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The Ambidexterity of Managers' Networks

Michelle Rogan
INSEAD
Entrepreneurship
michelle.rogan@insead.edu

Marie Louise Mors
London Business School
Strategy & Entrepreneurship
lmors@london.edu

Abstract

Addressing the call for a deeper understanding of ambidexterity at the individual level, we propose that managers? networks are an important yet understudied factor in the ability to balance the trade-off between exploring for new business and exploiting existing business. Analyses of 1449 ties in the networks of 79 senior partners in a management consulting firm revealed significant differences in both the structure and nature of ties of networks of managers who were able to both exploit and explore compared to managers that were able to predominately explore or exploit. The findings suggest that managers? networks are important levers for their ability to behave ambidextrously and offer implications for theories of organizational ambidexterity.

THE AMBIDEXTERITY OF MANAGERS' NETWORKS

ABSTRACT

Addressing the call for a deeper understanding of ambidexterity at the individual level, we propose that managers' networks are an important yet understudied factor in the ability to balance the trade-off between exploring for new business and exploiting existing business. Analyses of 1449 ties in the networks of 79 senior partners in a management consulting firm revealed significant differences in both the structure and nature of ties of networks of managers who were able to both exploit and explore compared to managers that were able to predominately explore or exploit. The findings suggest that managers' networks are important levers for their ability to behave ambidextrously and offer implications for theories of organizational ambidexterity.

A central challenge for firms is managing the tradeoff between exploring for new business and exploiting existing business, both of which are necessary for sustaining long-term performance (March, 1991). The tradeoff derives from recognition that organizational behavior is driven by adaptive processes that direct the behavior of the members of the organization towards exploitation of old certainties rather than exploration of new and potentially risky opportunities. In the context of the firm, this means that continuing with existing business in which near term success is certain is relatively more attractive to managers than exploring for new business in areas in which success is less certain. Consequently, a rich literature regarding both the reasons why resolving this performance dilemma is difficult and the means by which firms may be able to do so has developed (e.g. Benner and Tushman, 2002; 2003; Lavie, Stettner & Tushman, 2010).

In particular, scholars have devoted considerable attention to understanding organizational ambidexterity, the capability to both explore and exploit within the same organization. Arguments for organizational ambidexterity suggest that it may be achieved contextually, when organizations shape business unit contexts that enable the behaviors required to pursue both exploration and exploitation (e.g., Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008); temporally, when exploration and exploitation are performed by the same unit at different points in time (e.g., Brown & Eisenhardt, 1997; Puranam, Singh, & Zollo, 2006), and structurally, when exploration and exploitation activities are separated into different units in the firm (e.g., Adler, Goldoftas & Levine, 1999; Duncan, 1976; Tushman & O'Reilly, 1996).

While these three approaches differ in their assumptions about what underlies organizational ambidexterity, common across all approaches is a clear emphasis on the role of individuals in achieving organizational ambidexterity. According to Gibson and Birkinshaw

(2004: 211), "although ambidexterity is a characteristic of a business unit as a whole, it *manifests itself in the specific actions of individuals throughout the organization*" (emphasis in original). Likewise, in structural ambidexterity arguments, a critical component of an ambidextrous organization is the senior manager who serves as a point of integration between the structurally differentiated units (Tushman et al, 2010; Jansen, Tempelaar, Van den Bosch, F. & Volberda, 2009; Taylor & Helfat, 2009; Tushman & O'Reilly, 1996). Nevertheless, despite the fact that individuals are key elements of ambidexterity theory, to date, the bulk of empirical research on ambidexterity has been limited to organization level analyses (Raisch, Birkinshaw, Probst and Tushman 2009: 687), and empirical studies of individual level ambidexterity are scarce (for exceptions see Jansen et al 2008, 2009; Mom et al 2007, 2009). As a consequence, our understanding of the micro-foundations of ambidexterity – the individual managerial behaviors that underlie an organization's ability to both explore and exploit - remains underdeveloped.

We address this gap in the ambidexterity literature by empirically investigating the ambidextrous behaviors of individual managers in an organization. Following previous work, we define ambidexterity at the individual level as "a manager's behavioral orientation toward combining exploration and exploitation related activities within a certain period of time" (Mom et al., 2009: 812; Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2004). A large and well-developed literature has shown that the behavior of organizational actors, i.e. managers, is in large part shaped by the networks of relationships surrounding them (e.g., Burt, 1992; Coleman, 1988, Granovetter, 1985). Drawing on this literature, in our investigation we adopt a network perspective on ambidexterity. Applying network theory to the exploration-exploitation trade-off is an approach that recently has been gaining traction (e.g., Atuahene-Gima & Murray, 2007; Lavie & Rosenkopf, 2006; Lazer & Friedman, 2007; Tiwana, 2008). Our approach builds on this

prior work by examining individual-level networks and their relation to ambidextrous behavior among managers rather than firm-level networks relation to organizational ambidexterity, the focus of these prior studies. By directly observing the structure and content of managers' network relationships and their exploration and exploitation behaviors, we aim to develop insights into the micro-foundations of ambidexterity. If individual managers' behaviors represent the micro-foundations of ambidexterity as suggested by organizational ambidexterity arguments (cf. Gibson & Birkinshaw 2004), then the question of how managers' networks relate to their exploration and exploitation behaviors is clearly an important one.

Our study setting is a professional service firm that provides strategy and management consulting services to its clients. The ability to exploit existing business while also exploring for new business is essential to the long term performance of professional service firms (Anand, Gardner & Morris, 2007; Groysberg & Lee, 2009). In many professional service firms and in this firm in particular, the partners were expected to oversee both the firm's current business with its clients and the firm's activities for bringing in new business, or in other words to act ambidextrously (Lorsch & Tierney, 2002: 92-3). Nevertheless, acting ambidextrously was difficult given the inherent trade-off in the allocation of the firm's resources (e.g. staff, time, budget) to serving existing clients versus searching for new clients. Therefore, the answer to our research question is directly relevant to such firms and the partners managing them. Using an original dataset, we analyze the networks of 79 senior partners in the firm and identify attributes of their networks that relate to their ambidexterity.

INDIVIDUAL-LEVEL AMBIDEXTERITY

Although individual level ambidexterity remains underdeveloped in strategy and organizations research, research in psychology and neuroscience has shown that individuals do

vary in their abilities to engage in both exploration and exploitation activities (e.g., Cohen, McClure & Yu, 2007; Daw, O'Doherty, Dayan, Seymore & Dolan, 2006; Laureiro-Martinez, Brusoni & Zollo, 2010). However, unlike the undersocialized view of individuals that characterizes these studies, we examine differences among managers' capabilities for ambidexterity within an organizational context. Therefore, our study is most relevant to research considering the consequences of managerial behaviors for ambidexterity within organizations. In particular as noted above, our contextual approach allows for the development of further insights into the microfoundations of ambidexterity, i.e. the individual managerial behaviors that underlie an organization's ability to both explore and exploit (Eisenhardt et al., 2010; O'Reilly & Tushman, 2008).

Existing empirical studies of individual level ambidexterity within strategy and organizations research though few in number provide a useful starting point for further investigation. Certain attributes of senior teams have been identified as increasing organizational ambidexterity, in particular the extent to which the team is behaviorally integrated (Lubatkin et al, 2006), has a shared vision and uses contingency awards (Jansen et al, 2008; 2009). More directly related to managerial ambidexterity is work by Mom and colleagues (2007; 2009). In their study of managers in a semiconductor firm, different types of knowledge flows were associated with exploration and exploitation, specifically top down flows aided exploitation and bottom up or horizontal flows aided exploration behavior (Mom et al, 2007). In a more recent study, Mom and colleagues (2009) provide the most relevant insights for the antecedents to ambidexterity of managers. They argue that ambidexterity arises through the interaction of formal structures surrounding the manager and the manager's personal coordination mechanisms

(i.e. the manager's "connectedness" to other members of the organization) and find evidence of a positive association.

