

Managing Strategic Contradictions: A Top Management Model for Managing Innovation Streams

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Sustained organizational performance depends on top management teams effectively exploring and exploiting. These strategic agendas are, however, associated with contradictory organizational architectures. Using the literature on paradox, contradictions, and conflict, we develop a model of managing strategic contradictions that is associated with paradoxical cognition—senior leaders and/or their teams (a) articulating a paradoxical frame, (b) differentiating between the strategy and architecture for the existing product and those for innovation, and (c) integrating between those strategies and architectures. We further argue that the locus of paradox in top management teams resides either with the senior leader or with the entire team. We identify a set of top management team conditions that facilitates a team's ability to engage in paradoxical cognitive processes.

Key words: top management teams; innovation; exploration and exploitation; paradox; cognition

It is precisely the function of the executive to facilitate the synthesis in concrete action of the contradictory forces, to reconcile the concrete forces, instincts, interests, conditions, positions, and ideals (Barnard 1968, p. 21).

The paradox of administration [involves] the dual searches for certainty and flexibility (Thompson 1967, p. 150).

Even with Thompson's (1967) and Barnard's (1968) early admonitions, effectively managing strategic contradiction has not been at the center of organizational analysis. While Cameron and Quinn (1988) and Poole and Van de Ven (1989) have explicitly argued that firms must build capabilities to attend to contradictions, the theoretical and empirical work on building teams and architectures to manage these tensions has remained in our field's periphery. However, contradictions abound. Firms are pressed to be both big and small, efficient and effective, and to operate in multiple time frames, as well as to be prospectors and analyzers (Gavetti and Levinthal 2000, Miles and Snow 1978). Similarly, senior teams are pressed to search both forward and backward, to be both flexible and focused, and to both learn and unlearn (Bunderson and Sutcliffe 2002, Flynn and Chatman 2001, Adler et al. 1999). The purpose of this paper is to encourage scholars to bring the dynamics of attending to and dealing with strategic contradiction more to the center of organization science.

March (1991) clearly articulated contradictory strategic and organizational demands on firms in his work

on exploring and exploiting. He argued that organizational adaptation is rooted in balancing exploratory and exploitative activities. Too much exploiting drives inertia and dynamic conservatism; exploitation crowds out exploration (Sull 1999, Benner and Tushman 2002). Similarly, too much exploration drives out efficiencies and prevents gaining economies of scale or learning by doing (He and Wong 2004). D'Aveni (1994) similarly observed that competitive advantage is rooted in both building existing products and in creating products that cannibalize those existing products. It appears that sustained performance is rooted in simultaneously organizing for short-term efficiency as well as long-term innovation.

However, exploring and exploiting are associated with different and inconsistent organizational architectures and processes. These inconsistencies and their associated contradictory logics create fundamental organizational and senior-team challenges. Where exploration is rooted in variance-increasing activities, learning by doing, and trial and error, exploitation is rooted in variance-decreasing activities and disciplined problem solving. Where exploitation builds on an organization's past, exploration creates futures that may be quite different than the organization's past. Moreover, products born of exploration are often in direct competition with existing products. For example, Tripsas and Gavetti (2000) described the organizational and senior-team challenges of product substitution at Polaroid as it attempted to excel in its traditional analog technologies even as it tried to move into digital photography.

Balancing inconsistent learning modes may be a fundamental determinant of long-term organization effectiveness (Levitt and March 1988). It is the senior team that mediates between external forces for innovation and change and internal inertial forces (Virany 1992, He and Wong 2004). Senior teams make those decisions regarding organizational forms and resource allocation processes such that their firms might balance exploration as well as exploitation. This paper directly focuses on top management teams dealing with strategic contradictions. We explore the mechanisms by which top management teams might successfully manage the contradictions of both exploring and exploiting.

The top management team literature has been particularly silent on teams dealing with contradictions (e.g., Adner and Helfat 2002, Finkelstein and Hambrick 1996). This literature has focused predominantly on overcoming inertia and implementing innovation (Kaplan et al. 2003, Van de Ven et al. 1999). To address this question of balancing inconsistencies, we turn to the organizational literature on paradox, contradiction, and conflict (Lewis 2000, Poole and Van de Ven 1989). This literature assumes that inconsistent and contradictory agendas coexist and can both succeed simultaneously. By shifting the perspective from choosing between contradictory agendas to embracing the contradictions, this literature provides an important lens through which to understand how to manage contradictions. Building on this literature, we argue that effectively managing contradictions is rooted in paradoxical cognition—managerial frames and processes that recognize and embrace contradiction. We explore how these frames and processes operate in the context of top management teams, and identify aspects of team design and leader behaviors to support these processes.

On Exploring and Exploiting: Innovation Streams, Organizational Outcomes, and Ambidextrous Designs

In dynamic contexts, sustained organizational performance is rooted in executing both existing products and innovation simultaneously (March 1991, Christensen 1997). Long-term performance depends on the organization's ability to adapt and change through innovation, yet these organizations must also continue to perform in the short term (Brown and Eisenhardt 1997, Tushman and O'Reilly 1996, Van de Ven et al. 1999). Innovating at the expense of the existing product leads to sub-optimal results, as firms fail to capture the ongoing benefits of historically rooted efficiencies. Existing products provide slack resources, knowledge, and routines to help launch innovations. Similarly, innovations generate new knowledge, access to new markets, and increased customer awareness, all of which enhance the existing

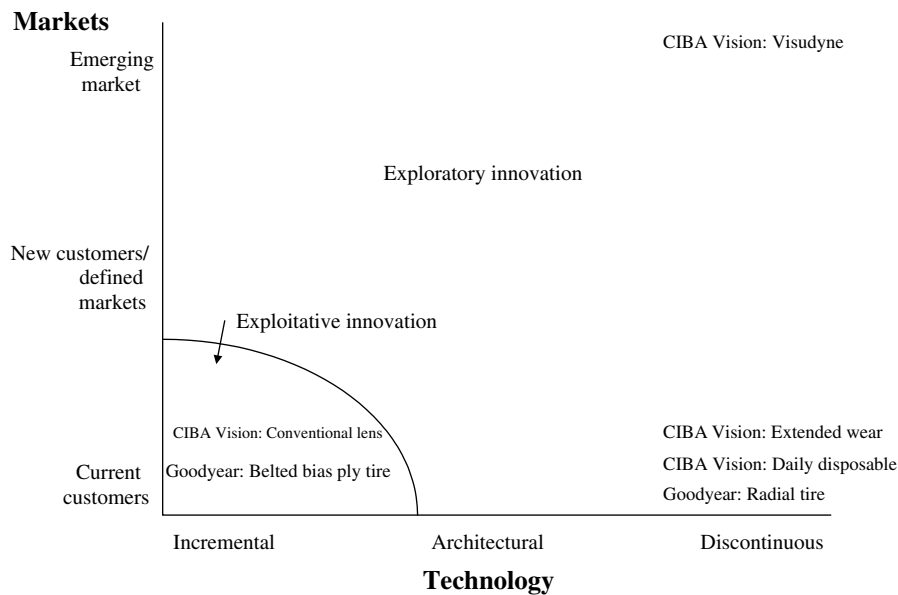
product (Leonard-Barton 1992, Gibson and Birkinshaw 2004).

An innovation stream refers to the portfolio of products simultaneously managed by an organization or strategic business unit (Tushman and Smith 2002). Products in this portfolio are defined relative to the technology and the target markets of the firm's existing product (Abernathy and Clark 1985). In comparison to the existing product, the firm's innovation can be incremental (Christensen 1997, Dosi 1982), architectural (Henderson and Clark 1991), or discontinuous (Gatignon et al. 2002). As well, the innovation may be targeted to existing customers, new customers in defined markets (Abernathy and Clark 1985), or emerging markets (Christensen 1997). Figure 1 depicts this innovation space. At the origin of this space is the firm's exploitative product—incremental improvement to the firm's current product that is targeted to the existing customer. Exploration occurs in the space outside of this origin.

A firm's innovation stream is made up of continued incremental innovation in the extant product, as well as at least one nonincremental innovation. For example, in 1969 Goodyear began to develop a radial tire even as it continued to produce its existing bias-ply tire (Sull et al. 1997). Compared with their existing belted bias-ply tire, the radial tire involved discontinuous technology, sold to the same customer (see Figure 1). Similarly, throughout the 1980s Ciba Vision continued to improve upon their hard contact lenses while investing in three distinct innovations—extended wear lenses, daily disposable lenses, and Visudyne (Tushman and O'Reilly 1997). The extended wear and daily disposable lenses were both low-cost, disposable soft contact lenses that employed fundamentally different technologies compared to the firm's conventional lens technology. These new products were, however, sold to the same end users as the hard contact lens. Visudyne, in contrast, was a pharmaceutical product developed to slow age-related macular degeneration. This product was sold to ophthalmologists. Thus, compared to Ciba Vision's extant conventional lens product, Visudyne was associated with discontinuous technological change and was marketed to a totally different customer. Where Goodyear was trapped by inertial forces in the firm and its senior team (Sull et al. 1997), Ciba Vision was able to make sustained competitive progress as it managed exploitative as well as exploratory innovations (Tushman and O'Reilly 1997).

