy a brokerage position that provides them with access to non-redundant information. However, we draw on bounded rationality arguments and propose that being exposed to diverse information also carries cognitive costs. Data from 68 employees in a single firm suggest that the relation between brokerage and creativity is curvilinear (inverted U shape), and contingent on the focal employee's ability to focus and concentrate in the workplace.

INTRODUCTION

Within an organization, employees may come up with new ideas to optimize processes, solve organizational problems, and more generally improve the quality of their own and others' work. Clearly, individual creativity in the workplace—that is, the generation of novel, useful and actionable solutions and processes (Amabile, 1996; Ford, 1996, Hennessey & Amabile, 2010)—is crucially important for organizational innovation, survival and success, particularly in uncertain and turbulent environments (Ford, 1996; Woodman, Sawyer & Griffin, 1993). Yet, creativity is difficult to encourage and even easy to stifle (Amabile, 1998). Thus, abundant research attention has been dedicated to understanding which factors may favor or hinder the emergence of individual creativity in organizations (Amabile, 1983, 1996; Amabile, Conti, Coon, Lazenby & Herron, 1996; Csikszentmihalyi, 1996).

An important part of this research proposes social interactions as fundamental drivers of individual-level creativity (Amabile, 1983, 1996; Fleming, Mingo & Cheng, 2007; Ford, 1996; Leonard & Swap, Obstfeld, 2005; 1999; Perry-Smith, 2006; Perry-Smith & Shalley, 2003; Shalley, Zhou & Oldham, 2004; Woodman et al., 1993). Specifically, structural holes theory (Burt, 1992, 2004), one of the most well known network theories, posits access to non-redundant information as the fundamental benefit of the lack of ties among an actor's alters, a condition that is named brokerage. According to the theory, ties that link otherwise disconnected people in the network provide access to non-redundant knowledge and information, and constitute a fundamental source of novel ideas (Brass, 1995; Burt, 2004). This reasoning is built on the widely accepted idea that novel combinations of heterogeneous knowledge are a fundamental driver of creativity and innovation (Amabile, 1996; Rodan & Galunic, 2004; Simonton, 1999; Turner & Fauconnier, 1999). In other words, research looking at the relational antecedents of creativity has depicted a positive relation between

brokerage and creativity (Allen, 1977; Nerkar & Paruchuri, 2005; Rodan & Galunic, 2004; Tushman, 1977), in fact, providing an entirely structural explanation for creativity.

However, this approach has been criticized in recent network research, where network positions have been described as providing opportunities from which actors differentially benefit from depending on their individual characteristics, such as personality, motivation, or ability (Adler & Kwon, 2002; Anderson, 2008; Emirbayer & Goodwin, 1994; Kilduff & Krackhardt, 1994; Mehra, Kilduff & Brass, 2001, Reinholt, Pedersen & Foss, 2011; Stevenson & Greenberg, 2000). Consistently, recent research has taken a more social-psychological approach, and started to investigate whether individual-specific factors such as personal attributes, heterogeneity of knowledge, or career experiences interact with brokerage opportunities in determining creativity outputs in the workplace (Fleming et al., 2007; Fleming & Waguespack, 2007; Mors, 2010; Obstfeld, 2005; Rodan & Galunic, 2004). Yet, little attention has been dedicated to understanding how the cognitive and attentional limitations that are inborn in human nature (Simon, 1955, 1978) constrain and shape this fundamental relation. This is problematic, as an imperfect understanding of these constraints may provide researchers and practitioners alike with an overly optimistic view of the creative implications of brokerage. We ask whether there is a point of diminishing returns where too many ties bridging structural holes become difficult to manage, and hence are no longer advantageous.[1]

People normally learn new ideas by associating those ideas with what they already know. Thus, meaningful communication—a precondition of knowledge exchange—requires some sharing of context between the subjects involved in the exchange in order to take place (Boland & Tenkasi, 1995). For this reason, transferring ideas that belong to disparate areas of expertise is more difficult than transferring ideas that belong to a relatively narrow area

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[1] For a similar perspective on different structural features cf. McFadyen and Cannella (2004), and Zhou, Shin, Brass, Choi and Zhang (2009).

(Reagans & McEvily, 2003). In sum, knowledge flows are complicated by cognitive distance (Nooteboom, 2000), and the processing of non-redundant information is more difficult than the processing of redundant information.

While employees bridging structural holes have many ties through which they can access non-redundant information and, in turn, generate creative insights (Brass, 1995; Burt, 2004), they also have limited attention resources to allocate across their contacts, and to dedicate to the processing of novel information (Simon, 1947; Ocasio, 1997). Thus, brokerage pushes the bounded rationality of the focal employee in terms of how many individuals she can deal with in terms of meaningfully exchanging information with them. Furthermore, factors that limit the ability of an employee to concentrate on the task at hand may further complicate the scenario. Therefore, while brokerage may generally provide the focal employee with opportunities for being creative in the workplace, this relation is likely to be contingent on the cognitive and attentional limitations that characterize boundedly rational actors.

In this research, we examine how social structuralist perspectives and psychological insights on limited attention combine to predict creativity in the workplace. We consider a model of the effects of attention and social network characteristics on individual-level creativity. Data from a survey of 68 employees in one single firm confirm that brokerage opportunities lead to the generation of creative ideas, and suggest that this effect is curvilinear in nature and contingent on the broker's attention.

