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Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance

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Organizational ambidexterity has emerged as a new research paradigm in organization theory, yet several issues fundamental to this debate remain controversial. We explore four central tensions here: Should organizations achieve ambidexterity through differentiation or through integration? Does ambidexterity occur at the individual or organizational level? Must organizations take a static or dynamic perspective on ambidexterity? Finally, can ambidexterity arise internally, or do firms have to externalize some processes? We provide an overview of the seven articles included in this special issue and suggest several avenues for future research.

Key words: ambidexterity; change; exploitation; exploration; innovation; organization design
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Introduction

One of the more enduring ideas in organization science is that an organization's long-term success depends on its ability to exploit its current capabilities while simultaneously exploring fundamentally new competencies (Levinthal and March 1993, March 1991). Earlier studies often regarded the trade-offs between these two activities as insurmountable, but more recent research describes *ambidextrous* organizations that are capable of simultaneously exploiting existing competencies and exploring new opportunities. Building upon earlier work by Duncan (1976), Tushman and O'Reilly (1996) were first to present a theory of organizational ambidexterity. They suggest that superior performance is expected from the ambidextrous organization and describe structural mechanisms to enable ambidexterity

In recent years, the concept of organizational ambidexterity has gained momentum in research on organizations. The number of studies in leading management journals that explicitly refer to the ambidexterity concept increased from less than 10 in 2004 to more than 80 today. This increasing attention has contributed to the refinement and extension of the ambidexterity concept. First, conceptual work has been complemented by large-scale empirical studies that provide evidence of organizational ambidexterity's generally positive association with firm performance (Gibson and Birkinshaw 2004, He and Wong 2004, Lubatkin et al. 2006). Second, the initial attention to structural antecedents has been extended to investigations of the roles played by contextual (Gibson and Birkinshaw 2004), informal network (Gulati and Puranam 2009), and leadership-based (Beckman 2006, Lubatkin et al. 2006, Smith and Tushman 2005) antecedents of ambidexterity. Third, studies have started to explore how environmental (Auh and Menguc 2005, Jansen et al. 2006) and organizational moderators (Atuahene-Gima 2005, Lubatkin et al. 2006, Kyriakopoulos and Moorman 2004) affect the interrelations between ambidexterity, its antecedents, and performance outcomes. This body of work has been categorized and thoroughly discussed in recent review papers (O'Reilly and Tushman 2008, Raisch and Birkinshaw 2008). Despite increasing interest in ambidexterity as a concept, an examination of the literature indicates that several important research issues remain unexplored, ambiguous, or conceptually vague. We suggest there are four closely interrelated "central tensions" that need to be addressed to enable further progress in research on ambidexterity.

The first tension relates to *differentiation* and *integration* as alternative or complementary pathways to ambidexterity. Differentiation refers to the separation of exploitative and explorative activities into distinct organizational units, whereas integration refers to the mechanisms that enable organizations to address exploitative

and explorative activities within the same organizational unit. To date, the two approaches have often been positioned as mutually exclusive solutions; however, scholars have pointed to various shortcomings inherent in both. Further progress in this area may depend on a better understanding of the tensions and complementarities between the two approaches.

The second tension relates to the question of whether ambidexterity manifests itself at the *individual* or *organizational* level. Ambidexterity research usually describes organizational mechanisms to enable ambidexterity, such as formal structures or lateral coordination mechanisms. Conversely, some studies indicate that ambidexterity is rooted in an individual's ability to explore and exploit. Organizational mechanisms may be required to enable ambidexterity at the individual level, and ambidextrous individuals may be vital to the usefulness of organizational mechanisms. There is, therefore, a need for theories that capture ambidexterity across multiple levels of analysis.

The third tension relates to *static* versus *dynamic* perspectives on ambidexterity. Although some research suggests that sequential attention should be paid to exploitation and exploration, the majority of organizational ambidexterity research presents a range of solutions that enables organizations to simultaneously pursue the two activities. These studies take a static view of organizational behavior: Organizations become ambidextrous by adopting certain configurations. Given the dynamism of markets and organizations, it is important to develop theories that combine static elements with more dynamic perceptions of ambidexterity.

Finally, the fourth tension relates to *internal* versus *external* perspectives on ambidexterity. Research on organizational ambidexterity has focused on how organizations address exploitation and exploration internally. Related research on innovation and knowledge processes stresses the importance of the external acquisition of new knowledge for exploration. Studies on dynamic capabilities describe interrelations between internal and external knowledge processes that play an important role in corporate renewal. There is a need to explore the interplay between internal and external processes in the creation and preservation of organizational ambidexterity.

In the remainder of this introductory article, we discuss the four central tensions in greater detail. Then we provide an overview of the seven articles included in this special issue and discuss their contribution to the central research tensions described above. We conclude by suggesting several avenues for future research.

Differentiation vs. Integration

Since Lawrence and Lorsch's (1967) seminal work, researchers have recognized the complementary roles of differentiation and integration as mechanisms for enabling organizations to deliver effective outcomes. However, ambidexterity researchers have typically focused on one side or the other of this duality. One group of studies has emphasized differentiation, that is, the subdivision of tasks into distinct organizational units that tend to develop appropriate contexts for exploitation and exploration. In this approach, the separate organizational units pursuing exploration are smaller, more decentralized, and more flexible than those responsible for exploitation (Benner and Tushman 2003, Christensen 1998, Tushman and O'Reilly 1996). This structural differentiation helps ambidextrous organizations maintain different competencies with which to address inconsistent demands arising from emerging and mainstream business opportunities (Gilbert 2005). The other group of studies has focused on integration, that is, the behavioral mechanisms that enable organizations to address exploitation and exploration activities within the same unit. Gibson and Birkinshaw (2004) describe how organizations design business unit contexts to enable employees to pursue both types of activities. Further, Lubatkin and colleagues (2006) found that the behavioral integration of top management teams facilitates the processing of disparate demands essential to attaining ambidexterity.