Successfully building an innovation stream is challenging because exploring and exploiting are contradictory to one another. Exploitative innovation is associated with efficiency, focus, convergent thinking, and reducing variance; while exploratory innovation is associated with experimentation, flexibility, divergent thinking, and increasing variance (Flynn and Chatman 2001, Rivkin and Siggelkow 2003, Van de Ven et al. 1999). These

Figure 1 Innovation Map*



*Adapted from Tushman and Smith (2002).

products are often in competition with one another for resources internal to the firm as well as in the marketplace (Christensen 1997). External demands of the marketplace and historically rooted inertia reinforce the existing products over innovation (Hannan and Freeman 1984, Tripsas and Gavetti 2000). If left unconstrained, these inertial forces trap the organization within its given competencies (Leonard-Barton 1992, Levitt and March 1988). Successful incumbents are often caught by the liabilities of age as exploitation drives out exploration (Kaplan et al. 2003, Benner and Tushman 2002). Similarly, entrepreneurial firms are often trapped by their exploratory routines as their contexts shift (Aldrich 1999, Anderson and Tushman 2001).

Ambidextrous designs are organizational forms that build internally inconsistent architectures and cultures into business units so that the firm can both explore and exploit (Adler et al. 1999). These organizational architectures involve highly differentiated units as well as top management team integration (He and Wong 2004, Gibson and Birkinshaw 2004, Tushman and O'Reilly 1997). Where structural differentiation permits firms to explore as well as exploit, the top management team serves as the point of integration between these contrasting agendas. It is the top management team that makes the decisions regarding organizational forms, cultures, and resource allocation processes, such that their firms can both explore and exploit (Hambrick 1994, Romanelli and Tushman 1994). An important function of the senior team is therefore to create meaning in the context of contradiction and to extract the benefits associated with contradictory strategic agendas (Barnard 1968, Weick 1979, Thompson 1967).

Top Management Teams, Team Outcomes, and Barriers to Exploring and Exploiting

Top management teams balance short-term performance and long-term adaptability through resource allocation trade-offs and organizational designs decisions (Edmondson et al. 2003, Eisenhardt and Zbaracki 1992, Hambrick 1994). These strategic decisions require teams to negotiate between the existing product and the innovation, identifying outcomes that will ensure the performance of both agendas. Borrowing from the negotiation and conflict management literature, we define balanced strategic decisions based on two criteria: (1) their distributive nature, which we define as making balanced trade-offs over time; and (2) their integrative nature, which we define as identifying synergies (Bazerman 1998, Lax and Sebenius 1986, Walton and McKersie 1965).

The distributive aspect of a decision involves the division of resources between the existing product and the innovation. Lax and Sebenius (1986) call this "claiming value," as managers identify resources for each individual product. Teams make a number of decisions in which they might preferentially support either the existing product or the innovation. These decisions are balanced when, over time, they support both products. For example, Ciba Vision's top management team balanced the ongoing demands of their conventional hard lenses even as they invested in daily disposables, extended wear, and Visudyne (Tushman and O'Reilly 1997). In allocating scarce resources, this senior team worked to balance the needs of the existing product even as they worked to develop several possible substitutes.

Decisions can also be defined by their integrative nature—the recognition of opportunities, linkages, and

synergies that might arise from the exploitative and exploratory activities. Lax and Sebenius (1986) call this creating value, in which the negotiated value increases when teams identify creative solutions in which both parties benefit. Top management teams might be able to achieve integrative value in their decisions when they identify ways to benefit from shared resources or to benefit from shared selling in the marketplace. For example, Ciba Vision unexpectedly found that introducing soft contact lenses to the market increased the demand for their conventional lenses. Similarly, *USA Today* found that their online business could leverage the newspaper's content and accelerate readership across both platforms (Gilbert 2005).

While organizations can excel when top management teams effectively balance strategic contradictions, structural, psychological, and social psychological barriers often prevent them from doing so (Van de Ven et al. 1999, Bazerman and Watkins 2004, Virany et al. 1992). Organizations benefit when structural features of the organization (tasks, skills, formal organization, culture) are internally aligned and are aligned with the firm's strategy (Chandler 1962, Nadler and Tushman 1992), yet these internally congruent design features are simultaneously associated with structural and social inertia. These internal inertial dynamics favor existing products at the expense of innovations (Tushman and Romanelli 1985, Leonard-Barton 1992). Further, managers are risk averse in situations of gains, and as such tend to reinvest in the less risky existing products at the expense of more risky innovation (Kahneman and Tversky 1979). Thus, when structure, strategies, and competencies all reinforce one another, managers are psychologically more resistant to changing them (Henderson and Clark 1991, Kaplan et al. 2003, Tripsas and Gavetti 2000). Levinthal and March (1993) suggest that managers are myopic—privileging short term over long term, close rather than far, and certainty of success over risk of failure. More broadly, Bazerman and Watkins (2004) observe that historical success is associated with a set of fundamental individual cognitive biases that drive predictable organizational (and social) pathology.

These structural and psychological forces for inertia tip the balance of resource trade-offs toward the existing product rather than the innovation. For example, Goodyear's senior team was trapped by their existing commitments, cognitions, structures, and competencies into reinvesting in bias-ply tires and incompetently investing in radial tires (Sull 1999, Sull et al. 1997). Similarly, Henderson and Clark (1991) found that structural barriers inhibited architectural innovation in those historically successful photolithography firms. Those organizations that are most successful in the short term are those in which the top management teams are most resistant to change and, as such, put their firms at risk (Audia et al. 2000, Milliken and Lant 1996, Kaplan et al. 2003).

Finally, distinct from inertial forces rooting organizations and their top management teams to the past, a different impediment to balanced decision making is an individual and team drive for consistency and uncertainty reduction (Festinger 1957, Heider 1958, Leana and Barry 2002). However, exploring and exploiting require fundamentally different and inconsistent organizational architectures and competencies (e.g., Bantel and Jackson 1989, Flynn and Chatman 2001). Managing these inconsistent architectures requires top management teams that can host these internal inconsistencies (He and Wong 2004, Tushman and O'Reilly 1997). However, if individuals privilege consistency over inconsistency, the response to these uncertainties and contradictions is to move toward reducing these inconsistencies and aligning one's own behaviors and cognitions, as well one's multiple activities and social networks, with one another (Lewis 2000, Denison et al. 1995).

This effort to preserve consistency stems from a fundamental epistemological belief of a unitary truth (Ford and Backoff 1988, Voorhees 1986). This belief in a unitary truth means inconsistencies cannot fundamentally coexist. There must be a contingency that mediates between inconsistent ideas. One consequence of consistency-oriented thinking is the need to solve conflicts. As this logic suggests, when two things are in conflict, one of them must be right and the other wrong. In a negotiation, this bias leads to what Bazerman (1998) calls the problem of the mythical fixed pie. By focusing on solving the conflict, negotiators focus on distributing resources between them, rather than finding cooperative means for expanding the value of resources.

However, in hosting exploration as well as exploitation, conflicts and inconsistencies between existing products and innovation cannot be eliminated (Cameron and Quinn 1988, Leana and Barry 2002). Balancing strategic decisions requires teams to recognize and use these conflicts, rather than try to resolve them. Mary Parker Follett recognized this in her early writings. She observed, "As conflict—difference—is here in the world, as we cannot avoid it, we should, I think, use it" (Follett 1925/1996, p. 67). Similarly, Eisenhardt et al. (1997) found that using conflict improves the quality of managerial strategic decision making. To make balanced strategic decisions, top management teams need to confront and overcome these structural, social psychological, and psychological barriers that create tendencies for both inertia and consistency. Top management team conditions must be able to support innovation, despite inertial tendencies, and enable the coexistence of inconsistent agendas, despite forces for consistency.

Managing Strategic Contradictions: Paradoxical Cognition

We develop a model of balancing strategic contradiction. This model takes into account challenges of inertia

and consistency that reinforce the existing product and push top management teams to choose one agenda rather than to support multiple agendas. In addressing these biases, we begin with the psychological biases, and identify cognitive frames and processes that can overcome organizational pressures for inertia as well as individual preferences for consistency. We then identify structural features that might facilitate a team’s ability to attend to and deal with strategic contradiction.

Cognitive biases define how managers understand a situation, seek information, and make decisions (Levinthal and March 1993, Walsh 1995). Managers’ understanding and processing of tensions and contradictions has an impact on whether they embrace the tensions and benefit from them or are halted by the inconsistencies (Ford and Backoff 1988, Lewis 2000, Smith and Berg 1987). Paradoxical cognition—paradoxical frames and cognitive processes of differentiating and integrating—enable balanced strategic decisions (see Figure 2).

Although the distinction between cognitive frames and cognitive processes is latent in the managerial cognition literature (Walsh 1995, Weick 1979), we make them explicit here. Cognitive frames are stable constructs that provide a lens to understand a situation. These cognitive frames, in turn, create a context for complex behavioral responses (Walsh 1995, Denison et al. 1995). Cognitive processes are behavioral routines and ways that managers use to think about and respond to information (Weick et al. 1999). These frames create foundations that enable a set of complex cognitive processes. Our explanation and examples of paradoxical cognition move between the individual and team levels. In the following section, we return to explore the grounding of this model at either the individual or team level in more depth.