THEORY AND HYPOTHESES

Brokerage, Creativity, and Bounded Rationality

A growing literature conceptualizes the organizational context as one of network relations where employees are represented by nodes linked to one another by relational ties (e.g., Borgatti & Foster, 2003; Borgatti & Halgin, 2011; Brass, Galaskiewicz, Greve & Tsai

2004). This research has revealed specific associations between structural characteristics of the informal organization and important outcomes such as productivity (Hansen, 2002; Reagans and Zuckerman, 2001), innovation (Tsai, 2001; Tsai and Ghoshal 1998), and job performance (Cross and Cummings, 2004). In particular, in line with the idea that social interactions are important predictors of creativity (Amabile, 1983, 1996; Ford, 1996; Leonard & Swap, 1999; Simonton, 1999), the logic that underlies network research has been applied to the context of individual-level creativity in organizations (Perry-Smith, 2006; Perry-Smith & Shalley, 2003; Shalley et al., 2004).

Specifically, those actors that connect otherwise disconnected people in the network—that is, brokers connected across structural holes—have been argued to benefit from information control, first access to non-redundant information, and, in turn, better opportunities to recombine ideas (Burt, 1992, 2004; Fleming et al., 2007). In other words, because of the nature of her ties, an employee that links several otherwise disconnected employees has access to more non-redundant information than an employee linking a small number of otherwise disconnected actors. Disconnected actors, in fact, are assumed to belong to distant social worlds, and hence to possess distinct knowledge and information (Borgatti & Halgin, 2011; Granovetter, 1973). Further, research highlights that access to non-redundant information and novel combinations of that information is a fundamental ingredient of creativity (Amabile, 1996; Burt, 2004; Fleming et al., 2007; Perry-Smith, 2006; Rodan & Galunic, 2004; Simonton, 1999). Thus, since employees that link otherwise disconnected others have more opportunities to obtain non-redundant information, and since access to non-redundant information is a fundamental driver of creativity, brokered social structures are more likely than cohesive social structures to lead to individual-level creativity (Borgatti & Halgin, 2011; Brass, 1995; Burt, 2004; Fleming et al., 2007; Reagans & Zuckerman, 2001).

However, the idea that attention and rationality are bounded, and hence that individuals can only meaningfully process limited amounts of information (Dearborn and Simon, 1958; Ocasio, 1997, 2011; Simon, 1955, 1978) suggests that brokers are also exposed to the cognitive costs that come with their specific positioning in the social structure. The higher the number of ties bridging structural holes, the higher the volume of non-redundant information that can be transferred through those ties, and, in turn, the greater the cognitive load involved in processing that information. Additionally, research indicates that the exploitation of new knowledge is in part a function of the amount of prior related knowledge (Cohen & Levinthal, 1990; Obstfeld, 2005). People normally learn new ideas by means of associating those ideas with their preexisting knowledge. Thus, it is more difficult to process non-redundant knowledge that originates from nodes belonging to distant social worlds (Reagans & McEvily, 2003). In other words, because of their specific position in the social structure, brokers get access to novel information that is at the same time very valuable, and yet difficult to process.

Given the limited absorptive capabilities of individuals, and the higher complexity associated with the processing of non-redundant information, we expect that the realization of the potential for creative outputs of brokers is contingent on their ability to process the information that flows through their network ties. That is, there should be a trade-off between information load and processing capacity resulting in different levels of creativity. Specifically, we investigate a curvilinear relation between brokerage and creativity: our thesis is that too few or too many ties linking otherwise disconnected nodes in the network may not result in high creativity levels.

Nodes linking otherwise disconnected others get access to different knowledge and perspectives. Thus, more ties of that type should provide access to more sources of novel information, and hence higher creativity (Burt, 1992). However, there may be a point of

diminishing returns on the number of ties linking otherwise disconnected others. Clearly, nodes that are connecting few otherwise disconnected others will only have access to little non-redundant information. On the other hand, nodes that are connecting too many otherwise disconnected others are likely to experience information overload. Too much non-redundant information may be cognitively demanding to the point that the focal employee may experience confusion, and this in turn would negatively impact on her likelihood of being creative (Ward, Smith & Finke, 1999). Additionally, establishing and maintaining social relationships are costly activities, and the amount of time and attention that the focal node can dedicate to her contacts is likely to decrease after the number of contacts exceeds some optimal level (McFadyen & Cannella, 2004; Zhou et al., 2009). Hence,

> **Hypothesis 1**: *There is a curvilinear relation between brokerage and creativity such that employees exhibit greater creativity when bridging is at intermediate levels than when it is at lower or higher levels.*

The Importance of Attention

A great deal of research has been dedicated to the idea of attention in organization science (Ocasio, 2011). Attention shapes organizational actors' judgments and behaviors (Dane, 2013). Individual-level attention—the "noticing and focusing of time and effort on both the environmental stimuli requiring action and the available repertoire of responses which define that action" (Hoffman & Ocasio, 2001: 415; Ocasio, 1997)—is a scarce resource, and boundedly rational actors can only allocate a limited amount of attention to a given number of activities (March & Simon, 1958; Ocasio, 2011; Simon, 1978). Further, information "consumes the attention of its recipients" (Simon, 1971: 40), and limited attention inhibits accurate information processing (Ocasio, 1997; Simon, 1955). Brokers are exposed to high volumes of novel information. Thus, it is particularly important for them to

avoid factors that may weaken their ability to attentively process the information that flows through their network ties.

Aside from individual-specific differences, an employee's attention is influenced by a firm's activities, procedures, and environmental contingencies (Cialdini, Reno & Kallgren 1990; Fiske & Taylor, 1991; Ocasio, 1997). In particular, employees are exposed to environmental stressors such as noise and disturbance in the workplace, and these have been shown to hinder information processing, memory and overall performance (Boggs & Simon, 1968; Hartley, 1973; Rotton, Olszewski, Charleton & Soler, 1978; Szalma & Hancock, 2011).