The relative scarcity of studies of individual level ambidexterity may be a function of two key challenges associated with this type of investigation – one empirical and the other theoretical. First, although scholars acknowledge that the adaptive processes that drive firm level capabilities for ambidexterity occur at the level of individual behavior, empirically observing these processes is difficult. Thus, much of the prior empirical research has used organization or unit level data to make inferences about individual level behavior (e.g., Gibson & Birkinshaw, 2004) or qualitative or small sample data with limited generalizability (Taylor & Helfat, 2009; Tushman & O'Reilly, 1996). While prior studies have clearly furthered our understanding of the role of individuals in ambidexterity, more work is needed that overcomes this empirical challenge. The second challenge is theoretical. In Gupta, Smith and Shalley's (2006) review of research on the exploration-exploitation tradeoff, they propose that the co-existence of exploration and exploitation within a single domain such as an individual person may not be possible and that only in a loosely coupled system, such as a team, unit or firm, is ambidexterity possible. By definition, the conceptualization of an individual as a single domain entails a highly tightly coupled system. Given the inherent tradeoffs between activities associated with exploration and those associated with exploitation, the question of whether ambidexterity can be achieved at an individual level of analysis arises - which raises a more fundamental question of whether research on ambidexterity at the individual level is warranted.

A network approach to the investigation of individual level ambidexterity provides a means to overcome these challenges. First, network analysis offers an opportunity to empirically investigate ambidexterity at the individual level without relying on organizational data and or

only qualitative or small sample data. A large body of knowledge regarding the observation and measurement of networks has been developed (e.g., Borgatti, Everett & Freeman, 2002; Marsden, 2004), and thus a network approach to the investigation of individual level ambidexterity overcomes the measurement difficulties encountered in other approaches. Furthermore, the network approach builds on prior ambidexterity work, in particular work by Mom and colleagues (2009) proposing a positive association between a manager's "connectedness" to other members and ambidexterity. We expand on this idea by unpacking connectedness into a set of network attributes and by considering not only the relevance of internal network attributes, but also external network attributes on a manager's ambidextrous behavior. To the extent that variance in the structure and nature of managers' networks is related to their abilities to balance exploration and exploitation, a network approach can provide further insight into the individual level correlates of ambidexterity. Second, a network approach also overcomes the theoretical challenge discussed above. In contrast to a conceptualization of the individual manager as a unitary actor that is a tightly coupled unit by definition (Gupta et al., 2006), a network approach conceptualizes the individual manager as an actor embedded in a network of relationships which varies on multiple dimensions and therefore is loosely coupled. The manager can engage or disengage certain parts of the network to perform different tasks, and thus, it may be possible for an individual manager to both explore and exploit, i.e. to act ambidextrously, by activating different parts of the network.

Prior work on ambidexterity suggests that achieving a balance between exploration and exploitation activities requires a set of capabilities that include some of those associated with exploration activities, some associated with exploitation activities and some associated with combining both. For example, access to novel knowledge and information enhances managers'

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abilities to pursue exploratory activities (Anand et al., 2007; March, 1991). At the same time, to exploit the firm's existing businesses, managers must be able to quickly and efficiently mobilize resources within-units and across units for the implementation of tasks associated with these (Adler et al., 1999). Finally, managers who both explore and exploit must juggle contradictory logics of action – one associated with exploration and flexibility and the other with exploitation and efficiency (Mom et al., 2009; Smith and Tushman, 2005). In order to manage these contradictory logics, these managers need a high level of autonomy in decision making. Thus, in our arguments below we focus on three mechanisms - (i) access to novel knowledge and information, (ii) mobilization of resources within and across units and (iv) autonomy in decision making - that underlie managers' abilities to both explore and exploit. The approach we take in our investigation is to identify network attributes that are associated with managerial ambidextrous behavior via the three mechanisms outlined above.

UTILIZING MANAGERIAL NETWORKS TO BALANCE EXPLORATION AND EXPLOITATION

While a network approach to the exploration-exploration trade-off has only recently been developed, evidence that the networks of organizational actors affect their abilities to balance exploration and exploitation has been accumulating. To date, the majority of this research has focused on interorganizational networks. In empirical research on alliances, scholars have argued and found that different relationships of the firm underlie firms' exploration and exploitation capabilities (e.g., Rothermael & Deeds, 2004; Lavie and Rosenkopf, 2006; Im and Rai, 2008; Tiwana 2008).

While the bulk of work on networks and the exploration-exploitation trade-off has been conducted at the level of interorganizational relationships, a few studies have begun to

investigate the implications of managerial networks for ambidexterity. In conceptual work, Kleinbaum and Tushman (2007) emphasize the role of the social networks of managers in cross unit innovation. These networks are hybrid social structures that consist of cross-divisional information brokerage, needed to identify possible collaborations, and cross-divisional cohesion, needed to implement them; which together underlie ambidexterity in firms. Similarly, Taylor and Helfat (2009) offer a conceptual framework for technology transitions in established firms in which middle management plays a key role in creating and maintaining linkages across exploratory and exploitative units in the firm. In empirical work, Mom and colleagues (2009) highlight the role of personal coordination mechanisms, measured as connectedness, to achieving ambidexterity, and Atuahene-Gima and Murray (2007) find that whereas managerial ties in the same industry were related to exploitative learning, managerial ties outside the industry were related to exploratory learning.

Our investigation builds on and extends this work. We consider not only the role of managerial networks inside the firm for achieving ambidexterity but also the effect of their external networks, which have been shown to be important in research at the organizational level (e.g. Lavie & Rosenkopf, 2006). Furthermore, our theory and analyses are developed at a more fine-grained level than prior work, allowing for further insights into the micro-foundations of ambidextrous behavior among managers.

While networks can vary on several dimensions, four dimensions highlighted in the networks literature are particularly relevant to our investigation. Network scholars have focused predominately on two dimensions of networks that affect the behavior of organizational actors: the structure of the ties in an actor's network and the content of those ties. Structure refers to the extent to which the ties comprising a network are densely or sparsely connected (Burt, 1992;

Coleman, 1988). A key insight of the theory is that structure affects an actor's access novel knowledge or the actor's ability to mobilize resources. Second, network scholars propose that the ties that comprise a network are conduits for resources and that the nature of the resources transmitted varies with the network content, i.e. the qualitative attributes of the ties in the networks (Podolny & Baron, 1997; Podolny, 2001). Therefore, in addition to the structure of the ties in the network, we consider a second dimension - the heterogeneity of contacts in the network (Rodan and Galunic, 2004) – in our arguments. Furthermore, when theorizing about individual actors as members of formal organizations like firms, as we do in this study, two additional dimensions become relevant. Within organizations, managerial behavior is shaped by both managers' formal ties, those associated with their formal positions in the firm, and their informal ties, those that are independent of their roles (Krackhardt & Hanson, 1993). Therefore, the third dimension is the extent to which a manager's ties are informal rather than formal. Finally, the locus of network, i.e. whether the ties in the network are internal or external to the boundaries of the firm, can modify the hypothesized effects of the first three dimensions. Thus, in our arguments we consider, not only the effect of network density on behavior, but also how the effect of density on behavior differs for a manager's internal or external network.