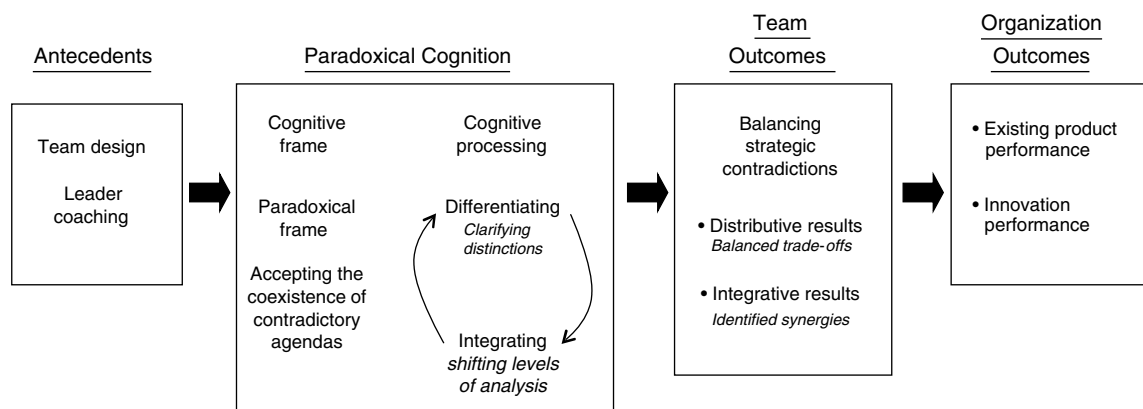
Cognitive Frames. Walsh (1995) defines a cognitive frame as “a mental template that individuals impose on an environment to give it form” (p. 281). These mental templates create a lens through which managers filter

knowledge and direct action. More specifically, managerial cognitive frames drive organizational action by directing attention to particular issues (Daft and Weick 1984, Dutton and Jackson 1987, Kaplan 2003), defining the leader’s understanding of the issues they face (Dutton and Ashford 1993, Gilbert 2005), and assigning socioemotional information to particular issues (Pinkley 1990).

Balancing strategic contradiction may be associated with paradoxical frames—mental templates in which managers recognize and accept the simultaneous existence of contradictory forces. To more clearly describe paradoxical frames, we explore the nature of paradoxes more generally. Ford and Backoff (1988) define social paradox (paradoxes of thoughts, actions, and beliefs, rather than paradoxes of mathematics or rhetoric) as “Some ‘thing’ that is constructed by individuals when oppositional tendencies are brought into recognizable proximity through reflection or interaction” (p. 89). This definition suggests that paradoxes involve aspects of both a situation (oppositional tendencies) and an actor’s cognition (reflection or interaction). Specifically, a paradox is created when (1) tensions in a situation (explore/exploit) are (2) juxtaposed through actor’s cognition.

Organizing inherently involves contradictions. The act of organizing creates distinctions of roles and responsibilities, which must be coordinated and integrated to achieve an overall goal. These distinctions result in contradictions within firms (Poole and Van de Ven 1989, Weick 1979). Organizational literature is ripe with the recognition of contradictory relations between, for example, individual and group demands, between focus and flexibility, and between autonomy and democracy (Cameron and Quinn 1988, Flynn and Chatman 2001, Nonaka and Toyama 2002, Rivkin and Siggelkow 2003). Increasingly, our literature has used the term paradox to define and describe these contradictory contexts. However, this use of paradox often obscures the role of the actor in understanding and then managing these ten-

Figure 2 A Model of Managing Strategic Contradiction: Antecedents, Paradoxical Cognition, and Outcomes



sions. Paradoxical frames therefore refer to an actor's cognitive juxtaposition of the opposing forces in which actors embrace rather than avoid or deny these tensions. Practitioners refer to these paradoxical frames as embracing "both/and" logic, rather than an "either/or" logic (Collins and Porras 1997).

We can identify cognitive frames of managers through their words and actions (Huff 1990, Kaplan 2003, Murnighan and Conlon 1991). For example, IBM CEO Sam Palmisano's definition of the corporate values suggests a paradoxical frame. He recently defined IBM's values as striving for both "dedication to every client's success" and "innovation that matters—for our company and for the world." The first value predominantly demands quality for today, while the second demands quality for tomorrow (Hemp and Stewart 2004). In contrast, Goodyear's management assumed a more linear approach to innovation in the context of the radial environmental challenge. Confronted by Michelin's introduction of the radial tire, Goodyear's senior team initially focused on the existing product and avoided the radial challenge. When they finally introduced the radial tire, Goodyear completely shifted from bias-ply tires to radials (Sull et al. 1997). This strategic shift at Goodyear was associated with a fundamentally new senior team (see also Virany et al. 1992).

Recognizing and embracing contradictions leads to increased success. At an organizational level, managers of the Toyota Production System, the highly successful just-in-time manufacturing process, framed their organizational goals paradoxically—low costs and high specialization, low (or no) inventory, yet immediate access to parts (Adler et al. 1999, Eisenhardt and Westcott 1988). The organization then built routines and processes to achieve these goals. At a team level, Murnighan and Conlon (1991) found that the performance among British string quartets was associated with members recognizing contradictions inherent in their group processes—democracy and leadership, conflict and compromise.

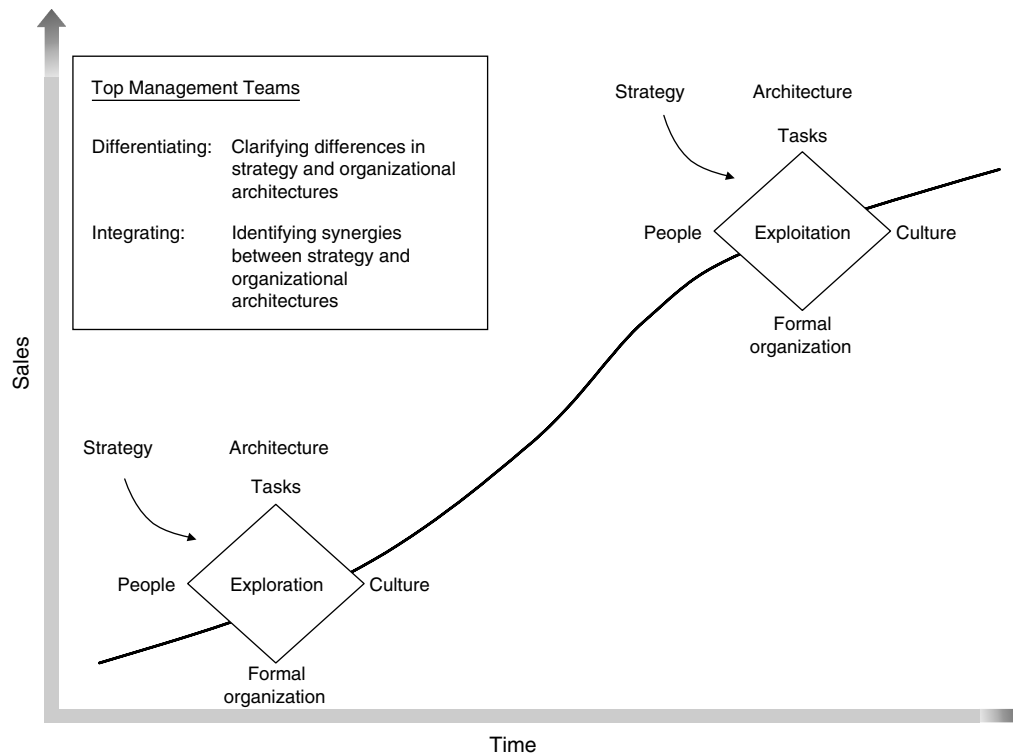
How might paradoxical frames increase organizational performance? First, these frames create a context that demands the articulation of distinct goals for the existing product and for the innovation. Creating clear and concise goals motivates the achievement of those goals (Latham and Locke 1995). By defining distinct goals, managers motivate the success of both the exploitative and the exploratory products. Paradoxical frames are also associated with reduced threat and fear, which enables positive conflict. A paradoxical frame signals that managers expect both frames to succeed. This opportunistic framing helps shift the threat and competition from between the two products to how these products might benefit one another and the larger firm (Dutton and Jackson 1987). Thus, teams that recognize the dualities and potential synergies of their challenges

are associated with less anxiety and stress, and enhanced performance (Murnighan and Conlon 1991, Smith and Berg 1987). Similarly, clinical therapy finds that paradoxical frames, frames in which patients embrace the symptoms they want to get rid of, lead to less anxiety, less fear, and ultimately increased clinical success (Frankel 1960, Linehan 1993).

Cognitive Processes. Paradoxical frames create a foundation for cognitive processes that can handle inconsistencies. Based on the assumption that both the existing product and innovation must succeed, managers can confront the relationship between these two products—both their differences and their similarities. Effectively managing these contradictions is associated with two distinct cognitive processes—differentiating and integrating. Whereas differentiating involves recognizing and articulating distinctions, integrating involves shifting levels of analysis to identify potential linkages. Differentiating helps overcome inertia both by reinforcing the needs of each product and being vigilant that the innovation is not crowded out by commitments to existing strategies and processes. Integrating, in contrast, is associated with sustained attention to possible synergies between the exploitative and exploratory products. Attention to integration helps the team explicitly look for ways that the contradictory strategies can help each other. By addressing different aspects of paradoxical contexts, differentiating and integrating reinforce one another. This notion of cognitive differentiating and integrating is similar to the Van de Ven et al. (1999) notion of innovation processes that involve divergent as well as convergent processes.