Noise and disruption influence the attention that brokers can allocate to the processing of the information that—because of their network position—they get access to. As a result, brokers that are exposed to different levels of environmental stressors are not equally efficient with respect to making the most out of their structural opportunities. The above arguments suggest that the curvilinear relation between brokerage and creativity (H1) is contingent on the focal employee's attention. Although intermediate levels of brokerage provide the focal actor with the opportunity to make the most out of her structural position (in terms of creativity outputs), this relation is subject to the extent to which that actor can carefully attend to the information that flows through her ties. High attention will allow the focal employee to better deal with the processing of non-redundant information. Additionally, high attention should also push the focal employee's absorptive limitations a bit further in the sense of allowing her to successfully deal with higher amounts of non-redundant information. On the other hand, brokers with low attention levels will encounter problems both in recognizing the possibility to obtain non-redundant information from their contacts, and in processing that information. For this reason, we expect the curvilinear relation between brokerage and creativity to be contingent on the focal employee's attentional capability. Hence,

Hypothesis 2: *The curvilinear relation between brokerage and creativity (H1)*

is contingent on the broker's attention: Intermediate levels of brokerage result

in higher creativity when the broker's attention is high than when it is low.

METHODS

Data Collection and Research Site

We collected data on behavior of employees in a single firm in order to keep constant external factors and firm-varying factors that might affect the creativity of employees. This implies that the variation we observe in individual-level employee creativity should be explained by factors at lower level than the firm-level, for example, at the level of the individual, the network or the department.

The firm that formed the site for our data collection is FeF Chemicals, a highly specialized, international chemical firm (with 120 employees) that focuses on manufacturing and supply of Quaternary Ammonium Compounds (Quats) for pharmaceutical and personal care products. FeF Chemicals is a highly vertically integrated firm that covers large parts of the value chain, including Research and Development, Quality Assurance, Regulatory Affairs, Production and Environment, and Sales and Customer Service. However, all activities are co-located on the same site. The close vicinity of the activities is seen as of central importance by the firm, which puts strong emphasis on creating the best possible conditions for promoting knowledge sharing and creativity among employees.

The data collection was conducted in close collaboration with the firm. At the time of the data collection effort (early 2012), FeF Chemical was planning a major reorganization, and was interested in learning more about the determinants of employee creativity and knowledge sharing in order to factor this insight into the reorganization of the firm. The firm provided full access to all employees and managers for the purpose of the survey, as well as for the purpose of conducting interviews.

In March 2012, a web-based questionnaire was distributed to all 120 employees. The invitation to respond to the questionnaire was uploaded on the front-page of the intra-net of the firm with a link to the used survey-instrument. In addition, all employees in the firm received a personal email from the CEO and HR Director urging them to respond to the questionnaire. After one week, a reminder was submitted to all employees that had not responded. Before closing the survey, these employees were given one more week to respond to the questionnaire. A total of 80 employees answered and returned the questionnaire, which corresponds to a response rate of 67 percent. However, because of missing values (in particular, on the network-related questions), the sample size was further reduced: 68 responses were used in the final data analysis (i.e., a final response rate of 57 percent).

In addition to the questionnaire submitted individually to all employees, we also submitted a shortened version of it to all managers in the firm that had employees referring directly to them. The managers were asked to assess the behavioral variables (including creativity and knowledge sharing) of each employee that referred to them. We approached 15 managers, and 12 of them provided their assessment of behavior for a total of 87 employees (i.e., 73 percent of all employees in the firm). For 45 employees of those 68 whose responses we use in this research we received both individual self-assessment of behavior, and the manager's assessments of (the same) behavior.

Although we have a high response rate (of 57 percent), we examined the risk of nonresponse bias in different ways. First, we discussed the results and demographic breakdown of respondents (e.g., on age, education, tenure, gender) with firm representatives that assured us that there were no visible biases differentiating those responding to the survey from the overall distribution of employees in terms of demography. Furthermore, we conducted a wave analysis in terms of comparing the demographic variables for early (1st week) and late (2nd week) respondents (Rogelberg and Stanton, 2007). The assumption here

is that the group of late respondents will be more similar to the nonresponding group than the group of early respondents. However, an analysis of variance (ANOVA) of the difference in means for the two groups for the demographic variables showed that the hypotheses of differences in the means can all be rejected (F-values < 2). These tests together with the high response rate make us confident that our data do not suffer from major problems of nonresponse bias.

Measures

In addition to employees' demographic and relational (network) information, the survey data includes individual employees' self-reported perceptions, their self-assessment of behavior, and managers' assessment of employee behavior. Specifically, each employee provided perceptual responses on a number of items related to work motivation and collaborative climate, as well as self-assessment of their knowledge sharing and creative behaviors. Additionally, these employee behaviors were also assessed by managers.

All the applied variables in our model were operationalized through the self-reported employee survey in order to maximize the number of included observations. Although such measures have well-known weaknesses—for example, that individuals may have biased perceptions, and biased views on their actual behavior—they remain the accepted way of capturing perceptions and behaviors among employees (Howard, 1994).