Network structure

Exploration for new opportunities requires a flow of novel ideas and knowledge from outside the firm. Extant research on networks shows that the structure of a manager's network affects access to novel information. Sparsely connected networks, as opposed to densely connected ones, have been found to provide managers with new knowledge and information (Burt, 1992; Reagans & McEvily, 2003). As Burt (1992) argues, the more interconnected the ties are in a manager's network, the more similar the information that the members of the network

hold, which in turn leads to greater redundancy in the information provided by each contact. Thus, by maintaining networks rich in 'structural holes,' i.e. low density, managers can improve their access to novel information (Burt, 1992). Similarly, in a simulation study, Lazer and Friedman (2007) illustrate how a sparsely connected network maintains greater diversity and consequently is better for exploration than a densely connected network. For these reasons, the *external* networks of managers who act ambidextrously should be characterized by the same low density associated with exploration. A manager's external contacts typically include customers and/or suppliers (Geletkanycz & Hambrick, 1997) who often serve as sources of new opportunities and thus facilitate exploration, in contrast to internal contacts that are more likely to facilitate the mobilization of resources as associated with exploitation as described below.

However, managers that act ambidextrously must also mobilize resources within the firm to exploit current business opportunities. Although the external networks of these managers are likely to resemble those of exploration managers, we expect their networks inside the firm to differ significantly. As described above, whereas the association of network density with redundant information means that dense networks are less helpful for exploration efforts, density in internal networks is important for exploitation activities. In networks in which members are themselves connected, information diffuses rapidly and efficiently aiding the coordination necessary for implementation of existing business activities (Coleman, 1988). Because internal resource mobilization is less important to exploration than exploitation, we expect that managers who act ambidextrously have denser internal networks than managers focused on exploration.

Bringing these arguments together, to act ambidextrously managers must be able to effectively mobilize resources for the implementation of tasks related to exploitation while continuing to access new knowledge and information for exploration, which requires a unique

combination of network attributes. Thus, although we expect the density of the external networks of such managers to resemble exploration-focused managers' networks, their internal networks should differ significantly and resemble the networks of exploitation-focused managers for resource mobilization purposes. These arguments lead to the following hypotheses:

Hypothesis 1. The density of the external networks of managers who act ambidextrously is lower than that of managers who are focused on exploitation.

Hypothesis 2. The density of the internal networks of managers who act ambidextrously is greater than that of managers who are focused on exploration.

Network heterogeneity/diversity

Another way that managers may access novel information needed for exploration in their network is through the diversity of the contacts to which they are connected. This diversity may come from the structure as argued above, but it could also come directly from the content that flows in the ties. Rodan and Galunic (2004) in their study of middle managers in a European telecommunications company show that the heterogeneity of the contacts is as important for access to diverse information as the structure of the network.

Building on this work we expect that higher levels of heterogeneity in a manager's external network is likely to facilitate exploration. Hence managers who are trying to act ambidextrously might benefit from higher levels of heterogeneity in terms of their external contacts. As such their network is likely to look more like those managers who focus primarily on exploration.

In addition to the need to mobilize resources *within* a given business unit, an important role of the senior manager in an ambidextrous organization is mobilizing resources *across* units (Kleinbaum and Tushman 2007, Taylor and Helfat, 2009). Senior managers need to identify

points for cross-fertilization of ideas between existing and emerging businesses and mobilize resources accordingly (Jansen et al., 2009; Tushman & O'Reilly, 1996). Those with a higher number of ties connecting different units in the firm are therefore better positioned to identify opportunities for sharing ideas and resources and to effectively mobilize resources across units. For example, in firms organized by industry sector such as the firm we study, to mobilize resources across units managers need ties to contacts in multiple industry units inside the firm. Therefore, we expect the industry heterogeneity of internal networks to be more strongly associated with acting ambidextrously than with an exploitation focus or exploration focus.

Formally,

Hypothesis 3. The external contact heterogeneity of managers who act ambidextrously is greater than that of managers focused on exploitation.

Hypothesis 4. The internal contact heterogeneity of managers who act ambidextrously is greater than that of managers focused on (a) exploitation and (b) exploration.

Formal v. informal relationships in network

Because managers regularly make decisions regarding the allocation of resources towards new or existing activities, an important function of these managers is to balance the contradictory agendas of exploration and exploitation (Eisenhardt et al, 2010; Gavetti & Levinthal, 2000; Smith & Tushman, 2005). This requires paradoxical thinking, which as described by Smith & Tushman (2005: 524) allows managers to "create meaning in the context of contradiction and to extract the benefits associated with contradictory strategic agendas." Given that firms generally tend towards exploitation at the expense of exploration, a large part of balancing agendas involves resisting pressures from the firm to invest mainly in existing business activities. To do so, managers require autonomy in decision making (Burgelman, 1994; McGrath, 2001) as this

allows them to allocate resources and attention towards exploration regardless of the pressures for exploitation.

Unlike other managers, managers that are able to act ambidextrously manage two contradictory logics of action – one associated with exploitation and the other with exploration. An exploitation logic involves local search, efficiency and short term performance. In contrast, an exploration logic involves distant search, flexibility and long term performance. Decisions about the allocation of resources to activities are shaped by both logics, yet the exploitation logic is usually the dominant one in most organizations (March, 1991). Managers that choose to allocate resources to exploration activities for which the returns are less certain are likely to face pushback from other organizational members who view the allocation as an inefficient use of firm resources. Therefore, to effectively balance the allocation of resources to exploration and exploitation activities, managers require autonomy in decision making. For example, Mom and colleagues (2009) found that a manager's formal decision making authority was significantly and positively related to their ambidexterity. We extend this prior work by developing arguments for a manager's informal decision making autonomy.

In general, the more power a manager has, the greater the manager's decision making autonomy (Tushman & Romanelli, 1983). While formal power is often attributed to a manager's position in the firm's hierarchy, an important source of informal power is the number of alternatives a manager has outside the firm (Emerson, 1962). In professional service firms, this is determined in part by the manager's ability to transfer human and social capital to another firm. When a manager has a network of relationships outside the firm that can be maintained independent of the firm, the manager and the network are portable and thus the manager has more alternatives to working in the current firm. Specifically, the degree to which a manager's

external network ties are informal, i.e. independent of the formal role the manager holds with the firm, should increase the manager's informal power and thus decision making autonomy. This argument is consistent with research by Groysberg (2008; 2010) on the portability of star analysts in financial services firms. Analysts whose performance was most portable were those who developed strong external relationships to clients that were independent of the firm. At the same time, a focus on developing informal external relationships at the expense of developing internal relationships negatively affected star analysts' performance when they transitioned to management roles. Applied to the current context these findings suggest that managers with external networks comprised of informal ties will have more options outside the firm and therefore greater latitude within the firm. They are better able to make decisions that run counter to the firm's pressures for exploitation. Nevertheless, too much focus on building informal external relationships could impair their ability to manage others inside the firm, which is important to exploitation activities. Therefore, we expect that managers that act ambidextrously will have more informal ties than exploitation managers but fewer informal ties than exploration managers in their external networks.

Informal ties inside the firm also aid in resource mobilization efforts (Ibarra, 1993; Krackhardt & Hanson, 1993; Tortoriello & Krackhardt, 2010), in particular when mobilization requires crossing formal boundaries. At the organizational level, Gulati and Puranam (2009) argue that inconsistencies between formal and informal structures provide a means for organizations to achieve ambidexterity. By enabling coordination in addition to that provided by the formal structure of the firm, informal relationships inside the firm allow managers to mobilize resources more effectively. These informal relationships may include ties formed in prior roles as well as new ties formed for personal reasons outside of the formal work roles. We

build on their arguments and propose that managers with more informal relationships inside the firm are more effective at mobilizing resources across units in the firm for at least two reasons. While all relationships are subject to reciprocity norms, exchange via informal relationships imbued with a personal dimension is more likely to be reciprocated in kind (Blau, 1964; Bouty, 2000). Furthermore, informal relationships allow managers to avoid bureaucracy that could hamper resource access (Løvås & Sorenson, 2008). Consistent with this argument, Mom and colleagues (2009) found that informal relationships (what they refer to as personal coordination mechanisms) of managers were positively related to their ambidexterity. For these reasons we expect that managers that have more informal ties in their internal networks will be better able to mobilize resources across units in the firm and therefore more likely to act ambidextrously than managers focused on either exploitation or exploration.