Differentiating involves clarifying distinctions between the existing product and innovation. Figure 3 depicts a model of possible distinctions between the existing product and innovation in their strategies and architectures (i.e., tasks, people, formal organization, and culture). Each product is associated with an internally consistent organizational architecture and associated logics, even as these architectures and logics are themselves fundamentally different (Sutton 2002, Tushman and O'Reilly 1997). Differentiating involves recognizing and reinforcing the differences in these organizing logics.

Differentiating limits inertia by dampening cognitive commitments to the existing product. Langer's (1989) theory of mindfulness focuses on drawing novel distinctions as a core process to enable learning, creativity, and effective decision making. By explicitly drawing distinctions, managers are less committed to existing categories or points of view. Rather, under these conditions, managers generate new categories and classifications. More clearly identifying and articulating the needs of both agendas allows decision makers to more effectively allocate the resources such that each agenda is allowed to

Figure 3 Differentiating and Integrating in Top Management Teams*

*Adapted from Tushman and Smith (2002).

evolve. For example, the innovation and existing product may not benefit equally from the team leader's time or might require different leadership styles (e.g., He and Wong 2004). Such differentiating between strategic agendas helps leaders develop the behavioral complexities such that both agendas can succeed (Dutton and Jackson 1987, Denison et al. 1995).

Cognitive differentiating also encourages managers to explore new markets, new skills, and new opportunities for the innovation, unburdened by the context of the existing product. For example, newspaper managers reacted differently to the introduction of online news. In those most successful newspapers, senior managers saw online as a strategic opportunity and were able to creatively differentiate online offerings from their traditional newspaper. This cognitive differentiation allowed these managers to build firms that excelled both in print and online. In contrast, those less successful teams saw online as a threat and, in turn, focused quickly on leveraging their existing competencies, and in turn restricting the innovation's growth (Gilbert 2005). Differentiating helps managers to overcome inertia as they are freed up to seek novelty and opportunity in the innovation (Dutton and Jackson 1987).

This cognitive differentiating in top management teams generates variation along with abundant information. Such information richness helps make more effective trade-offs and strategic decisions. For example, Eisenhardt and Zbaracki (1992) found that access-

ing and using more information helped decision makers make decisions more rapidly. Similarly, Weick et al. (1999) found that in high-reliability organizations, team members are unwilling to simplify their operations. This ongoing cognitive differentiating leads to the generation of more information and, ultimately, enhanced effectiveness in responding to challenging situations.

Differentiating is a process in which team members constantly contrast the existing product and innovation. These contrasts continually evaluate the existing product and innovation, even as the strategies emerge over time (Noda and Bower 1996). Differentiating allows team members to avoid cognitive commitments to the past even as they support the new product (Langer 1989). Polaroid's attempt to introduce a digital camera in the 1990s provides an example where managers did not engage in ongoing processes of differentiating. Tripsas and Gavetti (2000) described how Polaroid's senior team actively failed to cognitively differentiate their extant analog cameras from their newly developed digital cameras. The senior team conceptualized the digital innovation as fundamentally similar to its existing razor/blade strategy. Such undifferentiated thinking and associated strategic action was an important determinant of Polaroid's failure. Sull's (1999) description of the American tire industry's response to the radial threat presents a similar picture of undifferentiated strategic thinking and associated organizational pathology.

Differentiating further enables decision makers to identify more targeted and focused synergies between the distinct products. Suedfeld et al. (1992) found that differentiating is a necessary but, by itself, insufficient process in making complex and integrative decisions. The more distinctions managers uncover, the more they learn about each product, and the more they find points of convergence. Research on negotiations (McGinn et al. 2003) and cultural diversity (Ely and Thomas 2001) find similar processes in which differentiating reinforces learning, which leads to the possibility of integration.

While differentiating enables balanced decision making by reducing inertia, it can also lead to increased competition. Noticing distinctions reinforces distributive decision making at the expense of integrative decision making. These distinctions may be associated with group conflict and associated process losses (Steiner 1972, Edmondson et al. 2003). For example, Firestone's senior team's clarity about the fundamental strategic and organizational differences between radial tires and their existing bias-ply tires led them to underfund and undercut their development of an effective radial strategy (Sull 1999). Similarly, at Polaroid, even with significant resources devoted to digital photography, the senior team's response to this potentially cannibalizing technology was to resist and marginalize senior team members associated with the new technology (Tripsas and Gavetti 2000).

The potential team conflicts associated with differentiating may be offset by processes of integrating. In their analysis of integrative thinking, Suedfeld et al. (1992) define integrating as the "development of conceptual connections among differentiated dimensions or perspectives." Integrating involves shifting levels of analysis from the product level to the organizational level of analysis to identify possible synergies. Where cognitive differentiating at the product level builds in conflict, integrative thinking uses these conflicts to identify synergistic solutions at the organizational level. Shifting to the superordinate level (the organization) and linking to the overarching frame reinforces the cooperation between contradictory agendas and enables teams to better make trade-offs (Langer 1989, Sherif 1971). Recognizing conflicts associated with differentiation while also maintaining a belief that both products must succeed leads to creative, synergistic results. Rothenberg (1979) called this process Janusian thinking (after the two-faced Roman god Janus), in which holding inconsistencies simultaneously enabled creative solutions to the conflicts. Rothenberg (1979) found that genius thinking involved embracing inconsistent contradictions simultaneously. For example, at Ciba Vision, the articulation of an overarching aspiration of "Healthy Eyes for Life" as well as active senior team attention to integrative decision making created the context where the senior team was able to make a series of decisions such that both

their conventional and disposable lens products flourished (Tushman and O'Reilly 1997).

Differentiating and integrating are opposing, yet complementary, processes. Differentiating pulls apart the existing product and innovation by focusing on how they differ from one another. Integrating, in contrast, reinforces and makes mindful possible synergies between these products. These processes enable one another. Differentiating results in new categories and dimensions of the products and helps managers find synergies. In turn, as integrating reinforces the investment in each of the distinct products, it reduces the threat and competition that are obstacles to differentiating. It is the engagement in both of these cognitive processes that leads teams to be able to execute balanced decision making.

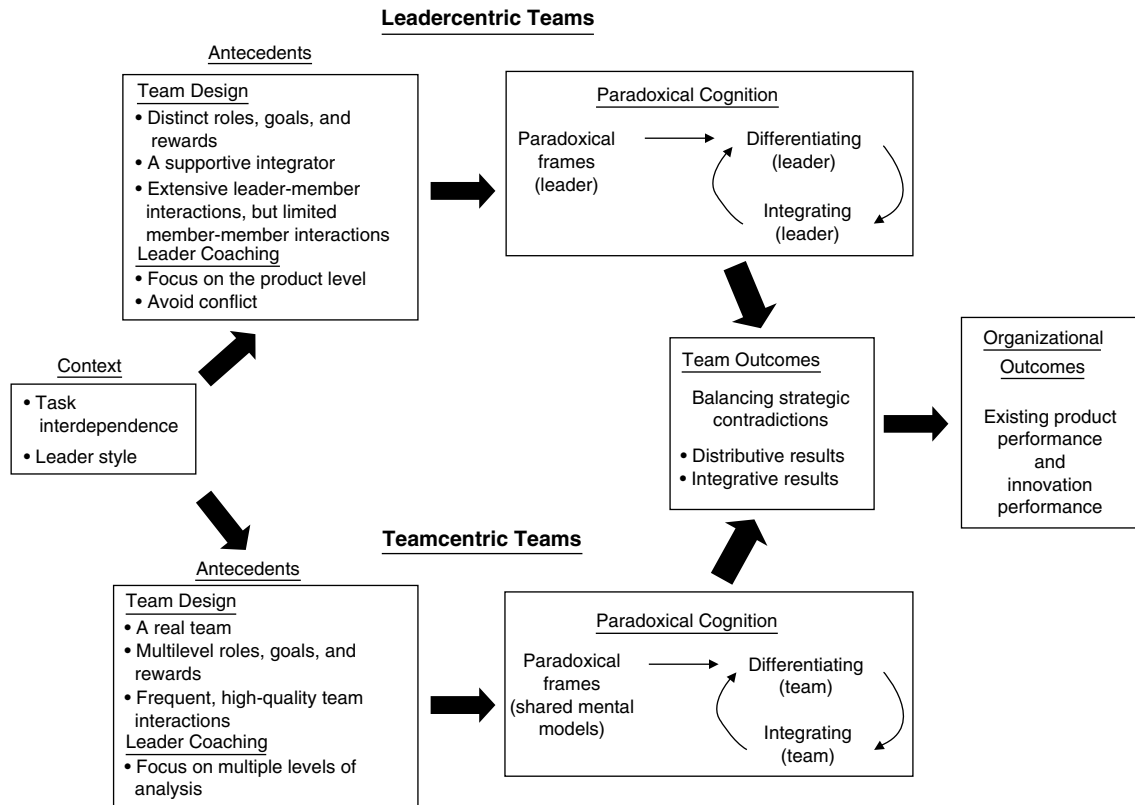
Teamcentric and Leadercentric Models of Embracing Paradoxical Cognition

How teams embrace paradoxical cognition depends on the locus of integration (Bunderson 2003, Hambrick 1994, Perlow et al. 2004). In some top management teams, integration of strategic contradiction occurs at the leader level. In other top management teams, a group of senior managers, typically the CEO/GM and his or her direct reports, share the responsibility for integrating strategic contradictions (Ancona and Nadler 1989, Bunderson and Sutcliffe 2003). We label these teams as leadercentric teams and teamcentric teams, respectively. Following Amabile (1996), we argue that the nature of the cognitive frames and processes are similar at the individual and the group level of analysis. Where these cognitions occur primarily in the leader in leadercentric teams, they occur through social interactions within teamcentric teams. The locus of strategic integration may be contingent on the team's context and the different team types are associated with contrasting antecedent conditions. Following the work of Hackman (2002) and Wageman (2001), we explore team conditions associated with team design and leader coaching. We then explore the impact of team context on the locus of strategic integration. (See Figure 4.)