Scholars have pointed to the shortcomings inherent in focusing too much on one side or the other of this duality. Critics of the differentiation approach, for example, claim that exploitation and exploration have to be recombined to create value (Eisenhardt and Martin 2000, O'Reilly and Tushman 2008, Teece 2007). From this perspective, the mere coexistence of exploitative and explorative activities in differentiated organizational units represents an important yet insufficient condition for organizational ambidexterity (Gilbert 2006). Several researchers have pointed to the need for top management teams to ensure integration across differentiated units (Tushman and O'Reilly 1996, Smith and Tushman 2005). Recently, scholars have started to suggest that ambidextrous organizations should use lower-level integration mechanisms to stimulate the lateral knowledge flow across units (Gilbert 2006, Raisch 2008).

Conversely, critics of the integration approach argue that integrative contexts are constrained by individuals taking on exploitative and explorative tasks (Bushe and Shani 1991, Inkpen and Tsang 2005, March 1991). They therefore rely on the same basic experiences, values, and capabilities to carry out both tasks, which makes exploring fundamentally different knowledge bases difficult. Adler et al. (1999) suggest complementing integrated contexts with "tactical" differentiation. They describe how production workers switch between the two tasks supported by "parallel" organizational structures, such as quality circles. These structures enable people from the same unit to move back and forth between a bureaucratic structure for routine tasks and an organic structure for nonroutine tasks.

The need to combine processes for differentiation and integration creates a paradox that is difficult to resolve. Managing a paradox requires "a creative way that captures both extremes" rather than a simple either/or tradeoff (Eisenhardt 2000, p. 703). However, it is still unclear how the tensions between differentiation and integration should be managed. Combining structural differentiation with tactical integration bears the risk of destroying the "pragmatic boundaries" that protect exploratory activities from being affected by the mainstream units' inertial forces (Carlile 2004, Westerman et al. 2006). Combining integration with tactical differentiation requires individuals to work in different "thought worlds" (Dougherty 1992, Kostova and Zaheer 1999), which is often beyond their cognitive limits (Inkpen and Tsang 2005). Therefore, neither solution may allow for maximizing both exploitation and exploration. When differentiation is combined with integration, exploitation and exploration need to be conceptualized as two ends of a continuum (Gupta et al. 2006). Thus the managerial task is to determine the right degree of differentiation and integration. It is likely that the right balance between differentiation and integration is dependent on the relative importance of exploitative and exploration activities (Gulati and Puranam 2009). Because the need for exploitation and exploration can vary across initiatives as well as over time, managing the differentiation-integration tensions is likely to be an important dynamic capability for creating and sustaining organizational ambidexterity.

The arguments presented above can be summarized in three observations that should be explored further. First, integration and differentiation are complementary, not alternative, mechanisms for achieving organizational effectiveness. Second, the relative balance between integration and differentiation is likely to vary with the specific task or activity at hand. Third, and resulting from the above, the tension between integration and differentiation requires ongoing managerial attention.

Individual vs. Organization

Ambidexterity research has usually described organizational mechanisms that enable firms to simultaneously address exploitation and exploration. In most of these studies, the tensions that ambidexterity creates are resolved at the next organizational level down (Raisch and Birkinshaw 2008). Consequently, a business unit may become ambidextrous by creating two functions or subdivisions with different foci (e.g., Benner and Tushman 2003). A manufacturing plant may become ambidextrous by creating two different teams, one in charge of exploration and another in charge of exploitation (e.g., Adler et al. 1999), and a single team may become ambidextrous by allocating different roles to each individual (e.g., Jansen et al. 2008). In sum, research has suggested that structural mechanisms are used to enable ambidexterity, whereas most individuals are seen as focused on either exploration or exploitation activities. Some studies on structural ambidexterity acknowledge that a few people at the top need to act ambidextrously by integrating exploitative and explorative activities (e.g., Smith and Tushman 2005). However, the individual dimension of ambidexterity is not explored further.

Although studies on contextual ambidexterity describe cultural rather than structural characteristics, they take a similar focus on organizational mechanisms. Gibson and Birkinshaw (2004), for example, describe business unit contexts that enable employees to conduct both exploration and exploitation activities. The important difference is that these studies assume that ambidexterity is rooted in an individual's ability to explore and exploit. Similarly, Mom et al. (2007) show that some managers simultaneously engage in high levels of exploitation and exploration activities. In these studies, individuals are important sources of organizational ambidexterity.

The possibility that individuals can take on both exploitative and explorative tasks creates a number of challenges that need to be addressed. Ambidextrous managers must manage contradictions and conflicting goals (Smith and Tushman 2005), engage in paradoxical thinking (Gibson and Birkinshaw 2004), and fulfill multiple roles (Floyd and Lane 2000). Amabile (1996) suggests that individuals who focus on creativity and exploration differ even in personality, from those who emphasize implementation or exploitation activities. Gupta et al. (2006) conclude that it is challenging for an individual to excel at both exploitation and exploration.

What makes an individual ambidextrous? Mom and colleagues (2007) found that the more a manager acquires top-down and bottom-up knowledge flows, or top-down and horizontal knowledge flows, the higher the levels of exploration and exploitation activities this manager may undertake. Several authors state that ambidextrous managers have both a short-term and a long-term orientation (e.g., O'Reilly and Tushman 2004, Probst and Raisch 2005). Although these studies observe that some managers seem to be able to take on contradictory tasks, they fail to explain *why* these managers—as opposed to others—are able to do so. Answering this question may require exploring managers' personal characteristics. Smith and Tushman (2005), for example, note that the ability to engage in paradoxical thinking may be vital for effectively managing exploitation and exploration. Cohen and Levinthal (1990) argue that individuals need prior related knowledge to assimilate and use new knowledge. Individuals with a breadth of prior knowledge categories, as well as various linkages across them, may thus be better prepared to take on both tasks.

In addition to personal characteristics, organizational factors affect individuals' ability to act ambidextrously.