Common method bias is an obvious limitation of such measures. However, the questionnaire consisted of different scales and some of them were reversed, which diminishes the risk of biases. In addition, we performed a number of statistical analyses to assess the severity of common method bias. First, a Harman's one-factor test on the items indicated that common methods bias was not a major issue. That is, multiple factors were detected and the variance did not merely stem from the first factors (Podsakoff & Organ, 1986). In fact, the nine variables included in the model (listed in Table 1) form several factors with an

eigenvalue > 1, and the first two factors only capture 24 percent and 18 percent of the total variance, respectively. Second, we ran a confirmatory factor analysis including all the underlying 25 items (that together form the nine variables) loaded on the same factor (a Single Factor Model). The assumption is that the existence of a single factor that is the common denominator across all items reflects the presence of a common method bias (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). However, in our case the goodness-of-fit statistics is highly unsatisfactory for the Single Factor Model capturing the common method bias (RMSEA = 0.19, GFI = 0.47, and NFI = 0.23), which indicates that we do not have a major problem of common method bias in the data. Third, the fact that for the dependent variable (creative behavior) we can match individual employee self-assessments with managers' assessment for the same individuals allows us to test for inter-rater reliability. When conducting this type inter-rater reliability tests we obtain high and satisfactory values for the Kappa-coefficient which is a measure of the agreement between the two raters (Gwet, 2010). This comparison further indicates that our data does not suffer from common methods bias.

These statistical tests do not eliminate the threat of common method bias. However, they suggest that our results are not driven predominantly by common method variance. Moreover, our results are based on complex estimations that involve multiple independent variables and a squared term. It has been argued that it is highly unlikely that the results of such models emerge solely as a result of common methods bias (Evans, 1985; Siemsen, Roth & Oliveira, 2010). Finally, while management urged employees to respond to the questionnaire in order to reduce potential social desirability bias, respondents were ensured that the survey software prevented identification of the individual employee. The applied survey instrument, surveyXact, and the server was located outside the firm, and all questionnaires were returned directly to the researchers. Only aggregate-level data was

reported back to the firm. Employees' knowledge of this further reduces the likelihood of biased responses (Podsakoff et al., 2003).

Most measures used in this study were adapted from existing scales. For reflective multi-item variables a confirmatory factor analysis was conducted to test for reliability.

Dependent Variable

Creativity is a multi-item measure that is based on the employees' self-assessment of their creative behavior. Individual employees were asked to indicate on a seven-point scale (1 = completely disagree and 7 = fully agree) their assessment concerning the following questions on creative behavior (four items adapted from Zhou & George, 2001; see also George & Zhou, 2001): "I provide new ideas to improve the department's performance", "I suggest new ways to increase quality", "I suggest new ways of optimizing processes and routines" and "I come up with creative solutions to emerging problems." The obtained Cronbach alpha-value for this construct was 0.83, and in the confirmatory factor analysis the construct obtained strong reliability, with values of 0.82 for composite reliability and 0.53 for average variance extracted (AVE). All these measures indicate that the construct is highly reliable and characterized by convergent validity.

In addition, managers have been asked to assess each employee on the same seven-point scale for three out of the four items listed above, namely: "The employee provides new ideas to improve the department's performance", "The employee suggests new ways to increase quality" and "The employee comes up with creative solutions to emerging problems." For 45 employees we could match the responses from employees and managers. When conducting the inter-rater reliability analysis on these three items we found a Kappa-coefficient of 0.56, 0.64 and 0.59, respectively, which is highly satisfactory (Gwet, 2010).

The average level of creativity is 5.7 for the self-assessment of the 68 employees, which seems relatively high on the seven-point scale. However, the managers' assessment of

the creative behavior of the employees was on the same high level with an average of 5.5. The reason for the high average value is that it is mainly the upper part of the seven-point scale that has been applied in the assessment both by employees and by their managers. However, there is still substantial variation around the median value of 5.5 in employees' assessment of their creative behavior.

Independent Variables

Brokerage. Each individual was asked to point to maximum ten colleagues (indicating their name and department) in FeF with whom they had communicated on work-related issues in the last year. On average, respondents listed 9 network relations providing us with a total of 953 relationships. Based on this information, we created a matrix on the network relations (relation or not = 1/0) among the 105 employees that have either responded themselves, or have been listed by others. We included the undirected ties (i.e., both the ties mentioned by the focal respondent itself, and the ties to the focal respondent mentioned by others) as all ties might be vehicles for creative behavior. Brokerage is measured as betweenness centrality. An actor's betweenness centrality (Freeman, 1979; Wasserman and Faust, 1994) captures the volume of traffic in a network "moving from each node to every other node that would pass through a given node" whose centrality is being measured (Borgatti, 2005: 60). Betweenness centrality is calculated in UCINET (version 6.436) for each employee as the number of times the focal employee acts as a bridge along the shortest path between two other employees. The value of betweenness centrality varies between 0 and 8.66, but with a median value of 2. The squared value of betweenness centrality is added in some of the models in order to test the proposed non-linear relationship between brokerage and creativity.

Attention, the "focused mental engagement on a particular item of information" (Davenport & Beck, 2001: 20, Hoffman & Ocasio, 2001), is a multi-item measure capturing

the employees' perception of their ability to attend to work-related tasks. The individual employees were asked to indicate on a seven-point scale (1 = completely disagree and 7 = fully agree) their assessment on the following items (adapted from Lee and Brand, 2005): "It is possible for me to concentrate in my office", "I have sufficient possibilities for avoiding disturbances in my office" and "There is only limited noise in my office". The obtained Cronbach alpha-value for this construct was 0.88, and in the confirmatory factor analysis the construct obtained strong reliability, with values of 0.88 for composite reliability and 0.72 for average variance extracted (AVE). These measures suggest that the construct is highly reliable and characterized by convergent validity.

Control Variables

Tie strength. An important debate on social capital has been looking at different benefits of sparse and dense networks (e.g., Fleming et al., 2007; Obstfeld, 2005). While sparse networks present an opportunity for accessing non-redundant information and in turn generating new ideas (Burt, 1992, 2004), cohesive structures may foster creativity in other ways. In particular, cohesive structures may lead to higher trust and better information flow because of the redundant and strong ties that tend to develop in such structures (Coleman, 1988; Reagans & McEvily, 2003). This facilitates knowledge sharing, which in turn may enhance creativity (Fleming, Mingo & Chen, 2007; Milliken, Bartel, & Kurtzberg, 2003). Thus, we controlled for tie strength as a potential alternative driver of employee creativity.