Antecedents of Leadercentric Teams

In leadercentric teams, the leader integrates the contradictory agendas. Team leaders collect information about each agenda, process that information, and make decisions primarily on their own. These leaders recognize the conflicts between the agendas, and they accept and manage those conflicts. These leaders may be able to most successfully embrace paradoxical cognitions and balance strategic decisions with teams that exhibit (1) distinct roles, goals, and rewards; (2) a supportive integrator; (3) extensive leader-member interactions, but limited member-member interactions; and (4) leader coaching to focus on the product level and avoid conflict.

Figure 4 A Model of Managing Strategic Contradiction by Team Type



Distinct Roles, Goals, and Rewards. Quinn (1984) and Van de Ven et al. (1999) both find that teams that successfully manage paradox involve both the roles of an advocate—one who supports a particular agenda—and the role of an integrator—one who creates connections between the disparate parts. In leadercentric teams these roles are allocated to distinct team members. The leader is the integrator and the team members are the advocates. More specifically, leadercentric teams benefit from assigning different individuals to advocate for either the existing product or the innovation. By separating these roles, team members focus on their distinct task, whether exploring or exploiting, unburdened structurally or psychologically by the contradictions associated with the other (Brown and Eisenhardt 1997, Levinthal and March 1993). Because the task of exploring and exploiting often requires different skills and leadership styles (Leonard-Barton 1992, Sutton 2002, Quinn 1984), separating these roles allows the team leader to assign appropriate team members to these tasks.

Separating roles also helps the team leaders learn about the different needs of each product. Leaders know who to turn to when seeking information about each product. More importantly, these team members can help the leader hear and understand the needs of their particular agenda. Identifying distinct roles and decision makers for the contrasting strategic agendas may be particularly important for the exploratory product (Adler et al.

1999, Benner and Tushman 2002). Aligning team members' responsibilities with clear goals and rewards helps motivate these managers (Hackman 2002, Kerr 1975, Latham and Locke 1995). Because members have distinct responsibilities for the existing product and innovation, their goals and rewards are quite distinct from one another.

Supportive Integrator. In leadercentric teams, the team leader integrates the contradictory agendas. Making these trade-offs is a significant cognitive burden for team leaders (Tetlock et al. 2004) and subjects the team to the leader's decision-making biases (Bazerman and Watkins 2004). Coleaders, trusted advisors, or a secondary team member assigned to focus on integration help offset these biases and alleviate some of the leader's cognitive burdens (Eisenhardt et al. 1997). In an assessment of the roles of individuals surrounding American presidents, Porter (1980) found that someone often plays the role of a cointegrator, or "honest broker" to help collect, sort, and assess information. Similarly, Heenan and Bennis (1999) found that in successful coleadership relationships, each of the partners offers different biases and skills to improve the quality of the leader's decisions. By providing another perspective, these supportive integrators help the team leader make balanced decisions.

High-Quality Leader-Member Interactions, but Limited Member-Member Interactions. Decision making in

leadercentric teams depends on the quality of the interactions between the team members and the team leader. High-quality interactions enable the team leader to seek and process relevant decision-making information and, in turn, to make more balanced decisions (Eisenhardt et al. 1997). High-quality interactions are associated with the amount of information exchanged, the amount of information revealed, and the mutual understanding between the team leader and his/her team members. These interactions depend on the extent to which managers are willing to share potentially threatening strategic as well as tactical information with the leader (Argyris and Schoen 1978, Edmondson 1999). Individuals within senior teams may avoid revealing crucial information given the substantial political and resource allocation stakes at the top of a firm (Ancona and Nadler 1989, Edmondson et al. 2003). Edmondson (1999) found that sharing sensitive information within teams depends on a shared belief as to whether it is safe to take interpersonal risks in team interactions.

While interactions between the team leader and team members may lead to high-quality decisions, interactions among team members may be more detrimental in leadercentric teams—particularly interactions between the advocates of the existing product and the innovation. Structurally differentiating responsibility for the existing product and innovation increases interpersonal conflicts, as the product leaders are in competition with one another for scarce resources (e.g., Deutsch 1973, Sherif 1971). In leadercentric teams, engaging conflict within the team level may be detrimental, as the locus of decision making resides with the leader. Leaders in these leadercentric teams engage more in one-on-one interactions and less in team strategic decision making.

Leader Coaching to Reinforce Differentiation. In leadercentric teams, the team leader's coaching provides valuable support that reinforces team processes and team beliefs (Edmondson 1999, Hackman 2002, Wageman 2001). In leadercentric teams, leaders direct and focus strategy at the team level even as they focus team members at their individual product level. Reinforcing differences between the existing product and the innovation encourages the leaders of each product to focus on their particular strategic agenda. Reinforcing the necessity of both products and exhibiting coaching behaviors consistent with the contrasting strategic agendas helps differentially motivate the performance of senior team members (Denison et al. 1995).

Antecedents of Teamcentric Teams

In teamcentric teams, the teams themselves integrate the contradictory agendas. Achieving balanced decisions on teamcentric teams is associated with shared mental models of paradoxical frames and collective cognitive processes. Shared paradoxical frames enable team members

to build a collective understanding of the team's complex goals and a collective acknowledgment of the tensions and conflicts between their contrasting agendas (Murnighan and Conlon 1991, Smith and Berg 1987). These frames create a foundation for cognitive processes through intensive team interactions.

Both Weick and Roberts (1993) and Wegner (1986) describe models of how groups process information and make decisions collectively. These models recognize that team members each have distinct knowledge to contribute to the group. Wegner (1986) articulated a transactive memory system in which each group member knows the location of all the knowledge in the group, even though they do not all know the content of this knowledge. Weick and Roberts's (1993) model of collective mind suggests how team members might integrate these disparate pieces of information. They argue that team members each offer their contributions to the group through interactions with each other. Through processes of heedful interrelating, a new group-level cognition emerges that is greater than the contributions of each individual member.

Teamcentric teams work together to make decisions in a way that is similar to these models of transactive memory and collective mind. Unlike leadercentric teams, where different individuals assume the roles of advocates and integrators, members of teamcentric teams each assume responsibilities for both of these roles. Team members may provide information and advocate for either the existing product or the innovation. However, through processes of heedful interrelating, these team members are also responsible for integrating across their team.

Effectively embracing both intra- and interpersonal conflict is an important determinant of success for teamcentric teams. Whereas leadercentric teams manage conflict by attempting to avoid it, conflict abounds on teamcentric teams. Team members may experience intrapersonal conflict in their dual roles of advocates for particular products and as integrators across these products. They may also experience interpersonal conflict with other team members who are competing for scarce resources. Using this conflict to balance contradictions leads to higher quality decisions in teamcentric teams. To build shared mental models and collaborative decision making, teamcentric teams are associated with teams that are designed as real teams (Hackman 2002). Further, teamcentric teams exhibit (1) roles, goals, and rewards at multiple levels of analysis; (2) frequent, high-quality team interactions; and (3) leader coaching to reinforce the organizational level of analysis.

Real Teams. Hackman (2002) defines a real team as one with a clear sense of boundaries, an interdependent task, and a clear understanding of the team's authority. A real team creates a foundation for groups of

individuals to work together to achieve their collective goals. A real team allows team members to allocate clear tasks to one another, know who else has information, and work with the other members to create shared mental models and shared processes. Even as there has been a move toward increasingly using integrated teamwork among senior management, achieving teamwork is often difficult in senior teams because of the political and career issues unique to senior teams (Ancona and Nadler 1989, Edmondson et al. 2003). However, having the top management team attend to themselves as a real team helps teamcentric teams deal with strategic contradiction.

Roles, Goals, and Rewards at Multiple Levels of Analysis. As with leadercentric teams, teamcentric teams benefit from assigning primary existing product and innovation roles to different team members and aligning these roles with product-level goals and rewards. Team members with specific product-level responsibilities focus on seeking product-specific information and ideas (Brown and Eisenhardt 1997), even as this information is shared with the entire team (Bazerman and Watkins 2004). These distinct responsibilities are important in overcoming inertia when teams make decisions together. When making group-level decisions, teams often prevent multiple, dissenting opinions from being expressed because team members want to quickly achieve consensus (Eisenhardt et al. 1997, Nemeth and Wachtler 1983). Often the needs of the minority opinion are not shared in group decision making. In top management teams, this minority opinion is often that of the innovation. Assigning a distinct individual to represent each agenda in team discussions encourages these opinions to be raised in team interactions.