Ghoshal and Bartlett (1997) describe socialization, recognition, and team-building practices to help individuals think and act ambidextrously. Gibson and Birkinshaw (2004) present contexts that allow managers to divide their time between alignment- and adaptability-oriented activities. Lubatkin and colleagues (2006) note that behavioral integration—the senior team's wholeness and unity of effort—can help process disparate demands. Jansen and colleagues (2008) cite formal senior team contingency rewards and informal senior team social integration as important mechanisms to enable senior teams to host contradictory forces. All these studies provide a strong indication that organizational factors have to be considered alongside personal characteristics when explaining individuals' ambidexterity.

Further, personal and organizational factors may be closely interrelated. For example, organizational contexts that provide managers with decision-making authority are likely to stimulate richer sense-making and cognitive processes at the personal level. Conversely, individuals' ability to act ambidextrously will have a cumulative effect on the organization's ambidexterity. However, organizational ambidexterity is different from the sum of its members' personal ambidexterity. As described by Tushman and O'Reilly (1996), a relatively small number of ambidextrous managers may be able to integrate exploitative and explorative outcomes generated in different parts of the firm by individuals focused on either exploitation or exploration. Ambidexterity is thus likely to be a function of closely interrelated individual and organizational effects—but in most cases more than the sum of the individual activities.

The following observations summarize our arguments. First, we argue that managers can exhibit (to different degrees) personal ambidexterity by engaging in both exploitation and exploration activities. Second, the extent to which managers are ambidextrous varies within and across contexts. The variance stems from both personal characteristics and the organizational contexts faced by the manager. Third, organizational ambidexterity is influenced by, but by no means limited to, its members' cumulative personal ambidexterity.

Static vs. Dynamic

Several scholars have suggested that firms should temporarily cycle through periods of exploitation and exploration (e.g., Brown and Eisenhardt 1998, Nickerson and Zenger 2002, Siggelkow and Levinthal 2003). From this perspective, "sequential ambidexterity" is expected to arise from the dynamic, temporal sequencing of routines for exploitation and exploration (Venkatraman et al. 2007, Puranam et al. 2006). Conversely, the majority of organizational ambidexterity research defines ambidexterity as the *simultaneous* pursuit of exploitation and exploration (Gupta et al. 2006, Raisch and Birkinshaw 2008). Researchers have presented a range of organizational solutions that enable organizations to become ambidextrous (e.g., Gibson and Birkinshaw 2004, Tushman and O'Reilly 1996). These studies take a static perspective: organizations become ambidextrous by adopting certain configurations.

This conceptualization comes close to traditional contingency theory and the idea of moving systems toward an ideal system state (Ginsberg and Venkatraman 1985, Miller and Friesen 1984). However, modern contingency theory shows that alignment is a dynamic process rather than a question of static configurations (Ketchen et al. 1993, Zajac et al. 2000). Organizations have to continuously reconfigure their activities to meet changing demands in their internal and external environments (Siggelkow 2002, Webb and Pettigrew 1999). It thus appears unlikely that organizational configurations (not even ambidextrous ones) could provide the exhaustive steady-state functionality required to deal with the entire range of boundary conditions that an organization faces over time (Raisch 2008).

O'Reilly and Tushman (2008) argue that ambidexterity can only become a dynamic capability if management repeatedly and intentionally orchestrates firm resources. Dynamic capabilities comprise and integrate both static and dynamic components—the interaction of exploitation and exploration is expected to become a full-blown dynamic capability over time (Schreyögg and Kliesch-Eberl 2007). Managing organizations for the simultaneous pursuit of exploitation and exploration may thus be a task of dynamic rather than static alignment (Siggelkow and Levinthal 2003, Westerman et al. 2006).

In terms of structural ambidexterity, it remains unclear how structurally differentiated units evolve over time. Based on a simulation study, Siggelkow and Levinthal (2003) recommend temporary decentralization, in which firms use differentiated units for exploration and then reintegrate them. Similarly, Westerman and colleagues (2006) describe how some differentiated units were transitioned to more integrated designs at later stages of the innovation life cycle. Conversely, other scholars describe structurally differentiated units that remain highly autonomous over time. Raisch (2008), for example, notes that the premium coffee maker Nespresso remained a fully autonomous unit within the food industry leader Nestlé Group for more than two decades. A case study of Xerox's autonomous Palo Alto Research Center (PARC) unit shows that although the unit remained separate for decades, the degree of cross-unit integration increased over time (George and Regani 2005).

In addition to changes in the relationship between mainstream organization and differentiated units, there may also be changes in the differentiated units themselves. Over time, the differentiated units' competitive context often evolves from the quasimonopoly position

of a first mover to an increasingly populated and competitive space. During this process, successful units significantly increase their scale and scope. Obviously, the altered boundary conditions force the unit to invest more time in exploitation activities to ensure efficient operations. It can thus be speculated that structurally differentiated units move from a primary orientation on exploration toward a more ambidextrous (or even exploitative) orientation over time. How these changes occur over time remains to be explored.

Contextual ambidexterity also has a dynamic component that has rarely been addressed. In such contexts, individuals make their own judgments on how to best divide their time between the conflicting demands for alignment and adaptability (Gibson and Birkinshaw 2004). Adler and colleagues (1999) suggest that individuals' attention to both demands may be either simultaneous or sequential. If the former, employees performing routine tasks can, for example, simultaneously engage in the nonroutine task of identifying improvement opportunities. If the latter, employees switch between the two types of tasks rather than attempting to address them both simultaneously. The "switching" between tasks may allow greater focus and reduce the risk of confusion. Despite human brains being literally ambidextrous—handling simultaneously controlled and automated processes (Wegner and Bargh 1998)—it nevertheless appears that sequential ambidexterity is easier to achieve at the individual level than simultaneous ambidexterity. However, the cycles with exploitative and explorative activities are probably shorter (perhaps even minutes or hours in length) and more tightly coupled than those observed at the corporate level and described in previous theories on "cycling" (e.g., Nickerson and Zenger 2002, Puranam et al. 2006, Gulati and Puranam 2009, Siggelkow and Levinthal 2003).