This combination of informal internal ties and informal external ties provides managers with enough autonomy to allocate resources to new business yet not so much that it impairs their ability to mobilize resources inside the firm. The use of informal ties in the external networks of managers who act ambidextrously should take on values in a middle range between exploitation-focused managers' networks and exploration-focused managers' networks. Formally,

Hypothesis 5. The informality of ties in the external networks of managers who act ambidextrously is (a) greater than that of managers focused on exploitation and (b) lower than that of managers focused on exploration.

Hypothesis 6. The informality of ties in the internal networks of managers who act ambidextrously is greater than that of managers focused on (a) exploitation and (b) exploration.

Figure 1 summarizes the predictions in our theoretical model.

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Insert Figure 1 about Here

METHODS

Empirical setting

The empirical setting is a professional services firm offering management consulting services to its clients (hereafter referred to as 'the firm'). We test our hypotheses on sample data of the professional networks of partners in the firm At the time of data collection, the firm had annual sales of more than US$500 million, employed more than 10,000 professionals worldwide, and operated in more than 40 countries. It had a partnership structure including analysts, consultants, project managers, senior project managers, associate partners, and senior partners. The firm was organized in global industry groups with functional specialty and geography as secondary dimensions. Importantly, the partners in the sample were drawn from the same hierarchical level within the firm, and thus we are able to examine the relationship of their network attributes to ambidexterity over and above the effects of organizational and role related factors identified in previous work (Mom et al., 2009). Although managers at any level of hierarchy in the firm can behave ambidextrously, we chose to focus our investigation on the ambidextrous behavior of senior managers. By examining senior managers at the same hierarchical level within the firm, we are able to rule out the effect of formal position on ambidexterity in our analyses and to focus on the relationship between the senior managers' networks and their ambidextrous behaviors.

Data collection

Testing the predictions required data on the managerial behaviors of partners and the attributes of their networks, which are available only via primary data collection. Therefore, we conducted two separate surveys: one survey of the supervisors of the partners to collect the

managerial behavior and performance data and another of the partners to collect their network

data. Furthermore, because access to senior executives, such as the partners in this study, is very

difficult to obtain and limited, we took additional measures to validate the design of the surveys

before administering them. In the first phase of data collection, in-depth interviews were

conducted with 32 senior partners across five Western European countries. The interviews

explored the role of professional networks in the work and performance of these partners and

provided input to the survey designs. The interviews revealed the importance of ambidexterity to

the performance of the firm. In the second phase, quantitative data were collected via two

surveys over three stages. In the first stage, the survey was piloted with ten partners (six in the

US and four in Europe) to eliminate potential biases arising from the sequencing or wording of

items. The results of the pilot indicated that an in-person interview format would generate the

highest response rate and provide more accurate and complete data than a written questionnaire,

and therefore, the survey was adapted for use in a face-to-face interview format. In the second

stage of data collection, a sample of 147 partners was randomly selected from offices located in

New York, Chicago, San Francisco, London, Paris, Milan, Madrid, Frankfurt, Tokyo, and

Sydney. A total of 133 survey interviews were scheduled, and of these 102 survey interviews

were completed.[1]

The survey design used in the second stage adhered to the standard network methodology

for egocentric designs (e.g., Burt 1984, 1992). It was organized in four main sections: (i)

demographic data (ii) identification and description of contact networks of each partner, i.e.,

name generator questions (iii) characteristics of each of the contacts in the partner's network, i.e.,

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[1] To rule out systematic bias between the partners sampled and those interviewed, we tested for differences in the mean values of the main organizational units of the firm (Levene, 1960). There were no significant differences across industry group and functional specialization and slight differences in geographic location. However these differences were a function of the availability of the interviewers in different geographic locations, not the partner's propensity to participate.

name interpreter questions. The name generator questions were adapted to the empirical context. Thus, to generate the list of contact names in their networks, the partners were asked on whom they relied to identify new business opportunities, to negotiate and close deals, to provide new knowledge and expertise, to develop their skills, to provide operational support, and sponsor their projects. A partner could identify a maximum of 24 different network contacts. Partners also indicated the existence of relationships among the contacts they named so that structural measures of the ego networks could be constructed. The network surveys were administered during 90-minute face-to-face meetings with individual partners between November 1999 and January 2000.

The third stage of data collection involved the collection of managerial behaviour and performance measures for each of the partners surveyed. Via a separate survey, the lead investigator interviewed the supervising partners of each partner in the sample to gather performance data. Due to legality and confidentiality issues, human resources would not provide performance data directly. Therefore, we adopted an approach consistent with related research on the performance of managers in consulting firms in which confidentiality issues did not allow access to actual performance data (e.g. Cross & Cummings, 2004), and asked the supervising partners to provide an assessment of each partner's performance. These data were collected via approximately 30-minute phone interviews with the supervising partners during February and March 2000, shortly after the official annual reviews of the partners were completed. The evaluation survey was designed to ensure that the questions were closely related to those in the actual internal annual review. In total, complete data on 79 of the 102 partners surveyed were collected, yielding a final sample size of 79 (1449 ties).[2]

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[2] We compared means from the final sample of 79 partners with the sample that we had collected network data along a number of demographic variables and found no evidence of bias.

Dependent variables

Managerial behavior. Managers vary in the extent to which they engage in primarily exploitation activities, primarily exploration activities or both exploitation and exploration. Prior empirical studies have treated the exploration-exploitation trade-off either as a continuum (e.g. Lavie & Rosenkopf, 2006) or as separate orthogonal dimensions (e.g. He & Wong, 2004, Jansen et al. 2009). As argued by Lavie, Stettner and Tushman (2010) in their review of exploration-exploitation research, the use of a continuum is preferable because it is most consistent with March's (1991) foundational conceptualization of the exploration-exploitation trade-off, and it does not conflate the underlying trade-off with efforts to reconcile the trade-off. A useful guideline provided by Gupta and colleagues (2006) is that the relationship between exploration and exploitation depends on whether the two activities compete for scarce resources and whether or not the analysis is focused on single or multiple domains. In this study, although the networks of the partners are loosely coupled, each individual partner represents a single domain. In addition, the resources used by each partner to pursue new or existing businesses are primarily their own time and human capital or that of other members of the firm, which are by definition scarce. Therefore, we measured each partner's exploration-exploitation behavior on a continuum.

We used managerial attention to new business, existing business or both as indicators of exploitation activities, exploration activities or ambidexterity, consistent with the structural ambidexterity approach which focuses on the distinction between new business and existing business activities in the firm (e.g., Tushman & O'Reilly, 1996). The supervising partners rated each partner on a five-point Likert scale: from one: 'much better at implementing existing business' to five: 'much better at new business development' with a midpoint of 'equally good at both.' 'New' in this context refers to activity in which the firm has not yet engaged, as opposed

to 'existing' which refers to an expansion or renewal based on existing practices with existing clients. From this measure we constructed the dependent variable comprised of three categories. Partners who received a score of one or two were categorized as 'exploitation managers.' Those receiving a three were categorized as 'ambidextrous managers.' Those who received a score of four or five were categorized as 'exploration managers.'