Assigning product-level roles, goals, and rewards reinforces the conflict and competition between managers of contradictory agendas. Managers of teamcentric teams are able to embrace this conflict and reinforce integrative thinking by identifying a second set of roles, goals, and rewards at the organizational level—dual roles, superordinate and/or opportunistic goals (Dutton and Jackson 1987, Sherif 1971), and common fate rewards (Tushman et al. 2002). This second set of organization-level roles, goals, and rewards helps motivate team members to consider the organization's overarching and integrative strategic agenda. Creating multilevel roles, goals, and rewards helps team members shift from focusing on competition to focusing on individual strategic agendas as well as the firm's overarching strategic agendas (Gilbert 2005). Team members are asked to engage in multiple leadership roles simultaneously—both integrators as well as advocates (Quinn 1984). As Brown and Eisenhardt (1997) note, these multilevel structures and incentives provide flexibility over time, as team members shift back and forth between each of these levels.

Frequent Team Interactions. Weick and Roberts (1993) describe a process of integrating across distinct contributions as heedful interrelating, where team members are aware of their own and others' contributions and subordinate their own contributions for the team's benefit. Heedful interrelating involves dynamic learning processes in which team members make contributions to the team and learn from the contributions of others. Heedful interrelating depends on team members' ability to interact. The frequency of their interactions allows for more opportunity to share information with one another. As well, the quality of their interactions ensures that information is actually being shared. As with leadercentric teams, psychological safety on the team (a shared team belief that it is safe to take interpersonal risks) reinforces positive team interactions (Edmondson 1999).

Leader Coaching to Facilitate Integration. The behaviors of the leader in leadercentric teams reinforce the focus on differentiating products, whereas the behaviors of the leader on teamcentric teams reinforce integrative behaviors. In leadercentric teams, the senior leader facilitates his/her team's interaction. These leaders encourage their team members to extend beyond their own product's focus. Teamcentric leaders coach their team members to attend to both their products as well as organizationwide issues. As such, team members in teamcentric teams "wear multiple hats" (Ancona and Nadler 1989). Such teamcentric facilitation encourages team members to actively manage conflict rather than allowing it to become an obstacle in team interactions.

Under what conditions do leadercentric versus teamcentric teams dominate in managing strategic contradictions? It may be that task interdependence and leadership style are important contextual factors affecting the relative effectiveness of these contrasting team types. Innovation streams in which the development of the existing product and innovation are highly interdependent require increased collaborative interaction between members of the team. It may be that such tasks require increased team member interaction to attend to the uncertainty associated with such substantial task interdependence (Rivkin and Siggelkow 2003, Nadler and Tushman 1996, Thompson 1967). Teamcentric teams might be more able to deal with substantial interdependence than leadercentric teams. In contrast, under conditions of limited task interdependence, leadercentric teams may have sufficient information-processing capabilities to deal with the more limited coordination requirements.

A second possible moderator is the team leader's preferred leadership style. Leadercentric teams are associated with leadership that is much more authoritative, whereas teamcentric teams are associated with more democratic leadership (e.g., Flynn and Chatman 2001, Perlow et al. 2004). While team leaders may need to express multiple roles and behavioral flexibility in managing contradictory agendas (e.g., Denison et al. 1995),

it may be that a leader's preferred leadership style is an important determinant of the differential effectiveness of leadercentric versus teamcentric teams.

Conclusion

Competitive pressures make even more salient Thompson's (1967) and Barnard's (1968) admonitions to take contradiction and paradox seriously. We believe that the management of strategic contradiction belongs at the forefront of organizational scholarship. As such, this paper has focused on developing a set of ideas on how top management teams might deal with strategic contradiction. It may be that a root of sustained organizational performance is in the senior team's ability to successfully attend to and deal with the challenges of operating in different timeframes and strategic logics (Adner and Helfat 2002, Adler et al. 1999, He and Wong 2004). We observe that sustained organizational performance is rooted in both exploring as well as exploiting, in developing innovation as well as sustaining the existing product. Research on dynamic managerial capabilities and organizational change has focused on how leaders can successfully innovate to enable adaptation (Adner and Helfat 2002, Kaplan et al. 2003). This focus on adaptation may lead to suboptimal performance. Instead, we argue that sustained performance occurs through attending to and dealing with strategic contradictions—short-term performance and long-term adaptability, exploration and exploitation, focus and flexibility.

The literature on organization design highlights the importance of building organizational forms that can both explore as well as exploit (e.g., Tushman and O'Reilly 1997, Gibson and Birkinshaw 2004, Siggelkow and Levinthal 2003), yet even as this literature highlights the role of the senior team in creating these contradictory contexts, there is little clarity on how these teams might deal with the challenges associated with strategic contradiction. We explore those factors that enable top management teams to achieve balanced strategic decisions in contradictory contexts. We contribute to an emerging body of literature on contradiction and paradox that explores the nature of these challenges and identifies team characteristics associated with managing them. While others have identified the roles of organizational structures, cultures, and routines to manage contradictions (Adler et al. 1999, Flynn and Chatman 2001), we argue that balancing contradiction in decision making is rooted in senior team cognitions. We argue that balanced strategic decision making in the context of contradiction is rooted in paradoxical cognition—cognitive frames and processes that allow teams to effectively embrace, rather than avoid, contradictions. We further argue that, depending on the locus of integration of the

inconsistent agendas, these cognitive frames and processes occur either with the senior leader or in the interactions of the entire top management team.

Empirical exploration is necessary to systematically explore the relationships between cognitive frames, cognitive processes, locus of integration, team decisions, and organizational outcomes. Such empirical research must take into account the difficulties of assessing managerial cognition. Empirically exploring such concepts requires multiple methods involving both rich qualitative data to identify and understand the nuances of managerial cognition (Huff 1997, Kaplan 2003) and larger sample analysis to validate these ideas (Sundaramurthy and Lewis 2003).

It might also be important to explore the applicability of these ideas to contradictions at different levels of analysis. While we focus on strategic contradictions between exploration and exploitation for top management teams, organizations face contradictions at multiple levels of analysis. Lorsch and Tierney (2002) and Sundaramurthy and Lewis (2003) raise questions about managing contradictory needs of multiple corporate stakeholders. Adler et al. (1999), Repenning (2002), and Tyre and von Hippel (1997) describe contradictions between efficiency and effectiveness on the factory floor and in product development. The challenge of balancing financial and social goals has received increased attention in the organizational literature (Margolis and Walsh 2003, Paine 2003). It may be that managing contradiction is a window into a range of important and understudied organizational challenges (Cameron and Quinn 1988, Poole and Van de Ven 1989). Bringing the study of contradiction more into the center of our field may help us rise to the challenge posed so long ago by Thompson (1967) and Barnard (1968).

There are several limitations to this model. First, this model is predicated on the assumption that organizations benefit from striving for adaptability and performance simultaneously. While an increasing amount of research supports this assumption (Gibson and Birkinshaw 2004, He and Wong 2004, Tushman et al. 2002), what are the conditions under which this assumption does not hold? What kind of organizations benefit from substituting the innovation for the existing product? It might be that when the existing product is failing and/or there is limited slack, organizations benefit from product substitution. Also, under what conditions do firms benefit from managing only existing products and splitting innovation out into a separate organization (Christensen 1997, Chesbrough 2002)? It may be that organizations benefit from splitting out the innovation when there is no leverage between the existing product and the innovation. Future research is necessary to fully understand under what conditions firms benefit from managing strategic contradictions internally versus externally.

Understanding how organizations effectively manage contradictions is a critical question for organizational scholars. The challenge issued by Thompson (1967) and Barnard (1968) decades ago still rings true. While there is a growing literature on the importance of exploration and exploitation, ambidextrous designs, and dynamic managerial capabilities, there is limited literature on the characteristics of the senior team that can manage these complex strategies as associated complex organizational forms. We suggest that embracing, rather than deciding between, contradictory styles and structures provides an important direction for organizational scholarship. As top management teams are at the juncture of internal forces for stability and external forces for change, the systematic study of the conditions under which the senior team attend to and deal with strategic contradiction deserves to be more at the center of our scholarship. Finally, to the extent that contradictions are more pervasive and occur at multiple levels of a firm makes the topic of teams and managing contradiction even more salient to our field.