While tie strength has previously been dichotomized into strong and weak (e.g., Zhou et. al, 2009), we follow the recent line of research that treats it as a continuous variable (Anderson, 2008; Hansen, Mors & Lovas, 2005). Specifically, tie strength was operationalized as an index of three formative items measuring frequency of communication, closeness of relationship, and duration of relationship (Anderson, 2008). For each tie listed, employees responded to these three items. The item for frequency of communication was:

"How often do you communicate with this person on work-related issues?" and it was measured on a nine-point scale with endpoints anchors being "never" (= 1) to "multiple times a day" (= 9). The closeness item was: "How close is your relation with this colleague?" and was measured on a seven-point scale (1 = very distant and 7 = very close). The item for duration was: "How many years have you known this colleague?" and it was measured as intervals on a six-point scale (1 = less than six months and 6 = more than 10 years). The three items were standardized and averaged in order to create an index of tie strength for each employee. The correlations between the items in this index were as follows: frequency and closeness were significantly correlated (r = 0.37, p = 0.002), while duration was insignificantly related with both frequency (r = -0.03, p = 0.80) and closeness (r = -0.19, p = 0.12). Given that tie strength is theoretically argued to be a construct based on these formative indicators, the low correlation among the items does not weaken the properties of the construct (cf. Anderson, 2008).

Tacitness of knowledge. For each tie listed, the respondents were asked to indicate on a seven-point scale: "To what extent is the communication with this person about codified knowledge [= 1] or tacit knowledge [= 7]". This variable controls for the different effects that the character of the exchanged knowledge may have on creativity, where exchange of tacit knowledge is expected to be more valuable and conducive of creative behavior (Lam, 2000).

Outflow of knowledge. We hypothesized a curvilinear effect of brokerage on creativity (H1) based on a bounded rationality logic. Brokers that are exposed to too much non-redundant information may experience cognitive overload, and this in turn would negatively impact on their likelihood of being creative. Although we do not exclude the possibility that brokers may experience overload because of the combination of knowledge inflow and outflow, it seems natural to suppose that overload is mainly driven by an excessive intake of information. We thus wanted to rule out the possibility that our brokerage

measure captures scenarios where the broker is highly engaged in sending out (rather than receiving) information. For this reason, we control for knowledge outflow.

The level of knowledge outflow was captured through four items where each employee was asked to indicate the degree to which "colleagues in your department have received work-related knowledge transferred by you", "colleagues in your department have made use of work-related knowledge transferred by you", "colleagues in other departments in FeF have received work-related knowledge transferred by you", and "colleagues in other departments in FeF have made use of work-related knowledge transferred by you". All four items were measured on a seven-point scale (1 = very limited extent and 7 = very high extent) and added together to form an index variable for outflow of knowledge (Alpha = 0.90, CR = 0.88, AVE = 0.65).

Autonomous work motivation. Self-determination theory (Deci and Ryan, 2000; Ryan and Deci, 2000) posits that motivation differs in terms of how autonomous it is. Autonomously motivated individuals see their behavior as one that is self-endorsed and congruent with their own interests and values (Weinstein and Ryan, 2010). Individuals, however, can also be motivated in a controlled way. When this is the case, the feeling is one of pressure, and tasks are performed because of some external end (Deci and Ryan, 1985). Autonomous motivation in the workplace leads to higher behavioral effort and persistence (Ryan and Deci, 2000), and is a fundamental driver of creativity (Amabile, 1983, 1986; Amabile et al., 1996; Hennessey & Amabile, 2010; Mumford & Hunter, 2005). The variable of autonomous work motivation is based on five items (scale from Ryan and Connell, 1989; Gagné, Forest, Gilbert, Aube, Morin and Malorni, 2010) that form a strong construct (Alpha = 0.88, CR = 0.88, AVE = 0.61): "I make an effort in my job because the tasks I work on is exciting", "… because my job is interesting", "… because I find it personally satisfactory", "… because I feel good when I conduct my work", and "… because I like to conduct my

work." All the items were measured on a seven-point scale (1 = very limited extent and 7 = very high extent).

Collaborative climate. Research also highlights that contextual and environmental factors have an impact on employees' creativity. Specifically, a work environment where collaboration, communication, and mutual respect are promoted may reinforce feelings of reciprocity and cohesiveness, which in turn may facilitate the development of informal relationships, knowledge transfer and, eventually, creativity (Mumford & Hunter, 2005). Collaborative climate consists of three items (scale from Ramaswami, 1996) that perform very well in forming a strong construct (Alpha = 0.83, CR = 0.83, AVE = 0.63): "Managers invite for collaboration among employees", "…for a climate where employees respect each other", and "…for work-related discussions." All the items were measured on a seven-point scale (1 = very limited extent and 7 = very high extent).

Tenure. Finally, experience has been argued to provide people with more complete cognitive structures and knowledge bases that enable them to successfully process and recombine the available information into creative thoughts (Mumford & Hunter, 2005). We thus included tenure of the employee to tease out the variation in creativity that may be driven by work experience. This variable is a single item measure where respondents were asked: "How many years have you worked in the firm?"