Independent variables

Network density. Network density is the extent to which a partner's contacts interact with one another. We measured network density according to the method proposed by Borgatti, Everett and Freeman (2002) for ego-centric network data, which is as follows:

$$Network\ density = ties\ /\ [\ (size*(size\text{-}1))\ /\ 2\ ]$$

Ties are the number of actual relationships among the contacts in the partner's network. *Size* is the total number of contacts in the partner's network where the denominator represents the number of possible ties among the contacts in the network. A high score on network density indicates that the partner's contacts are highly interconnected. Separate network density scores were calculated for the external and internal networks.

Contact heterogeneity. The firm was primarily organized by industry group, and therefore mobilizing resources across units in the firm often involved bridging industry groups. When reporting their network contacts, partners were asked to give the main industry within which each contact worked. Thus, contact heterogeneity is measured as the count of different industries represented in each partner's network. Separate scores were calculated for the external and internal networks.

Informal ties. The informality of relationships was measured by asking the partners which resources they used to build and maintain each relationship with their contacts. On the

written questionnaire item, the partners were reminded that they invested resources to build and maintain their network ties, and that some of these resources were independent of their formal role in the firm (e.g. personal knowledge, expertise, reputation, or friendship) and some were made available to them through their formal position in the firm (e.g. the firm's knowledge, reputation, or delivery capacity). The partners were asked to indicate on a five-point Likert scale the combination of resources they used to build and maintain each relationship with five indicating 'independent of formal' and one indicating 'formal.' We then calculated the average score for all ties in the partner's internal and external networks respectively. Thus, higher values indicate greater informality of ties in the partners' networks.

Control variables

We included standard human capital controls that could affect the relationship between our explanatory variables and dependent variable, including age and education.[3] Time to partner, or the number of years a manager was employed by the firm before promotion to partner, and tenure, total years with the firm, were included to capture the socialization of managers into the firm's routines, which could bias a manager towards exploitation. We also included the average growth rate in the partner's industry over the five years prior to the study year gathered from *Value Line* to control for industry driven differences in managerial growth performance.[4] We included a measure of each partner's revenue generation capability gathered during the interviews with the supervising partners (five-point Likert scale with five indicating highest level of revenue generation capability) as a control for performance differences across partners.

The sizes of the partners' internal and external networks were included as controls to rule

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[3] Including gender as a control variable does not affect the findings and gender is not significant. Therefore, we do not report the models including gender as a control variable.
[4] The Value Line data were compiled and made available to us by Professor Aswath Damadoran at NYU (http://pages.stern.nyu.edu/~adamodar/).

out the possibility that network size rather than the hypothesized network indicators were responsible for differences in ambidexterity. We also controlled for the effect of tie strength. Consistent with prior studies (Marsden & Campbell, 1984; Tsai & Ghoshal, 1998) we measure tie strength as the closeness to each contact measured on a five-point Likert scale from one indicating "distant" to five indicating "especially close." We then calculated the average closeness across the partner's contacts in the external and internal networks.

The partners in the sample were at the same level in the firm's hierarchy ruling out differences in ambidexterity due to differences in formal role. Because our sample is drawn from a single firm, we also can rule out organization-level variance in ambidexterity. However, although the partners were at the same level of hierarchy in the firm, they were members of different units in the firm. To be certain that the variance in managerial ambidexterity in our sample is not a function of unit-level ambidexterity, we control for unit-level ambidexterity by including the average managerial behavior score given to partners in the same organizational unit in the firm (17 unique units in the sample).

Analysis

The dependent variable, managerial behavior, is categorical. Therefore we estimated the models using a multinomial logistic regression (Long, 1997). The variable coefficients in the models indicate the effect of a one unit change in the variable on the log of the ratio of the probability of being an ambidextrous manager over the probability of being an exploitation or exploration manager. A positive (negative) sign on a coefficient corresponds to an increase (decrease) in the probability of being an ambidextrous manager rather than the probability of being an exploitation or exploration manager. All models were generated using STATA's

(version 11.0) mlogit command with robust standard errors, and clustered by the raters (i.e. the supervising partners providing the performance data).

RESULTS

Descriptive statistics and correlations are given in Table 1. Of the 79 partners in the sample, 34 were categorized as ambidextrous managers (43%), 21 as exploitation managers (27%) and 24 as exploration managers (30%). The high incidence of ambidexterity in the sample differs from prior work, which suggests that ambidexterity should be rare given the strong pressures for exploitation assumed to exist in firms. However, this could be explained by the fact that our study subjects were all senior managers in the firm. As reported by Mom and colleagues (2009), formal decision making authority is positively related to ambidexterity, and thus, within the firm, ambidexterity should be more common among the group of partners sampled than among managers lower in the hierarchy. Nevertheless, enough variance in managerial behaviors exists for our analyses.

Insert Tables 1 and 2 about Here

Results from the multinomial logistic regression analyses are given in Table 2. Model 1 reports the results for the tests of hypotheses 1 and 2. The negative significant coefficient on external network density in the baseline exploit model indicates that the likelihood of being an ambidextrous manager rather than exploitation manager decreases with external network density supporting Hypothesis 1. Hypothesis 2, predicting that ambidextrous managers would have denser internal networks relative to exploration managers was not supported. Model 2 reports the results for the tests of contact heterogeneity effects, Hypotheses 3 and 4. Hypothesis 3, predicting that ambidextrous managers have greater external contact heterogeneity than exploitation managers, was not supported. Hypothesis 4, predicting that ambidextrous managers

have greater internal contact heterogeneity than either exploitation or exploration managers, receives partial support. Model 3 reports the results for the final two hypotheses. Hypothesis 5, predicting that ambidextrous managers' external networks would include more informal ties than exploitation managers' networks but fewer informal ties than exploration managers' networks, receives strong support. Hypothesis 6 predicting that ambidextrous managers' would have more informal internal ties than either exploitation or exploration managers receives partial support. In summary four of six hypotheses received support.

Robustness checks

A test of the independence of irrelevant alternatives (IIA) assumption was not significant (Hausmann & McFadden, 1984). Nevertheless, we also estimated the models using multinomial probit analysis, which is appropriate if the IIA assumption is violated, and the results are consistent with those reported here. Multinomial logistic regression can produce incorrect results if the sample size is too small given the number of explanatory variables in the models. Therefore we also estimated a reduced form model including only the significant variables in Models 5 and 6 in Table 3. The results are consistent with those reported here.

Interpretation

We checked the change in the predicted probability of being rated as ambidextrous given a one standard deviation increase in each of the explanatory variables using the estimates from Model 4. A one standard deviation increase in external network density, internal contact heterogeneity, and external formal ties decreases the probability of being rated as ambidextrous by 0.21, 0.15, and 0.50 respectively. In contrast, a one standard deviation increase in internal informal ties increases the probability by 0.15.

In summary, the findings of this study are as follows. Regarding network structure, managers who explore and exploit have sparser external networks than managers who predominately exploit in line with the expectation that sparser networks provide access to novel information which is a key part of ambidexterity. Regarding network content, ambidextrous managers have greater heterogeneity of contacts than managers who exploit, in line with our prediction; but not as high a level as exploration managers, contrary to our expectations. Higher levels of heterogeneity among internal contacts is valuable when mobilizing resources across units of the firm; however, contact heterogeneity also can provide access to new opportunities or ideas via the combination of ideas, and so it is also key to exploration behaviors of managers and therefore, we did not observe a significant difference between exploration and ambidextrous managers here. Regarding the informality of networks, in external networks managers who behave ambidextrously have a level of informality that is greater than managers who predominately exploit but lower than managers who predominately explore. In line with our predictions, ambidextrous managers have significantly more informal ties in their internal networks than exploration managers, but in contrast to our prediction there is not a significant difference with exploitation managers. Managers who behave ambidextrously must mobilize resources in the firm, often in ways that formal organizational reporting lines do not follow, and therefore, their informal networks inside the firm are positively related to their ambidexterity. Those managers who primarily exploit do not need to manage such resource mobilization and so, informal ties internally appear to be less important.