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References

- Abernathy, W., K. Clark. 1985. Innovation: Mapping the winds of creative destruction. *Res. Policy* **14** 3–22.
- Adler, P. S., B. Goldoftas, E. Levine. 1999. Flexibility vs. efficiency? A case study of model changeovers in the Toyota product system. *Organ. Sci.* **10** 43–68.
- Adner, R., C. Helfat. 2002. Corporate effects and dynamic managerial capabilities. *Strategic Management J.* **24**(10) 1011–1025.
- Aldrich, H. 1999. *Organizations Evolving*. Sage Publications, Thousand Oaks, CA.
- Amabile, T. M. 1996. *Creativity in Context*. Westview Press, Boulder, CO.
- Ancona, D. G., D. A. Nadler. 1989. Top hats and executive tales: Designing the senior team. *Sloan Management Rev.* **31**(1) 19–28.
- Anderson, P., M. Tushman. 2001. Organizational environments and industry exit: The effects of uncertainty, munificence and complexity. *Indust. Corporate Change* **10**(3) 675–711.
- Argyris, C., D. A. Schoen. 1978. *Organizational Learning: A Theory of Action Perspective*. Addison-Wesley, Reading, MA.
- Audia, P. G., E. A. Locke, K. G. Smith. 2000. The paradox of success: An archival and a laboratory study of strategic persistence following radical environmental change. *Acad. Management J.* **43**(5) 837–853.
- Bantel, K. A., S. E. Jackson. 1989. Top management and innovations in banking: Does composition of the top team make a difference? *Strategic Management J.* **10** 107–124.
- Barnard, C. 1968. *The Functions of the Executive*, 2nd ed. Harvard University Press, Cambridge, MA.
- Bazerman, M. 1998. *Judgment in Managerial Decision Making*, 4th ed. Wiley, New York.
- Bazerman, M., M. Watkins. 2004. *Predictable Surprises: The Disasters You Should Have Seen and How to Prevent Them*. Harvard Business School Press, Boston, MA.
- Benner, M., M. Tushman. 2002. Process management and technological innovation: A longitudinal study of the photography and paint industry. *Admin. Sci. Quart.* **47** 676–706.
- Brown, S. L., K. M. Eisenhardt. 1997. The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Admin. Sci. Quart.* **42**(1) 1–34.
- Bunderson, J. S. 2003. Team member functional background and involvement in management teams: Direct effects and the moderating role of power centralization. *Acad. Management J.* **46**(4) 458–474.
- Bunderson, J. S., K. M. Sutcliffe. 2002. Why some teams emphasize learning more than others: Evidence from business unit management teams. H. Sondak, ed. *Toward Phenomenology of Groups and Group Membership*, Vol. 4. Elsevier Science, Oxford, UK, 49–84.
- Bunderson, J. S., K. M. Sutcliffe. 2003. Management team learning orientation and business unit performance. *J. Appl. Psych.* **88**(3) 552–560.
- Cameron, K., R. Quinn. 1988. Organizational paradox and transformation. R. Quinn, K. Cameron, eds. *Paradox and Transformation*. Ballinger Publishing Company, Cambridge, MA, 1–18.
- Chandler, A. D. 1962. *Strategy and Structure: Chapters in the History of the Industrial Enterprise*. MIT Press, Cambridge, MA.
- Chesbrough, H. 2002. Graceful exits and missed opportunities. *Bus. Hist. Rev.* **76** 803–837.
- Christensen, C. 1997. *The Innovator's Dilemma*, 2nd ed. Harper-Collins, New York.
- Collins, J., J. Porras. 1997. *Built to Last: Successful Habits of Visionary Companies*. Harper Business, New York.
- Daft, K. Weick. 1984. Toward a model of organizations as interpretation systems. *Acad. Management Rev.* **9** 284–295.
- D'Aveni, W. 1994. *Hypercompetition: Managing the Dynamics of Strategic Maneuvering*. Free Press, New York.
- Denison, D., R. Hooijberg, R. Quinn. 1995. Paradox and performance: Toward a theory of behavioral complexity in managerial leadership. *Organ. Sci.* **6** 524–540.
- Deutsch, M. 1973. *The Resolution of Conflict*. Yale University Press, New Haven, CT.
- Dosi, G. 1982. Technological paradigms and technological trajectories. *Res. Policy* **11** 147–162.
- Dutton, J., S. Ashford. 1993. Selling issues to top management. *Acad. Management Rev.* **18**(3) 397–428.
- Dutton, J. E., S. E. Jackson. 1987. Categorizing strategic issues: Links to organizational action. *Acad. Management Rev.* **12**(1) 76–90.
- Edmondson, A. 1999. Psychological safety and learning behavior in work teams. *Admin. Sci. Quart.* **44**(4) 350–383.
- Edmondson, A., M. A. Roberto, M. D. Watkins. 2003. A dynamic model of top management team effectiveness: Managing unstructured task streams. *Leadership Quart.* **14**(3) 297–325.
- Eisenhardt, K., B. Westcott. 1988. Paradoxical demands and the creation of excellence: The case of just-in-time manufacturing. R. Quinn, K. Cameron, eds. *Paradox and Transformation: Toward a Theory of Change in Organization and Management*. Ballinger Publishing Company, Cambridge, MA, 169–194.

- Eisenhardt, K. M., M. J. Zbaracki. 1992. Strategic decision making. *Strategic Management J.* **13** 17–37.
- Eisenhardt, K. M., J. L. Kahwajy, L. J. I. Bourgeois. 1997. Conflict and strategic choice: How top management teams disagree. *California Management Rev.* **39**(2) 42–62.
- Ely, R. J., D. A. Thomas. 2001. Cultural diversity at work: The moderating effects of work group perspectives on diversity. *Admin. Sci. Quart.* **46** 229–273.
- Festinger, L. 1957. *A Theory of Cognitive Dissonance*. Row Peterson, Evanston, IL.
- Finkelstein, S., D. Hambrick. 1996. *Strategic Leadership: Top Executives and Their Effects on Organizations*. West Publishing Company, Minneapolis/St. Paul, MN.
- Flynn, F., J. Chatman. 2001. Strong cultures and innovation: Oxy-moron and opportunity? C. Cooper, S. Cartwright, C. Earley, eds. *International Handbook of Organizational Culture and Climate*. J. Wiley, Chichester, England, 263–287.
- Follett, M. P. 1925/1996. Constructive conflict. P. Graham, ed. *Mary Parker Follett: Prophet of Management*. Harvard Business School Press, Boston, MA.
- Ford, J., R. Backoff. 1988. Organizational change in and out of dualities and paradox. R. Quinn, K. Cameron, eds. *Paradox and Transformation*. Ballinger Publishing Company, Cambridge, MA, 81–121.
- Frankel, V. 1960. Paradoxical intention. *Amer. J. Psychotherapy* **14** 520–535.
- Gatignon, H., M. L. Tushman, W. Smith, P. Anderson. 2002. A structural approach to assessing innovation: Construct development of innovation locus, type, and characteristics. *Management Sci.* **48**(9) 1103–1122.
- Gavetti, G., D. Levinthal. 2000. Looking forward and looking backward: Cognitive and experiential search. *Admin. Sci. Quart.* **45** 113–137.
- Gibson, C. B., J. Birkinshaw. 2004. The antecedents, consequences, and mediating role of organizational ambidexterity. *Acad. Management J.* **47**(2) 209–226.
- Gilbert, C. 2005. Unbundling the structure of inertia: Resource vs. routine rigidity. *Acad. Management J.* Forthcoming.
- Hackman, J. R. 2002. *Leading Teams: Setting the Stage for Great Performances*. Harvard Business School Press, Boston, MA.
- Hambrick, D. 1994. Top management groups: A conceptual integration and reconsideration of the “team” label. B. M. Staw, L. Cummings, eds. *Research in Organizational Behavior*. JAI Press, Greenwich, CT, 171–214.
- Hannan, M., J. Freeman. 1984. Structural inertia and organizational change. *Amer. Sociology Rev.* **49**(2) 149–164.
- He, Z.-L., P.-K. Wong. 2004. Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organ. Sci.* **15**(4) 481–494.
- Heenan, D., W. Bennis. 1999. *Co-Leaders: The Power of Great Partnerships*. John Wiley & Sons, New York.
- Heider, F. 1958. *The Psychology of Interpersonal Relations*. Wiley, New York.
- Hemp, P., T. Stewart. 2004. Leading change when business is good: An interview with Sam Palmisano. *Harvard Bus. Rev.* **82**(12) 60–71.
- Henderson, R., K. Clark. 1991. Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Admin. Sci. Quart.* **35** 9–30.
- Huff, A. S. 1990. *Mapping Strategic Thought*. John Wiley and Sons, Chichester, NY.
- Huff, A. S. 1997. A current and future agenda for cognitive research in organizations. *J. Management Stud.* **34**(6) 947–952.
- Kahneman, D., A. Tversky. 1979. Prospect theory: An analysis of decision under risk. *Econometrica* **47** 263–291.
- Kaplan, S. 2003. Framing contests: Strategy making during a technological discontinuity. Working paper, Wharton School, University of Pennsylvania, Philadelphia, PA.
- Kaplan, S., A. Murray, R. Henderson. 2003. Discontinuities and senior management: Assessing the role of recognition in pharmaceutical firm response to biotechnology. *Indust. Corporate Change* **12**(4) 203–233.
- Kelley, H. H. 1971. *Attribution in Social Interaction*. General Learning Press, Morristown, NJ.
- Kerr, S. 1975. On the folly of rewarding A, while hoping for B. *Acad. Management J.* **18**(4) 769–782.
- Langer, E. 1989. *Mindfulness*. Addison-Wesley, Boston, MA.
- Latham, G. P., E. A. Locke, eds. 1995. *Goal Setting: A Motivational Technique That Works*, 2nd ed. Prentice Hall, Englewood Cliffs, NJ.
- Lax, D. A., J. K. Sebenius. 1986. *The Manager As Negotiator*. The Free Press, New York.
- Leana, C. R., B. Barry. 2002. Stability and change as simultaneous experiences in organizational life. *Acad. Management Rev.* **25**(4) 753–761.
- Leonard-Barton, D. A. 1992. Core capabilities and core rigidities: A paradox in managing new product development. *Strategic Management J.* **13** 111–125.
- Levinthal, D., J. March. 1993. The myopia of learning. *Strategic Management J.* **14** 95–112.
- Levitt, B., J. March. 1988. Organizational learning. *Annual Rev. Sociology* **14** 319–340.
- Lewis, M. 2000. Exploring paradox: Toward a more comprehensive guide. *Acad. Management Rev.* **25**(4) 760–776.
- Linehan, M. M. 1993. *Cognitive-Behavioral Treatment of Borderline Personality Disorders*. Guilford Press, New York.
- Lorsch, J. W., T. J. Tierney. 2002. *Aligning the Stars*. Harvard Business School Press, Boston, MA.
- March, J. 1991. Exploration and exploitation in organizational learning. *Organ. Sci.* **2** 71–87.
- March, J., H. Simon. 1958. *Organizations*. John Wiley & Sons, New York.
- Margolis, J. D., J. P. Walsh. 2003. Misery loves company: Rethinking social initiatives by business. *Admin. Sci. Quart.* **48**(2) 268–305.
- McGinn, K. L., L. Thompson, M. H. Bazerman. 2003. Dyadic processes of disclosure and reciprocity in bargaining with communication. *J. Behavioral Decision Making* **16**(1) 17–34.
- Miles, R. E., C. C. Snow. 1978. *Organizational Strategy, Structure and Process*. McGraw-Hill, New York.
- Milliken, F. J., T. K. Lant. 1996. The effect of an organization’s recent performance history on strategic persistence and change: The role of managerial interpretations. *Adv. Strategic Management* **7** 129–156.
- Murnighan, J. K., D. Conlon. 1991. The dynamics of intense work groups: A study of British string quartets. *Admin. Sci. Quart.* **36** 165–186.
- Nadler, D., M. Tushman. 1992. Designing organizations that have good fit. D. Nadler, ed. *Organizational Architecture*. Jossey-Bass, San Francisco, CA.