The adoption of time as an important research lens (Ancona et al. 2001) allows for a deeper exploration of the dynamic processes underlying the emergence of organizational ambidexterity. The specific arguments made above can be summarized in the form of the following observations. First, managing for ambidexterity is a task of dynamic rather than static alignment. Second, different solutions, including structural and contextual ones, may be required over time to sustain ambidexterity. Third, ambidexterity may arise from both simultaneous and sequential attention to exploitation and exploration.

Internal vs. External

One suggestion for resolving the paradoxical requirements of exploitation and exploration has been to externalize one or another set of activities through outsourcing or by establishing alliances (Baden-Fuller and Volberda 1997, Holmqvist 2004, Lavie and Rosenkopf 2006, Rothaermel and Deeds 2004). Conversely, research on organizational ambidexterity has focused on how organizations address exploitation and exploration *internally*. Benner and Tushman (2003), for example, conclude that the externalization of exploitation or exploration processes may be harmed by the difficulties in realizing strategic integration across independent firms.

On the other hand, research on exploration stresses the importance of the external acquisition of new knowledge. Eisenhardt and Martin (2000) describe the risk of obsolescence when firms source all their knowledge internally. Rosenkopf and Nerkar (2001) found empirical evidence that exploration beyond organizational boundaries had more impact than exploration within organizations. Puranam and Srikanth (2007) describe the organizational challenges faced by acquirers seeking to renew their knowledge bases through the acquisition of innovative firms. The discrete nature of structural integration in acquisitions appears to force a choice between leveraging existing knowledge or the capacity for ongoing innovation by the target firm.

Studies show that externally acquired knowledge may contribute to the reconfiguration of existing knowledge bases. Kogut and Zander (1992, p. 384) describe "combinative capabilities" as the firm's ability "to synthesize and apply current and acquired knowledge." Similarly, Henderson and Cockburn (1994, p. 66) define "architectural competence" as "the ability to access new knowledge from outside the boundaries of the organization and the ability to integrate knowledge flexibly across boundaries within the organization." Ambidexterity is thus likely to require both internal and external knowledge processes as well as their integration across organizational boundaries.

Researchers have found that interorganizational activities, such as customer relationships (Im and Rai 2008), corporate venturing (Hill and Birkinshaw 2008), and strategic alliances (Lin et al. 2007, Rothaermel and Deeds 2004), can enable both exploitative and explorative knowledge processes. To access external knowledge, these studies suggest that organizations need to establish relational contexts characterized by a broad set of resources from other actors and the normative and social cues these actors provide (Adler and Kwon 2002, Nahapiet and Ghoshal 1998). Managers take on brokering roles (Hargadon 2002, Hargadon and Sutton 1997) to span organizational boundaries and to pull resources together. At the same time, however, externally acquired knowledge has to be absorbed and integrated to realize its potential (Cohen and Levinthal 1990, Kogut and Zander 1992).

Scholars from different research fields acknowledge the tensions between acquiring and integrating external knowledge. Research on absorptive capacity, for example, argues that although internal knowledge processing and external knowledge acquisition are both necessary, excessive dominance by one or the other will

be dysfunctional (Cohen and Levinthal 1990, Zahra and George 2002). Research on organizational boundaries found that activities focused on the creation and reinforcement of boundaries need to be combined with boundary-spanning activities (Ancona and Caldwell 1992, Miller et al. 2007). Ambidexterity may thus imply the managerial challenge of not only balancing exploitation and exploration but also of integrating external and internal knowledge.

Not much is known about how ambidextrous organizations take on these challenges. A starting point for future investigations may be research on social networks. Social network theory has shed light on how network characteristics affect knowledge transfer and integration (Hansen 1999, Obstfeld 2005). This work has recently been extended to include the notion of ambidexterity (e.g., Atuahene-Gima and Murray 2007, Lin et al. 2007). Tiwana (2008), for example, found that in the context of alliances, strong ties are required to integrate knowledge, whereas bridging ties are needed to access diverse, novel knowledge. Further, Tiwana (2008) proposes that strong ties complement bridging ties in enhancing ambidexterity. Tempelaar et al. (2008) found that external social relationships enhance knowledge acquisition, whereas internal social relationships facilitate knowledge diffusion. They conclude that ambidexterity requires complementary internal and external social relationships. Ambidexterity may thus arise from complex social networks that balance various tensions.

We can summarize the above arguments in the following observations. First, ambidexterity may depend on the firm's ability to integrate internal and external knowledge bases. Second, the ability to integrate external knowledge relies on a combination of external brokerage and internal absorptive capacity. Third, ambidexterity may be supported by social networks that contrast internal and external as well as strong and bridging ties.

The Work in This Special Issue

In this section, we summarize the articles contributed to this special issue and relate them to the four tensions presented above. Overall, we received 61 submissions. We invited authors of 16 manuscripts to revise and resubmit, and we ultimately accepted seven manuscripts for publication. The articles provide a variety of research approaches: they span various levels of analysis, use different research contexts, and deploy alternative methods (see Table 1).

Andriopoulos and Lewis's (2009) article "Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation" presents a comprehensive model of the exploitation-exploration tensions and their management. Based on a multiple case study of ambidextrous firms in the product design industry, the authors present three nested paradoxes of innovation: strategic intent, customer orientation, and personal drivers. Contributing to the differentiation-integration tension, the findings reveal that firms use a mix of integration and differentiation tactics to manage exploitation-exploration paradoxes. Blending both tactics is found to be vital for stimulating the virtuous cycles of ambidexterity. Addressing the individual-organizational tension, the study shows that the paradoxes of innovation occur at different organizational levels. The strategic intent paradox operates at the firm level, whereas the customer orientation paradox affects efforts within projects, and the personal drivers paradox impacts individual knowledge workers. They conclude that firms need to manage innovation paradoxes at multiple levels and the interactions across levels reinforce ambidextrous practices.