DISCUSSION AND CONCLUSIONS

O'Reilly and Tushman (2004: 81) conclude that "one of the most important lessons is that ambidextrous organizations need ambidextrous senior teams and managers." Yet despite the

recognition of the need for managers to be able to act ambidextrously, research has largely neglected individual level ambidexterity. Hence our study contributes to the ambidexterity literature by examining the distinguishing characteristics of 'ambidextrous managers.' We argue and find that managers that act ambidextrously have networks that differ significantly from other managers' networks.

Our study makes three contributions. First, our research adds to a stream of papers applying network theory to better understand ambidexterity (Haas, 2010; Hansen et al., 2001; Im & Rai, 2008; Lazer & Friedman, 2007; Rosenkopf & Nerkar, 2001; Tiwana, 2008). Whereas past studies have explored either ambidexterity within relationships such as alliances or the effect of networks on organization level ambidexterity, our study offers arguments for how differences in networks affect ambidexterity at the individual level. In particular, the evidence provided by our analysis that different constellations of network characteristics are associated with different managerial behaviors should be of interest to network scholars. Likewise, evidence that different networks support exploration versus exploitation underlines ambidexterity researchers' claims that exploration and exploitation are inherently different activities (Lavie et al., 2010; March, 1991).

Second, our findings offer an opportunity to resolve a puzzle that exists in the ambidexterity literature. A central debate is whether ambidexterity is achievable either through the separation of exploitation and exploration activities into distinct units or by creating an organizational context that allows for the simultaneous pursuit of both activities (cf. Lavie et al., 2010). Our findings point to a middle ground. The use of different parts of managers' networks for exploration and exploitation suggests that it may be possible to consider a managers' networks as comprised of different domains as has been conceptualized in previous work at the

inter-organizational level of analysis (cf. Lavie, Kang, & Rosenkopf, 2009; Lavie et al., 2010). Organizational ambidexterity may be achievable in part via structural separation, in part via the development of an appropriate organizational context and finally via domain separation. The implication of this is that to explore and exploit managers do not necessarily need to separate the activities entirely but rather can "specialize" in either exploration or exploitation within different parts of their networks.

Lastly, our study aids in our understanding of the microfoundations of strategy (Eisenhardt et al., 2010; O'Reilly & Tushman, 2008). A recent stream of work has begun exploring the underlying individual-level mechanisms that explain outcomes at the level of organization and in so doing contribute to our understanding of strategy (e.g., Corredoira & Rosenkopf, 2010; Cui, Ding & Yanadori, 2011). Like these recent studies, our paper addresses the call for ambidexterity research at different levels of analysis (Lavie et al., 2010; O'Reilly & Tushman, 2008). By outlining how networks affect the ability of senior managers to act ambidextrously, this study not only advances our understanding of individual level ambidexterity but also lays more of the groundwork for understanding the implications of ambidexterity for organizational performance at higher levels of analysis.

REFERENCES

Atuahene-Gima, K. & Murray. 2007. Exploratory and exploitative learning in new product development: A social capital perspective in new technology ventures in China. *Journal of International Marketing*, 15(2): 1-29.

Adler, P., Goldoftas, B. & Levine, D. 1999. Flexibility versus efficiency? A case study of model changeovers in the Toyota production system. *Organization Science*, 10 (1): 43–68.

Anand, N., Gardner, H. & Morris, T. 2007. Knowledge based innovation: Emergence and embedding of new practice areas in management consulting firms. *Academy of Management Journal*, 50(2): 406-428.

Benner, M.J. & Tushman, M. L. 2003. Exploitation, exploration, and process management: The productivity dilemma revisited. *Academy of Management Review*, 28(2): 238-256.

Blau, P. 1964. *Exchange and power in social life*. Wiley: New York.

Borgatti, S. P., Everett, M. G., & Freeman L. C. 2002. *Ucinet for Windows: Software for Social Network Analysis*. Analytic Technologies: Harvard.

Bouty, I. 2000. Interpersonal and interaction influences on informal resource exchanges between R & D researchers across organizational boundaries. *Academy of Management Journal*, 43(1): 50-65.

Brown, S. L. & Eisenhardt, K. M. 1997. The art of continuous change: Linking complexity theory. *Administrative Science Quarterly*, 42: 1-35.

Burgelman, R.A. 1994. Fading memories: A process theory of strategic business exit in dynamic environments. *Administrative Science Quarterly*, 39: 24–56.

Burt, R.S. 1984. Network items and the general social survey. *Social Networks,* 6: 293-339.

Burt, R.S. 1992. *Structural holes*. Harvard University Press: Cambridge, MA.

Coleman, J. S. 1988. Social capital in the creation of human capital. *American Journal of Sociology*, 94(Supplement): S95-S120.

Cohen, J. D., McClure, S. M. & Yu, A. 2007. Should I stay or should I go? How the human brain manages the trade-off between exploitation and exploration. *Philosophical Transactions of the Royal Society*, 362: 933-42

Corredoira, R. A. & Rosenkopf, L. 2010. Should auld acquaintance be forgot? The reverse transfer of knowledge through mobility ties. *Strategic Management Journal*, 31 (2): 159-181

Cross, R. & Cummings, J. N. 2004. Tie and network correlates of individual performance in knowledge-intensive work. *Academy of Management Journal,* 47(6): 928-937.

Cui, V., Ding, W. W. & Yanadori, Y. 2011. Compensation structure and the creation of exploratory knowledge in technology firms. Working paper.

Daw, N. D., O'Doherty, J. P., Dayan, P., Seymore, B. & Dolan, R. J. 2006. Cortical substrates for exploratory decisions in humans. *Nature*, 441(7095): 876-879.

Duncan, R. B. 1976. The ambidextrous organization: Designing dual structures for innovation. R. H. Kilmann, L. R. Pondy, D. Slevin, eds. *The Management of Organization Design:* 167-188. North Holland, New York.

Eisenhardt, K. M., Furr, N. R. & Bingham, C. B. 2010. Microfoundations of performance: Balancing efficiency and flexibility in dynamic environments. *Organization Science*, 21(6): 1263-1273.

Emerson, R. M. 1962. Power-dependence relations. *American Sociological Review*, 27: 31-40.

Gavetti, G. & Levinthal, D. 2000. Looking forward and looking backward: Cognitive and experiential search. *Administrative Science Quarterly,* 45(1): 113-137.

Geletkanycz, M. A. & Hambrick, D. C. 1997. The external ties of top executives: Implications for strategic choice and performance. *Administrative Science Quarterly*, 42: 654-681.

Gibson, C. B. & Birkinshaw, J. 2004. The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, 47(2): 209-226.

Granovetter, M. 1985. Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91(3): 481-93.

Groysberg, B. 2008. How star women build portable skills. *Harvard Business Review*, 86(2): 74-81.

Groysberg, B. 2010. *Chasing Stars: The Myth of Talent and the Portability of Performance*. Princeton University Press.

Groysberg, B. & Lee, L. 2009. Hiring stars and their colleagues: Exploration and exploitation in professional service firms. *Organization Science,* 20(4): 740-758.

Gulati, R. & Puranam, P. 2009. Renewal through reorganization: The value of inconsistencies between formal and informal organization. *Organization Science*, 20(2): 422-440.

Gupta, A. K., Smith, K. G. & Shalley, C. E. 2006. The interplay between exploration and exploitation. *Academy of Management Journal*, 49(4): 693-706.

Haas, M. 2010. The double-edged swords of autonomy and external knowledge: Team effectiveness in a multinational organization. *Academy of Management Journal*, 53: 989-1008

Hansen, M. T., Podolny, J. M. & Pfeffer, J. 2001. So many ties, so little time: A task contingency perspective on corporate social capital. *Research in the Sociology of Organizations*: 21-57.