RESULTS

The correlation matrix is shown in Table 1, which includes descriptive statistics for all variables. None of the independent variables have correlations that indicate problems of multicollinearity, as all of the correlations among the independent variables are below the commonly accepted threshold of 0.4. The highest correlation among the independent variables is found between brokerage and tie strength ($r = -0.38$, $p = 0.01$), which is not surprising as sparse social structures rich in structural holes tend to be characterized by the

presence of weak ties between the nodes (therefore the negative coefficient). It is also noteworthy that the correlation of brokerage and outflow of knowledge ($r = 0.36$, p = 0.01) is highly significant, indicating that a brokerage position does not just entail inflow of knowledge, but typically also involves outflow of knowledge. This is consistent with the idea that knowledge exchanges are typically not one-way streets, but rather interactive and bidirectional processes where information is acquired, processed, and also shared by the parties involved in the exchange.

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Insert Table 1 here

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We ran hierarchical regression to test the proposed hypotheses. Several checks were done to verify that the assumptions of the regression model were met, including examining variance inflation factor (VIF) values (where highest value obtained in Model 1 is 1.37), residual plots, and normal probability plots of the residuals. Model 1 is our base-line model that includes the main effects of our two hypothesized variables—brokerage and attention— and the six control variables. In Model 2 we add the squared term of brokerage to test the curvilinear relationship proposed in Hypothesis 1. Hypothesis 2 is tested in Model 3, where the sample is split into those observations with low *versus* high attention.

The results are presented in Table 2. It appears from Model 1 that the included variables explain no less than 43% of the variation in creative behavior (F = 5.46, p = 0.01). This is due to the significant effects of autonomous motivation, outflow of knowledge and tacitness of knowledge, and to the relatively high ratio of explanatory variables to observations in the dataset. It is further noticeable that brokerage does not have a significant impact on creativity. This might be due to the fact that more bridging provides access to more information which is valuable, and yet at the same time difficult to process. However, when the squared term of brokerage is introduced in Model 2 both the first order and second order

effect of brokerage becomes significant. Specifically, the first order effect turns positive (β = 0.24, p = 0.05) and the second order effect turns negative (β = -0.04, p = 0.01), while the other variables basically remain the same. This is also reflected in the increase in R-square from 0.43 to 0.49, and in the significant F-test for increment in the R-square (F = 6.82, p = 0.01). All in all, Model 2 provides support for Hypothesis 1 that brokers exhibit greater creativity when they are bridging an intermediate (as opposed to low or high) number of otherwise disconnected nodes in the network.

The sample split in Model 3 allows us to test the model for the employees with low attention *versus* those with high attention. The sample is split according to the median where all employees with a value below 5 on the attention scale is categorized as low attention and those equal to or higher than 5 as high attention. An analysis of variance of the differences in the means of creativity for the two groups indicate that there is no significant difference in the level of creativity for the two groups (F = 0.02, p = 0.89) as the means are 5.70 and 5.73 for the low and high attention group respectively. In other words, employees with low attention are as creative as employees with high attention (which is also the reason why the attention variable is insignificant in Model 1 and 2).

It appears from Model 3 that both first and second order effects of brokerage are insignificant for those employees with low attention. In other words, brokerage has no effect on creativity when the broker's attention is in the low end of the scale. On the other hand, in the high attention group, both the first order and second order effects are significant with the first order effect being positive (β = 0.46, p = 0.01) and second order effects being negative (β = -0.07, p = 0.01). It is striking that we get the same curvilinear relation for the high attention group in Model 3 as we did for all employees in Model 2. However, the coefficients are much higher for the high attention group in Model 3 than for all employees in Model 2. This is illustrated in Figure 1, where the obtained coefficients are applied to portray the

relationship between brokerage and creativity for both all employees, and for those employees in the high attention group only. The maximum effect of brokerage on creativity that is obtained for all employees is 0.39, while it is double as high (0.78) for the group of high attention employees. Taken together, these results provide support for Hypothesis 2 on the relation between brokerage on creativity being contingent on brokers' attention.

Among the control variables, autonomous motivation is consistently significant over all the presented models. This confirms that employees' own internal motivation is indeed of high importance for creative behaviors (Amabile, 1983, 1986; Mumford & Hunter, 2005). Similarly, tacitness of knowledge is also significant in most of the presented models. This again is not surprising, as tacit knowledge has been theorized to be conducive to creativity (Lam, 2000). Our results on outflow of knowledge, however, may seem to be less intuitive. Outflow of knowledge is positively related to creativity. Although the nature of our data does not allow us to substantiate the direction of causality, a possible explanation could be that creative people have more valuable ideas, and are therefore recognized as valuable source of information in the organization. For this reason, we could expect highly creative people to be approached by many colleagues in search of advice or information, and thus to have high knowledge outflow levels.

Finally, a number of robustness checks were conducted in order to validate the results. The models were tested while excluding the three observations with a brokerage value above 5 as these might be considered outliers, but the results qualitatively remained the same. We also conducted different splits between the low and high attention group—e.g., with the value 4 as the dividing point (instead of the median of 5)—but the results remained the same.

CONCLUDING DISCUSSION

What drives individual-level employee creativity? We consider two constructs—brokerage and attention—that both influence creativity in the workplace. Brokerage captures

a node's access to otherwise disconnected nodes, and, in turn, her access to non-redundant information. Attention captures an employee's capacity for cognitively attending to that information. Our research highlights that brokerage opportunities together with the possibility to focus and concentrate in the workplace are critical parts of an answer to this question.