Taylor and Helfat's (2009) article "Organizational Linkages for Surviving Technological Change: Complementary Assets, Middle Management, and Ambidexterity" states that technological innovations sometimes require industry incumbents to shift to a completely new core technology. The authors develop a conceptual framework in which the ability to build and leverage organizational linkages between the new technology and its existing complementary assets is essential for a successful technological transition. In this framework, organization linking mechanisms promote ambidexterity by enabling firms to transition to a new technology while utilizing valuable preexisting capabilities. An important contribution to the differentiation-integration tension is the authors' recognition of organizational linkages between new capabilities and the potentially valuable preexisting complementary capabilities. Ambidextrous management requires firms to explore new knowledge, exploit existing knowledge, and coordinate these knowledge bases. Further, the article adds to the individual-organizational tension by describing the important role played by middle managers in implementing organizational linkages. Top management can use economic, structural, social, and cognitive influences to enable middle managers to carry out these linking activities. Finally, the study contributes to the static-dynamic tension by showing that ambidexterity emerges from continuous alignment activities throughout the multiple phases of technological change.

Groysberg and Lee's (2009) article "Hiring Stars and Their Colleagues: Exploration and Exploitation in Professional Service Firms" examines the performance of star security analysts who join new firms in exploration roles versus exploitation roles. They find that stars hired for exploration roles experience an immediate decline in performance that persists for at least five years. This decline is most pronounced among star analysts who move by themselves rather than with a group of colleagues from the originating firm. Star analysts who join new firms in exploitation roles also exhibit a drop in performance, but only for a year. These findings suggest that even at the individual level, the probabilities

Table 1 Summarization of Special Issue Articles

Article	Level of analysis	Method	Context/Sample	Differentiation vs. integration	Individual vs. organization	Static vs. dynamic	Internal vs. external	Core contribution
Andriopoulos and Lewis	Individual/ organization	Comparative case study	Five product design industry leaders	X	X			Examination of the integration and differentiation tactics to address three nested paradoxes of innovation
Taylor and Helfat	Individual/ organization	Dual case study	Technological transitions at IBM and NCR	X	X	X		Conceptualization of organizational linkages between the new technology and existing assets during transitions
Groysberg and Lee	Individual	Archival/hypothesis testing	Sample of 1,053 analysts in 78 investment banks		X	X	X	Examination of the role of individuals in exploitation and exploration activities in professional service firms
Rothaermel and Alexandre	Organization	Survey and archival/ hypothesis testing	Multi-industry sample of 141 U.S. manufacturing firms				X	Conceptualization of ambidexterity as the pursuit of exploitation and exploration by combining internal and external knowledge
Cao et al.	Organization	Survey/hypothesis testing	Sample of 122 SME in three Chinese high-tech parks	X				Unpacking the organizational ambidexterity construct into the balance and the combined dimension
Jansen et al.	Organization	Survey/hypothesis testing	Multi-industry sample of 230 private firms	X	X			Conceptualization of ambidexterity as dynamic capability that creates integrative value across differentiated units
Mom et al.	Individual	Survey/hypothesis testing	Sample of 716 managers in five large firms		X			Conceptualization of ambidexterity at the managerial level and of the organizational mechanisms affecting it

of success in exploration activities are lower than in exploitation activities, thereby reinforcing the tendency toward exploitation. The article adds to the individual-organizational tension by showing that individual, group, and organizational factors affect ambidexterity. Further, the study addresses the static-dynamic tension by distinguishing between the short-term and long-term effects of exploitation and exploration. Finally, regarding the internal-external tension, the study provides valuable insights into the challenges related to the integration of externally acquired capabilities and the importance of these processes for ambidexterity.

Rothaermel and Alexandre's (2009) article "Ambidexterity in Technology Sourcing: The Moderating Role of Absorptive Capacity" maintains that a firm's organizational and technological boundaries are two important demarcation lines when sourcing technology. Applying an ambidexterity perspective to a firm's technology sourcing strategy, the authors hypothesize that there is a curvilinear relationship between a firm's technology sourcing mix and its performance. Further, they introduce a contingency element by proposing that a firm's absorptive capacity exerts a positive moderating effect on this relationship. They empirically test these hypotheses on a random, multi-industry sample of U.S. manufacturing companies. Contributing to the internal-external tension, the findings show that ambidexterity in a firm's technology sourcing strategy not only requires the firm to address the trade-offs that arise from simultaneously pursuing exploration and exploitation but also the trade-offs that arise from combining internal and external technology sourcing. An overly strong reliance on either internal or external sourcing is related to negative performance implications. To harness the benefits of ambidexterity, managers have to actively manage the spillovers from internal and external technology sourcing. The ability to do so depends on the organization's absorptive capacity.

The Cao et al. (2009) article "Unpacking Organizational Ambidexterity: Dimensions, Contingencies, and Synergistic Effects" observes that there is still significant ambiguity regarding the conceptualization of organizational ambidexterity. The authors unpack the one-dimensional ambidexterity construct into its "balance dimension" and its "combined dimension." The balance dimension corresponds to a firm's orientation toward a relative balance between exploratory and exploitative activities, and the combined dimension corresponds to their combined magnitude. The authors find that over and above the independent effects of each, concurrent high levels of both dimensions yield synergistic benefits. They also find that the balance dimension is more beneficial to resource-constrained firms, whereas the combined dimension is more beneficial to firms with greater access to resources. Addressing the differentiation-integration tension, the findings show that ambidexterity is fostered by close interrelations between existing and new knowledge. A synergistic effect can be achieved by allowing existing resources to be more fully employed to acquire new capabilities and also by permitting new knowledge to be more fully integrated into the existing pool of resources. Thus differentiation approaches need to be combined with integrative efforts to reach ambidexterity's full potential.