Hausman, J. & McFadden, D. 1984. Specification tests for the multinomial logit model. *Econometrica*, 52(5): 1219-1240.

He, Z. L. & Wong, P. K. 2004. Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organization Science*, 15(4): 481–494.

Hoetker, G. 2007. The use of logit and probit models in strategic management research: Critical issues. *Strategic Management Journal*, 28: 331-343.

Ibarra, H. 1993. Network centrality, power and innovation involvement: Determinants of technical and administrative roles. *Academy of Management Journal*, 36(3): 471-501.

Im, G. & Rai, A. 2008. Knowledge sharing ambidexterity in long-term interorganizational relationships. *Management Science,* 54(7): 1281–1296.

Jansen, J. J. P., George, G., Van den Bosch, F. A. J. & Volberda, H. W. 2008. Senior team attributes and organizational ambidexterity: The moderating role of transformational leadership. *Journal of Management Studies*, 45(5): 982-1007.

Jansen, J. J. P., Tempelaar, M. P., Van den Bosch, F. A. J. & Volberda, H. W. 2009. Structural differentiation and ambidexterity: The mediating role of integration mechanisms. *Organization Science*, 20(4): 797–811.

Kleinbaum, A. & Tushman, M. 2007. Building bridges: The social structure of interdependent innovation*, Strategic Entrepreneurship Journal*, 1(1): 103-122.

Krackhardt, D. & Hanson, J. R. 1993. Informal networks: The company behind the chart. *Harvard Business Review*, 71(4): 104111.

Laureiro-Martinez, D., Brusoni, S. & Zollo, M. 2010. The neuroscientific foundations of the exploration-exploitation dilemma. *Journal of Neuroscience, Psychology, and Economics*, 3(2): 95-115.

Lavie, D., Kang, J. & Rosenkopf, L. 2009. The performance effects of balancing exploration and exploitation within and across alliance domains. Paper presented at the Academy of Management Best Paper Proceedings, Chicago.

Lavie, D. & Rosenkopf, L. 2006. Balancing exploration and exploitation in alliance formation. *Academy of Management Journal*, 49(4): 797-818.

Lavie, D., Stettner, U. & Tushman, M. L. 2010. Exploration and exploitation within and across organizations. *The Academy of Management Annals*, 4: 1, 109-155.

Lazer, D. & Friedman, A. 2007. The network structure of exploration and exploitation. *Administrative Science Quarterly*, 52(4): 667-694.

Levene, H. 1960. Robust tests for equality of variances. In I. Olkin (Ed). *Contributions to Probability and Statistics*. Stanford University Press: Stanford, CA.

Long, J. S. 1997. *Regression Models for Categorical and Limited Dependent Variables*. SAGE Publications: Thousand Oaks, CA.

Lorsch, J. W. & Tierney, T. J. 2002. *Aligning the Stars: How to Succeed When Professionals Drive Results*. Harvard Business School Press: Boston, MA.

Lubatkin, M., Simsek, Z., Ling, Y. & Veiga, J. 2006. Ambidexterity and performance in small-to medium-sized firms: The pivotal role of top management team behavioral integration. *Journal of Management*, 32(5): 646-672.

Løvås, B. & Sorenson, O. 2008. The mobilization of scarce resources. In J.A.C. Baum and T. J. Rowley (eds.) *Advances in Strategic Management*, 25: 361-390. Oxford, UK: JAI/Elsevier.

March, J.G. 1991. Exploration and exploitation in organizational learning. *Organization Science*, 2: 71-87.

Marsden, P. & Campbell, K. 1984. Measuring tie strength. *Social Forces,* 63: 482-501.

Marsden, P. 2004. Network Analysis. In Kimberly Kempf-Leonard (Ed.) *Encyclopedia of Social Measurement*. San Diego, CA: Academic Press: 819-825.

McGrath, R. G. 2001. Exploratory learning, innovative capacity and managerial oversight. *Academy of Management Journal*, 44(1): 118-131.

Mom, T., van den Bosch, M. & Volderba, H. 2007. Investing managers' exploration and exploitation activities: The influence of top-down, bottom-up, and horizontal knowledge inflows. *Journal of Management Studies*, 44(6): 910-931.

Mom, T. J. M., van den Bosch, F. A. J. & Volberda, H. W. 2009. Understanding variation in managers' ambidexterity: Investigating direct and interaction effects of formal structural and personal coordination mechanisms. *Organization Science*, 20(4): 812-828.

O'Reilly III, C. A. & Tushman, M. L. 2004. The ambidextrous organization. *Harvard Business Review,* 82(4): 74-81.

O'Reilly III, C. A. & Tushman, M. L. 2008. Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Research in Organizational Behavior*, 28: 185-206.

Podolny, J. M. 2001. Networks as the pipes and prisms of the market. *American Journal of Sociology,* 107: 33-60.

Podolny, J. M. & Baron, J. N. 1997. Resources and relationships: Social networks and mobility in the workplace. *American Sociology Review,* 62(5): 673-693.

Puranam, P., Singh, H. & Zollo, M. 2006. Organizing for innovation: Managing the coordination-autonomy dilemma in technology acquisitions. *Academy of Management Journal*, 49: 263-280.

Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. L. 2009. Organizational ambidexterity: Balancing exploitation and exploration for sustained performance. *Organization Science*, 20(4): 685-695.

Raisch, S. & Birkinshaw, J. 2008. Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*, 34(3): 375-409.

Reagans, R. & McEvily, B. 2003. Network structure and knowledge transfer: The effects of cohesion and range. *Administrative Science Quarterly,* 48: 240-267.

Rodan, S. & Galunic, D. 2004. More than network structure: How knowledge heterogeneity influences managerial performance and innovativeness, *Strategic Management Journal*, 25: 541-556.

Rosenkopf, L. & Nerkar, A. 2001. Beyond local search: Boundary-spanning, exploration, and impact in the optical disk industry. *Strategic Management Journal*, 22(4): 287–306.

Rothermael, F. & Deeds, D. 2004. Exploration and exploitation alliances in biotechnology: A new system of new product development*, Strategic Management Journal*, 25(3): 201-221.

Smith, W. K. & Tushman, M. L. 2005. Managing strategic contradictions: A top management model for managing innovation streams. *Organization Science*, 16(5): 522-536.

Taylor, A. & Helfat, C. E. 2009. Organizational linkages for surviving technological change: Complementary assets, middle management, and ambidexterity. *Organization Science*, 20(4): 718-739.

Tiwana, A. 2008. Do bridging ties complement strong ties? An empirical examination of alliance ambidexterity. *Strategic Management Journal,* 29(3): 251–272.

Tortoriello, M. & Krackhardt, D. 2010. Activating cross-boundary knowledge: The role of simmelian ties in the generation of innovations. *Academy of Management Journal*, 53(1): 167-181.

Tsai, W. & Ghoshal, S. 1998. Social capital and value creation: The role of intrafirm networks. *Academy of Management Journal,* 43: 464-476.

Tushman, M. L. & O'Reilly, C. A. I. 1996. Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*, 38(4): 8-30.

Tushman, M. L. & Romanelli, E. 1983. Uncertainty, social location and influence in decision making: A sociometric analysis. *Management Science,* 29(1): 12-23.

Tushman, M. L., Smith, W. & Wood, R.C., Westerman, G. & O'Reilly, C. 2010. Organizational designs and innovation streams. *Industrial and Corporate Change*, Advance Access: 1-36.