Access to non-redundant information is a fundamental ingredient of creativity (Amabile, 1996; Simonton, 1999). *Ceteris paribus*, employees that link otherwise disconnected others in a network get access to more non-redundant information, and are thus expected to be more creative than employees that do not have this structural opportunity (Borgatti & Halgin, 2011; Fleming et al., 2007). This research, however, does not show a linear relation between brokerage and creativity (cf. Zhou et al., 2009), but rather a curvilinear one. This finding is consistent with the idea that, because of bounds in human rationality, the benefit of having access to non-redundant information can, after a certain point, be outweighed by the cognitive costs of managing that information. Given the importance of creativity in organizations (Amabile, 1996; Ford, 1996), this research was aimed at better understanding how bounds on human rationality impact on the relation between brokerage and individual-level creativity in the workplace.

In line with limited information-processing capability arguments (Simon, 1978), we proposed that there is a point of diminishing returns where too many ties bridging otherwise disconnected nodes in a network become difficult to manage for the focal employee. Further, we took an attention-based perspective (March and Simon, 1958; Ocasio 1997, 2011), and proposed attention as a fundamental contingency factor that determines whether a broker can benefit from her position in the social structure. We find that employees exhibit higher creativity when their brokerage levels are intermediate, and that this relation is contingent on the possibility for the broker to focus and concentrate in the workplace. This finding is interesting, as previous research on the network antecedents of creativity has looked at the

effects of structural (Burt, 1992, 2004), and more recently psychological (e.g., Fleming et al., 2007; Rodan & Galunic, 2004) factors without addressing the extent to which these effects are impacted by employees' cognitive and attentional limitations.

The main insight of this research is that network-driven opportunities for being creative in the workplace are constrained by bounds in human rationality. Thus, the possibility to dedicate attention to the processing of the information that flows through a brokered social structure is a crucial factor that decides whether the opportunity to link otherwise disconnected others results in creative behaviors. With these findings we contribute to two main areas of research. First, by looking at how social structure and attention combine in predicting creativity in organizations we confirm Adler and Kwon's insight that: "The mere fact of a tie implies little about the likelihood that social capital effects will materialize" (2002: 25), and contribute to research in network theory that emphasizes the importance of looking at social relationships together with psychological mechanisms (e.g., Adler and Kwon 2002, Anderson 2008, Emirbayer and Goodwin 1994, Mehra et al. 2001). Second, we contribute to research looking at network structures as predictors of creativity in organizations (e.g., Fleming et al., 2007; Perry-Smith, 2006; Perry-Smith & Shalley, 2003). Controlling for factors that have already been shown to be conducive to creativity such as autonomous work motivation, a collaborative climate, and work experience, we find that the potential of brokerage needs to be considered together with psychological factors.

The contributions of this study should be considered in light of its limitations. First, we rely on cross-sectional data. Thus, the direction of causality in our model cannot be fully ascertained. That is, while we argue in the direction from brokerage and attention to creativity, it is also possible to hypothesize alternative causal explanations. For example, it could be argued that our creativity measure reflects pre-existing individual characteristics: People that are very creative may tend to place themselves in social contexts where they

know that they can interact with people pertaining to distant social worlds, and hence obtain novel information. However, our arguments run in the opposite direction because abundant research highlights that creativity is indeed a malleable characteristic that is influenced by personal and contextual factors (Amabile, 1983, 1986; Mumford & Hunter, 2005; Shalley et al., 2004). This notwithstanding, additional research based on experimental or longitudinal data is needed to confirm the direction of causality that we propose in our model.

Second, attention involves the focusing of mindfulness and energy on a limited number of elements at a time. Focused attention eases perception and action towards those elements being attended to (Kahneman, 1973). Thus, employees that selectively focus their attention on opportunities for being creative in the workplace may benefit from a brokerage position even with relatively low attention levels. We control for environmental, individual, and organizational factors that may influence an employee's ability to attend to tasks. However, we do not look at mechanisms of selective attention allocation. In other words, we assume that low overall attention also means low attention that is dedicated to information processing.

Finally, our results also carry important managerial implications. In order to stimulate employee creativity in the workplace, managers need not only to ensure that employees develop intermediate numbers of ties bridging structural holes, but they also need to protect employees' attention in the workplace. This defines an important role for the numerous factors that may influence the attention that employees allocate to their tasks and behaviors—for example, the way in which the office space is designed (e.g., open-space versus closed offices), the way in which communication is carried out, or the scheduling of meetings that may have an impact on the normal workflow. Thus, a better understanding of how structural and attentional factors combine in fostering individual-level creativity in the workplace not only enriches our theoretical understanding of this fundamentally important behavior, but

also provides managers with refined guidance for value creation. We trust that the analysis presented here will encourage future developments of this important path towards a better understanding of how rational limitations and structural factors combine in determining individual-level creativity in the workplace.