The Jansen et al. (2009) article "Structural Differentiation and Ambidexterity: The Mediating Role of Integration Mechanisms" claims that structural differentiation can help ambidextrous organizations maintain multiple inconsistent and conflicting demands; however, these differentiated activities need to be mobilized, coordinated, integrated, and applied. In this sense, the authors delineate formal and informal senior team integration mechanisms, and formal and informal organizational integration mechanisms, and examine how they mediate the relationship between structural differentiation and ambidexterity. Addressing the differentiation-integration tension, the findings suggest that structural differentiation's previously asserted direct effect on ambidexterity operates through informal senior team and formal organizational integration mechanisms. Integration thus occurs not only at the top management level but also through formal and lateral cross-unit interfaces. Adding to the individual-organizational tension, the findings suggest that integration—which depends on the hierarchical level—occurs through either personal or formal organizational mechanisms. At the corporate level, ambidextrous organizations encourage senior team members to socially and informally integrate. At lower hierarchical levels, ambidexterity is achieved through more formal cross-functional interfaces.

The Mom et al. (2009) article "Understanding Variation in Managers' Ambidexterity: Investigating Direct and Interaction Effects of Formal Structural and Personal Coordination Mechanisms" states that the conceptual and empirical understanding of ambidexterity at the individual level of analysis is very limited. The authors address this gap by investigating managers' ambidexterity. Findings regarding the formal structural mechanisms indicate that a manager's decision-making authority is positively related to ambidexterity. Regarding the personal coordination mechanisms, the findings indicate that both a manager's participation in cross-functional interfaces and his or her connectedness to other organization members are positively related to ambidexterity. Adding to the individual-organizational tension, the findings confirm that managers can act ambidextrously. Further, organizational mechanisms were found to positively affect managerial ambidexterity.

These seven articles contribute to the four fundamental tensions explored above. Collectively, these studies reinforce our four main arguments: (1) Ambidexterity

requires active management of the tensions between differentiation and integration; (2) ambidexterity results from and manifests itself at both individual and organizational levels; (3) ambidexterity is the outcome of a dynamic process that involves both the simultaneous and subsequent attention to exploitation and exploration; and (4) ambidexterity depends on the ability to integrate internal and external knowledge bases for synergistic benefits.

Avenues for Future Research

Based on our discussion of four central tensions inherent in organizational ambidexterity research and the review of the seven articles that make up this special issue, there are several potentially fruitful avenues for future research:

First, studies that take a longitudinal perspective of organizational ambidexterity are scarce. Although all seven articles in this special issue stress the need for more dynamic perspectives of the topics under investigation, only two studies (Andriopoulos and Lewis 2009, Groysberg and Lee 2009) have a dynamic component. We hope that these studies motivate researchers to address questions on the dynamic processes underlying organizational ambidexterity. A longitudinal perspective brings about interesting questions related to all four research tensions discussed above. For example, how does the relative importance of differentiation and integration evolve over time? What are the differences between situations in which managers address exploitation and exploration simultaneously and those situations in which they alternate between the two tasks? Are alternative solutions used to enable ambidexterity at different stages of development? Does the external search for new knowledge dominate in early stages while internal processes take the lead in later stages of development?

Second, studies spanning multiple levels of analysis are also scarce. Several studies in this special issue provide the first evidence that ambidexterity results from interactions across multiple levels (Andriopoulos and Lewis 2009, Groysberg and Lee 2009, Jansen et al. 2009, Mom et al. 2009, Taylor and Helfat 2009). These combined studies provide the groundwork for further research addressing highly relevant questions: How do individual factors affect organizational ambidexterity? What are the similarities, contradictions, and interrelations between an individual's, a group's, and an organization's activities that affect ambidexterity? How are efforts synchronized and managed across levels? Alternatively, are there contradictory exploitative and explorative activities that enable ambidexterity across multiple levels? How do supervisory boards contribute to an organization's ambidextrous orientation?

Third, studies that examine the conditions under which ambidexterity leads to success are relatively scarce. The works in this special issue indicate that differences in size and resource endowment (Cao et al. 2009), industry contexts (Andriopoulos and Lewis 2009, Groysberg and Lee 2009), and environmental dynamism (Cao et al. 2009, Mom et al. 2009, Rothaermel and Alexandre 2009) matter when relating ambidexterity to performance. Future studies should develop more fine-grained accounts that consider the mediators and moderators that may affect the ambidexterity-performance relationship. It could also be beneficial to explore ambidexterity's effect on alternative measures of performance. Ambidexterity is likely to be positively related to more fundamental measures of success, including firm survival, resistance to organizational crises and decline, the creation of employment, employee satisfaction and motivation, and corporate reputation.

Conclusion

We started this introduction to the special issue by mentioning the importance of organizational ambidexterity for long-term firm performance. We explored four fundamental tensions related to organizational ambidexterity, including differentiation versus integration, individual versus organizational, static versus dynamic, and internal versus external. The seven articles in this special issue contribute to our knowledge on these tensions and open up promising avenues for future research. Such research is vital as firms across industries and geographical settings struggle with the challenges related to sustainable value creation. Research on organizational ambidexterity shows that some individuals, groups, and organizations are successful in the long run, and this research provides important insights into the strategies, structures, and processes that allow them to balance and harmonize seemingly contradictory requirements.

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References

Adler, P. S., S. W. Kwon. 2002. Social capital: Prospects for a new concept. *Acad. Management Rev.* **27**(1) 17–40.

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

Amabile, T. M. 1996. *Creativity in Context*. Westview Press, Boulder, CO.

Ancona, D. G., D. F. Caldwell. 1992. Demography and design: Predictors of new product team performance. *Organ. Sci.* **3**(3) 321–341.

Ancona, D. G., P. S. Goodman, B. S. Lawrence, M. L. Tushman. 2001. Time: A new research lens. *Acad. Management Rev.* **26** 645–663.