TABLE 1
Descriptive statistics and correlations[a]

		Mean	S.D.	Min	Max	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.	Managerial Behavior	2.04	.76	1	3										
2.	External Network Density	.33	.32	0	1	-.17									
3.	Internal Network Density	.62	.20	.20	1	.06	.06								
4.	Ext. Contact Heterogeneity	1.13	.71	0	5	.13	-.02	.11							
5.	Int. Contact Heterogeneity	1.75	.95	0	5	.16	-.03	-.11	.35*						
6.	External Informal Ties	2.78	.94	1	5	.24*	.17	.09	.01	.02					
7.	Internal Informal Ties	3.30	.95	1	5	-.08	.23*	.13	-.14	.01	.31*				
8.	Revenue Generation	3.43	1.06	1	5	.22	.13	.08	-.02	-.17	-.03	.16			
9.	Age	43.72	4.46	37	55	-.11	-.09	-.07	-.05	.21	.03	-.01	-.13		
10.	Education Level	3.72	.55	3	5	.09	-.00	.07	.19	.01	.13	-.04	.12	.22*	
11.	Tenure	15.73	5.11	2	29	-.26*	-.02	.01	-.07	.23*	-.12	.02	-.05	.31*	-.25*
12.	Industry Avg. Growth Rate	.07	.03	.03	.11	.15	-.07	.11	.14	.03	.03	-.02	.04	-.01	.19
13.	Years Before Partner	9.61	3.58	0	15	-.27*	.11	.10	-.11	.02	-.09	.02	-.03	-.30*	-.29*
14.	Unit Level Ambidexterity	2.04	.31	1	2.80	.41*	-.19	.16	.09	-.05	-.01	-.13	.10	-.08	.04
15.	External Network Size	4.62	2.51	0	12	-.01	.15	.14	.34*	-.00	.03	.01	.14	.10	.16
16.	Internal Network Size	11.59	3.44	4	18	-.01	.01	-.35*	-.14	.24*	-.01	-.17	-.16	-.05	-.21
17.	External Tie Strength	3.44	.76	1.50	5	.08	.15	.15	.04	.10	.50*	.13	-.06	.11	.24*
18.	Internal Tie Strength	3.97	.50	2.62	5	.08	.07	.59*	.18	-.12	.08	.17	.23*	.10	.22

		11.	12.	13.	14.	15.	16.	17.
12.	Industry Avg. Growth Rate	-.10						
13.	Years Before Partner	.65	-.07					
14.	Unit Level Ambidexterity	-.20	.38*	-.11				
15.	External Network Size	.18	-.05	.10	.01			
16.	Internal Network Size	-.01	-.12	-.04	-.17	-.29*		
17.	External Tie Strength	-.05	.10	-.12	.06	.10	-.14	
18.	Internal Tie Strength	.10	.11	.05	.02	.44*	-.43*	.36*

[a]N=79

*p<0.05

TABLE 2 Multinomial Regression of Ambidexterity

	Model 1		Model 2		Model 3		Model 4	
	Baseline Exploit	*Baseline Explore*	*Baseline Exploit*	*Baseline Explore*	*Baseline Exploit*	*Baseline Explore*	*Baseline Exploit*	*Baseline Explore*
External Network Density	**-3.46****	-1.31					**-5.94*****	-1.24
	(1.10)	(1.32)					**(1.54)**	(1.35)
Internal Network Density	2.32	**1.87**					1.53	**4.07**
	(2.40)	**(2.38)**					(3.41)	**(2.69)**
Ext. Contact Heterogeneity			**-0.05**	0.08			**-0.86**	0.67
			(0.45)	(0.78)			**(0.84)**	(0.80)
Int. Contact Heterogeneity			**0.90+**	**-0.19**			**1.60***	**-0.88***
			(0.50)	**(0.31)**			**(0.76)**	**(0.40)**
External Informal Ties					**0.64***	**-1.42****	**1.61*****	**-2.58****
					(0.33)	**(0.54)**	**(0.37)**	**(0.88)**
Internal Informal Ties					**-0.23**	**0.98***	**-0.05**	**1.49****
					(0.42)	**(0.45)**	**(0.59)**	**(0.50)**
Revenue Generation	1.07**	0.11	0.63	-0.03	0.68	-0.21	1.94*	-0.10
	(0.39)	(0.33)	(0.50)	(0.29)	(0.49)	(0.31)	(0.78)	(0.40)
Age	-0.18	0.10	-0.16	0.08	-0.19	0.14	-0.43*	0.18
	(0.12)	(0.14)	(0.11)	(0.14)	(0.14)	(0.15)	(0.20)	(0.21)
Education Level	0.85	0.74	0.55	0.72	0.73	0.92	0.69	0.86
	(0.90)	(0.58)	(1.04)	(0.65)	(1.01)	(0.75)	(1.42)	(0.76)
Tenure	-0.01	-0.22	-0.05	-0.16	0.06	-0.24	-0.05	-0.22
	(0.15)	(0.14)	(0.14)	(0.12)	(0.13)	(0.15)	(0.21)	(0.20)
Industry Avg. Growth Rate	-22.62*	-7.72	-18.26*	-6.19	-16.57	-9.04	-34.32*	-12.19
	(11.13)	(11.32)	(7.94)	(11.94)	(10.71)	(13.85)	(14.92)	(20.79)
Years Before Partner	0.05	0.47*	-0.04	0.38*	-0.06	0.53*	-0.05	0.65*
	(0.19)	(0.18)	(0.16)	(0.16)	(0.17)	(0.22)	(0.25)	(0.31)
Unit Level Ambidexterity	5.63*	-2.05	7.02***	-1.47	5.92***	-1.36	11.21**	-2.29+
	(2.47)	(1.31)	(2.02)	(1.20)	(1.63)	(1.25)	(4.02)	(1.37)
External Network Size	0.19	0.21	0.12	0.15	0.09	0.29	0.40	0.48+
	(0.20)	(0.21)	(0.24)	(0.18)	(0.20)	(0.19)	(0.30)	(0.25)
Internal Network Size	-0.06	-0.11	-0.10	-0.11	-0.09	-0.10	-0.18	-0.01
	(0.11)	(0.10)	(0.11)	(0.10)	(0.12)	(0.10)	(0.12)	(0.11)
External Tie Strength	0.62	0.11	-0.09	-0.04	0.05	1.12	-0.45	2.78**

	(0.61)	(0.49)	(0.68)	(0.48)	(0.77)	(0.78)	(0.81)	(1.04)
Internal Tie Strength	-0.40	-0.66	1.09	-0.11	0.49	-0.85	0.46	-2.91+
	(1.37)	(1.49)	(0.93)	(1.14)	(1.07)	(1.25)	(1.70)	(1.52)
Constant	-9.06	-1.57	-12.84+	-1.73	-9.47	-5.63	-12.32	-6.25
	(9.49)	(8.23)	(7.46)	(7.16)	(7.34)	(7.01)	(10.20)	(11.17)
Log pseudolikelihood	-60.06	-60.06	-60.48	-60.48	-57.09	-57.09	-44.65	-44.65
Pseudo R2	0.29	0.29	0.29	0.29	0.33	0.33	0.48	0.48
df	13	13	13	13	13	13	17	17

[a] N=79; Dependent variable has three categories: Exploitation manager, ambidextrous manager and exploration manager. The baseline outcome is either exploitation or exploration as indicated for each Model. Robust standard errors clustered by supervisor are in parentheses. The relevant coefficients for the hypotheses tests are given in bold.

+ $p<0.10$
* $p<0.05$
** $p<0.01$
*** $p<0.001$

FIGURE 1
Summary of predictions

Network characteristics

Structure (Density)
External network
Internal network

Contact Heterogeneity
External network
Internal network

Informality of Ties
External network
Internal network

Unobserved mechanisms

Access to novel information

Resource mobilization

Autonomy

Outcome

Managerial ambidexterity

Positive relationship
Negative relationship