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Figure 1. Relation between brokerage and creativity
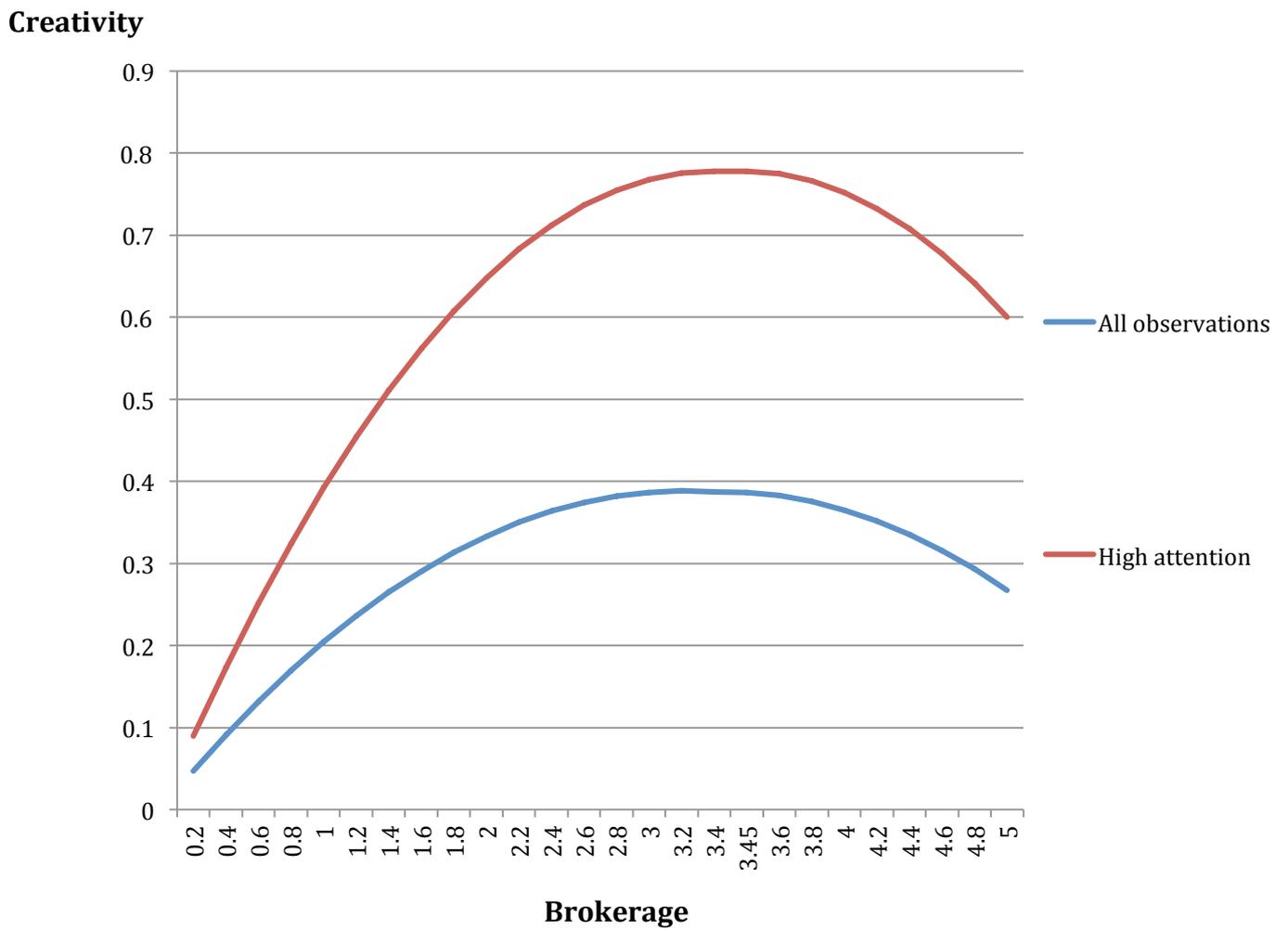
Creativity

Table 1: *Correlation matrix (n = 68)**

	1	2	3	4	5	6	7	8	9
1) Creativity	1.00								
2) Brokerage	0.04	1.00							
3) Attention	0.02	0.01	1.00						
4) Tie strength	-0.04	-0.38	0.07	1.00					
5) Tacitness of knowledge	0.22	-0.14	0.11	0.23	1.00				
6) Outflow of knowledge	0.31	0.36	-0.06	-0.17	-0.02	1.00			
7) Autonomous motivation	0.47	0.03	-0.01	-0.20	-0.05	0.22	1.00		
8) Collaborative climate	0.37	-0.03	0.07	-0.01	-0.03	0.19	0.37	1.00	
9) Tenure	0.22	-0.15	-0.01	0.01	-0.01	0.03	0.14	0.12	1.00
Mean	5.71	2.20	5.00	0	4.80	5.21	6.2	5.72	8.33
Std. dev.	0.69	1.83	1.49	0.61	0.88	1.27	0.65	0.99	6.93
Min. values	4	0	1	-1.40	2.4	1	3.8	2	0
Max. values	7	8.66	7	1.53	7	7	7	7	29

*All coefficients above |0.30| are significant at 5% significance level

Table 2: Hierarchical regression results *(n = 68)**

	Model 1	Model 2	Model 3	
			Low attention	High attention
Attention	-0.01 (0.05)	0.01 (0.04)	0.04 (0.10)	0.42* (0.20)
Brokerage	0.01 (0.04)	0.24** (0.10)	-0.40 (0.24)	0.46*** (0.15)
Brokerage*Brokerage		-0.04*** (0.01)	0.10 (0.07)	-0.07*** (0.02)
Controls				
Tie strength	0.08 (0.13)	0.05 (0.12)	0.11 (0.15)	-0.15 (0.22)
Tacitness of knowledge	0.18** (0.08)	0.21*** (0.08)	0.13 (0.13)	0.17* (0.10)
Outflow of knowledge	0.16*** (0.06)	0.14** (0.06)	-0.01 (0.09)	0.21*' (0.08)
Autonomous work motivation	0.37*** (0.12)	0.33*** (0.11)	0.62** (0.24)	0.28** (0.13)
Collaborative climate	0.12 (0.08)	0.16** (0.07)	-0.01 (0.14)	0.13 (0.09)
Tenure	0.01 (0.01)	0.01* (0.01)	0.01 (0.01)	0.01 (0.02)
Intercept	1.03 (0.83)	0.76 (0.80)	1.23 (1.30)	-1.81 (1.59)
N	68	68	33	35
F-value	5.46***	6.16***	3.23**	6.38***
R-square	0.43	0.49	0.56	0.70
F-tests of increment in R-square		6.82***		
Maximum point		(3.21, 0.39)		(3.38, 0.78)

***, ** and * indicates a significance level of 1%, 5% and 10%, respectively