Andriopoulos, C., M. Lewis. 2009. Exploitation-exploration tensions and organizational ambidexterity: Managing paradoxes of innovation. *Organ. Sci.* **20**(4) 696–717.

Atuahene-Gima, K. 2005. Resolving the capability-rigidity paradox in new product innovation. *J. Marketing* **69**(4) 61–83.

Atuahene-Gima, K., J. Y. Murray. 2007. Exploratory and exploitative learning in new product development: A social capital perspective on new technology ventures in China. *J. Internat. Marketing* **15**(2) 1–29.

Auh, S., B. Menguc. 2005. Balancing exploration and exploitation: The moderating role of competitive intensity. *J. Bus. Res.* **58** 1652–1661.

Baden-Fuller, C., H. Volberda. 1997. Strategic renewal in large complex organizations: A competence- based view. A. Heene, R. Sanchez, eds. *Competence-Based Strategic Management*. John Wiley & Sons, Chichester, UK, 89–110.

Beckman, C. M. 2006. The influence of founding team company affiliations on firm behavior. *Acad. Management J.* **49**(4) 741–758.

Benner, M. J., M. L. Tushman. 2003. Exploitation, exploration, and process management: The productivity dilemma revisited. *Acad. Management Rev.* **28** 238–256.

Brown, S. L., K. Eisenhardt. 1998. *Competing on the Edge: Strategy as Structured Chaos*. Harvard Business School Press, Boston.

Bushe, G. R., A. B. Shani. 1991. *Parallel Learning Structures: Increasing Innovation in Bureaucracies*. Addison-Wesley, Reading, MA.

Cao, Q., E. R. Gedajlovic, H. Zhang. 2009. Unpacking organizational ambidexterity: Dimensions, contingencies, and synergistic effects. *Organ. Sci.* **20**(4) 781–796.

Carlile, P. R. 2004. A pragmatic view of knowledge and boundaries: Boundary objects in new product development. *Organ. Sci.* **15**(4) 442–455.

Christensen, C. M. 1998. *The Innovator's Dilemma*. Harvard Business School Press, Boston.

Cohen, W., D. Levinthal. 1990. Absorptive capacity: A new perspective on learning and innovation. *Admin. Sci. Quart.* **35**(1) 128–152.

Dougherty, D. 1992. Interpretive barriers to successful product innovation in large firms. *Organ. Sci.* **3**(2) 179–202.

Duncan, R. B. 1976. The ambidextrous organization: Designing dual structures for innovation. R. H. Kilmann, L. R. Pondy, D. P. Slevin, eds. *The Management of Organization Design*, Vol. 1. *Strategies and Implementation*. North-Holland, New York, 167–188.

Eisenhardt, K. M. 2000. Paradox, spirals, ambivalence: The new language of change and pluralism. *Acad. Management Rev.* **25**(4) 703–705.

Eisenhardt, K. M., J. A. Martin. 2000. Dynamic capabilities: What are they? *Strategic Management J.* **21**(October–November) 1105–1121.

Floyd, S., P. Lane. 2000. Strategizing throughout the organization: Managing role conflict in strategic renewal. *Acad. Management Rev.* **25** 154–177.

George, S. S., S. Regani. 2005. Xerox PARC: Innovation without profit? ECCH Case Study 305-053-1, ICFAI Center for Management Research, Hyderabad, India.

Ghoshal, S., C. A. Bartlett. 1997. *The Individualized Corporation: A Fundamentally New Approach to Management*. Harper Business, New York.

Gibson, C. B., J. Birkinshaw. 2004. The antecedents, consequences, and mediating role of organizational ambidexterity. *Acad. Management J.* **47** 209–226.

Gilbert, C. G. 2005. Unbundling the structure of inertia: Resource vs. routine rigidity. *Acad. Management J.* **48**(5) 741–763.

Gilbert, C. G. 2006. Change in the presence of residual fit: Can competing frames coexist? *Organ. Sci.* **17**(1) 150–167.

Ginsberg, A., N. Venkatraman. 1985. Contingency perspectives of organizational strategy: A critical review of the empirical research. *Acad. Management Rev.* **10**(3) 421–434.

Groysberg, B., L. E. Lee. 2009. Hiring stars and their colleagues: Exploration and exploitation in professional service firms. *Organ. Sci.* **20**(4) 740–758.

Gulati, R., P. Puranam. 2009. Renewal through reorganization: The value of inconsistencies between formal and informal organization. *Organ. Sci.* **20**(2) 422–440.

Gupta, A. K., K. G. Smith, C. E. Shalley. 2006. The interplay between exploration and exploitation. *Acad. Management J.* **4** 693–706.

Hansen, M. 1999. The search-transfer problem: The role of weak ties in sharing knowledge across organizational subunits. *Admin. Sci. Quart.* **44** 83–111.

Hargadon, A. 2002. Brokering knowledge: Linking learning and innovation. *Res. Organ. Behav.* **24** 41–85.

Hargadon, A., R. I. Sutton. 1997. Technology brokering and innovation in a product development firm. *Admin. Sci. Quart.* **42**(4) 716–749.

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

Henderson, R., I. Cockburn. 1994. Measuring competence? Exploring firm effects in pharmaceutical research. *Strategic Management J.* **15** 63–84.

Hill, S. A., J. Birkinshaw. 2008. Strategy-organization configurations in corporate venture units: Impact on performance and survival. *J. Bus. Venturing* **23** 423–444.

Holmqvist, M. 2004. Experiential learning processes of exploitation and exploration within and between organizations: An empirical study of product development. *Organ. Sci.* **15**(1) 70–81.

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

Inkpen, A. C., E. W. K. Tsang. 2005. Social capital, networks, and knowledge transfer. *Acad. Management Rev.* **30**(1) 146–165.

Jansen, J. J. P., F. A. J. van den Bosch, H. W. Volberda. 2006. Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Management Sci.* **52**(11) 1661–1674.

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

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

Ketchen, J. R., J. B. Thomas, C. C. Snow. 1993. Organizational configurations and performance: A comparison of theoretical approaches. *Acad. Management J.* **36**(6) 1278–1313.

Kogut, B., U. Zander. 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organ. Sci.* **3**(3) 383–397.

Kostova, T., S. Zaheer. 1999. Organizational legitimacy under conditions of complexity: The case of multinational enterprise. *Acad. Management Rev.* **24** 64–81.

Kyriakopoulos, K., C. Moorman. 2004. Tradeoffs in marketing exploitation and exploration strategies: The overlooked role of market orientation. *Internat. J. Res. Marketing* **21**(3) 219–240.

Lavie, D., L. Rosenkopf. 2006. Balancing exploration and exploitation in alliance formation. *Acad. Management J.* **49**(4) 797–818.

Lawrence, P. R., J. W. Lorsch. 1967. Differentiation and integration in complex organizations. *Admin. Sci. Quart.* **12**(1) 1–47.

Levinthal, D. A., J. G. March. 1993. The myopia of learning. *Strategic Management J.* **14** 95–112.

Lin, Z., H. Yang, I. Demirkan. 2007. The performance consequences of ambidexterity in strategic alliance formations: Empirical investigation and computational theorizing. *Management Sci.* **53**(10) 1645–1658.

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

March, J. G. 1991. Exploration and exploitation in organizational learning. *Organ. Sci.* **2**(1) 71–87.

Miller, D., P. H. Friesen. 1984. *Organizations: A Quantum View*. Prentice-Hall, Englewood Cliffs, NJ.

Miller, D., M. J. Fern, L. B. Cardinal. 2007. The use of knowledge for technological innovation within diversified firms. *Acad. Management J.* **50**(2) 308–326.

Mom, T. J. M., F. A. J. van den Bosch, H. W. Volberda. 2007. Investigating managers' exploration and exploitation activities: The influence of top-down, bottom-up, and horizontal knowledge inflows. *J. Management Stud.* **44**(6) 910–931.

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

Nahapiet, J., S. Ghoshal. 1998. Social capital, intellectual capital, and the organizational advantage. *Acad. Management Rev.* **23**(2) 242–266.

Nickerson, J. A., T. R. Zenger. 2002. Being efficiently fickle: A dynamic theory of organizational choice. *Organ. Sci.* **13**(5) 547–566.

Obstfeld, D. 2005. Social networks, the tertius lungens orientation, and involvement in innovation. *Admin. Sci. Quart.* **50**(1) 100–130.

O'Reilly, C. A., M. L. Tushman. 2004. The ambidextrous organization. *Harvard Bus. Rev.* **82** 74–81.

O'Reilly, C. A., M. L. Tushman. 2008. Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Res. Organ. Behav.* **28** 185–206.

Probst, G., S. Raisch. 2005. Organizational crisis: The logic of failure. *Acad. Management Executive* **19**(1) 90–105.

Puranam, P., K. Srikanth. 2007. What they know vs. what they do: How acquirers leverage technology acquisitions. *Strategic Management J.* **28**(8) 805–826.

Puranam, P., H. Singh, M. Zollo. 2006. Organizing for innovation: Managing the coordination-autonomy dilemma in technology acquisitions. *Acad. Management J.* **49**(2) 263–280.

Raisch, S. 2008. Balanced structures: Designing organizations for profitable growth. *Long Range Planning* **41**(5) 483–508.

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

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

Rothaermel, F. T., M. T. Alexandre. 2009. Ambidexterity in technology sourcing: The moderating role of absorptive capacity. *Organ. Sci.* **20**(4) 759–780.

Rothaermel, F. T., D. L. Deeds. 2004. Exploration and exploitation alliances in biotechnology: A system of new product development. *Strategic Management J.* **25**(3) 201–221.

Schreyögg, G., M. Kliesch-Eberl. 2007. How dynamic can organizational capabilities be? Towards a dual-process model of capability dynamization. *Strategic Management J.* **28**(9) 913–933.

Siggelkow, N. 2002. Evolution toward fit. *Admin. Sci. Quart.* **47**(1) 125–159.

Siggelkow, N., D. A. Levinthal. 2003. Temporarily divide to conquer: Centralized, decentralized, and reintegrated organizational approaches to exploration and adaptation. *Organ. Sci.* **14**(6) 650–669.

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

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

Teece, D. J. 2007. Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management J.* **28**(13) 1319–1350.

Tempelaar, M., J. J. P. Jansen, F. A. J. van den Bosch. 2008. Knowing your clients: The joint effect of client and internal social capital on organizational ambidexterity. Strategic Management Society Annual Conference, Cologne, Germany.

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

Tushman, M. L., C. A. O'Reilly. 1996. Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Rev.* **38** 8–30.

Venkatraman, N., C. H. Lee, B. Iyer. 2007. Strategic ambidexterity and sales growth: A longitudinal test in the software sector. Unpublished manuscript, Boston University, Boston, http://www.softwareecosystems.com/SMJManuscript_revised.pdf.

Webb, D., A. Pettigrew. 1999. The temporal development of strategy: Patterns in the U.K. insurance industry. *Organ. Sci.* **10**(5) 601–621.

Wegner, D. M., J. A. Bargh. 1998. Control and automaticity in social life. D. Gilbert, S. T. Fiske, G. Lindzey, eds. *Handbook of Social Psychology*, Vol. 1, 4th ed. McGraw-Hill, New York, 446–496.

Westerman, G., F. W. McFarlan, M. Iansiti. 2006. Organization design and effectiveness over the innovation life cycle. *Organ. Sci.* **17**(2) 230–238.

Zahra, S., G. George. 2002. Absorptive capacity: A review, reconceptualization, and extension. *Acad. Management Rev.* **27**(2) 185–203.

Zajac, E. J., M. S. Kraatz, R. K. F. Bresser. 2000. Modeling the dynamics of strategic fit: A normative approach to strategic change. *Strategic Management J.* **21**(4) 429–455.

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