- Nadler, D., M. Tushman. 1996. *Competing By Design*. Oxford University Press, New York.
- Nemeth, C. J., J. Wachtler. 1983. Creative problem solving as a result of majority vs. minority influence. *Eur. J. Soc. Psych.* **13** 45–55.
- Noda, T., J. Bower. 1996. Strategy making as integrated processes of resource allocation. *Strategic Management J.* **17** 169–192.
- Nonaka, I., R. Toyama. 2002. A firm as a dialectical being: Towards a dynamic theory of a firm. *Indust. Corporate Change* **11**(5) 995–1009.
- Paine, L. S. 2003. *Value Shift: Why Companies Must Merge Social and Financial Imperatives to Achieve Superior Performance*. McGraw-Hill, New York.
- Perlow, L., J. H. Gittel, N. Katz. 2004. Conceptualizing patterns of work group interactions. *Organ. Sci.* **15**(5) 520–536.
- Pinkley, R. L. 1990. Dimensions of conflict frame: Disputant interpretations of conflict. *J. Appl. Psych.* **75** 117–126.
- Poole, M. S., A. Van de Ven. 1989. Using paradox to build management and organizational theory. *Acad. Management Rev.* **14** 562–578.
- Porter, R. 1980. *Presidential Decision Making: The Economic Policy Board*. Cambridge University Press, Cambridge, UK.
- Quinn, R. 1984. Applying the competing values approach to leadership: Toward an integrative model. J. G. Hunt, R. Steward, C. Schriesheim, D. Hosking, eds. *Leaders and Managers: International Perspectives on Managerial Behavior and Leadership*. Paragon, New York, 10–27.
- Repenning, N. 2002. A simulation-based approach to understanding the dynamics of innovation implementation. *Organ. Sci.* **13**(2) 109–127.
- Rivkin, J. W., N. Siggelkow. 2003. Balancing search and stability: Interdependencies among elements of organizational design. *Management Sci.* **49**(3) 290–312.
- Romanelli, E., M. L. Tushman. 1994. Organizational transformation as punctuated equilibrium: An empirical test. *Acad. Management J.* **37**(5) 1141–1167.
- Rothenberg, A. 1979. *The Emerging Goddess*. University of Chicago Press, Chicago, IL.
- Sherif, M. 1971. Superordinate goals in the reduction of intergroup conflict. B. L. Hinton, H. J. Reits, eds. *Groups and Organizations*. Wadsworth, Belmont, CA.
- Sherif, M., O. J. Harvey, B. J. White, W. R. Hood, C. W. Sherif. 1961. *Intergroup Conflict and Cooperation: The Robbers Cave Experiment*. University of Oklahoma Book Exchange, Norman, OK.
- Siggelkow, N., D. Levinthal. 2003. Temporarily divide to conquer: Centralized, decentralized, and reintegrated organizational approaches to exploration and adaptation. *Organ. Sci.* **14** 650–669.
- Smith, K., D. Berg. 1987. *Paradoxes of Group Life*. Josey-Bass Publishers, San Francisco, CA.
- Steiner, I. 1972. *Group Processes and Productivity*. Academic Press, New York.
- Suedfeld, P., P. Tetlock, S. Streufert. 1992. Conceptual/integrative complexity. C. Smith, J. Atkinson, D. McClelland, J. Veroff, eds. *Motivation and Personality: Handbook of Thematic Content Analysis*. Cambridge University Press, Cambridge, England, 393–400.
- Sull, D. 1999. The dynamics of standing still: Firestone tire and rubber and the radial revolution. *Bus. Hist. Rev.* **73** 430–464.
- Sull, D., R. Tedlow, R. Rosenbloom. 1997. Managerial commitments and technology change in the US tire industry. *Bus. Hist. Rev.* **73** 430–464.
- Sundaramurthy, C., M. Lewis. 2003. Control and collaboration: Paradoxes of governance. *Acad. Management Rev.* **28**(3) 397–415.
- Sutton, R. 2002. *Weird Ideas That Work*. Free Press, New York.
- Teece, D., G. Pisano, A. Shuen. 1997. Dynamic capabilities and strategic management. *Strategic Management J.* **18**(7) 509–533.
- Tetlock, P. E., A. P. McGraw, O. Kristel. 2004. Proscribed forms of social cognition: Taboo tradeoffs, blocked exchanges, forbidden base rates, and heretical counterfactuals. N. Haslam, ed. *Relational Models Theory: A Contemporary Overview*. Erlbaum, Mahway, NJ.
- Thompson, J. 1967. *Organizations in Action: Social Science Bases of Administrative Theory*. McGraw-Hill, New York.
- Tripsas, M., G. Gavetti. 2000. Capabilities, cognition and inertia: Evidence from digital imaging. *Strategic Management J.* **18**(Summer) 119–142.
- Tushman, M. L., C. A. I. O'Reilly. 1996. Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Rev.* **38**(4) 8–30.
- Tushman, M., C. A. O'Reilly. 1997. *Winning Through Innovation*. Harvard Business School Press, Boston, MA.
- Tushman, M., E. Romanelli. 1985. Organizational evolution: A metamorphosis model of convergence and reorientation. B. M. Staw, L. Cummings, eds. *Research in Organizational Behavior*. JAI Press, Greenwich, CT, 171–222.
- Tushman, M., W. K. Smith. 2002. Organizational technology. J. Baum, ed. *Companion to Organizations*. Blackwell, Malden, MA, 386–414.
- Tushman, M., W. Smith, R. Wood, G. Westerman, C. O'Reilly. 2002. *Innovation Streams and Ambidextrous Organizational Forms*. Working paper, Harvard Business School, Boston, MA.
- Tyre, M., E. von Hippel. 1997. The situated nature of adaptive learning in organizations. *Organ. Sci.* **8**(1) 71–83.
- Van de Ven, A., D. Poley, R. Garud, S. Venkataraman. 1999. *The Innovation Journey*. Oxford Press, New York.
- Virany, B., M. Tushman, E. Romanelli. 1992. Executive succession and organizational outcomes in turbulent environments: An organizational learning approach. *Organ. Sci.* **3**(1) 72–92.
- Voorhees, B. 1986. Toward duality theory. *General Systems Bull.* **16**(2) 58–61.
- Wageman, R. 2001. How leaders foster self managing team effectiveness: Design choices versus hands-on coaching. *Organ. Sci.* **12**(5) 559–577.
- Walsh, J. P. 1995. Managerial and organizational cognition: Notes from a trip down memory lane. *Organ. Sci.* **6**(3) 280–321.
- Walton, R. E., R. B. McKersie. 1965. *A Behavioral Theory of Labor Negotiations*. McGraw Hill, New York.
- Wegner, D. 1986. Transactive memory: A contemporary analysis of group mind. B. Mullen, G. R. Goethals, eds. *Theories of Group Behavior*. Springer-Verlag, New York, 185–208.
- Weick, K. 1979. Cognitive processes in organizations. B. M. Staw, ed. *Research in Organizational Behavior*. JAI Press, Greenwich, CT, 41–74.
- Weick, K., K. H. Roberts. 1993. Collective mind in organizations: Heedful interrelating on flight decks. *Admin. Sci. Quart.* **38**(3) 357–382.
- Weick, K., K. M. Sutcliffe, D. Obstfeld. 1999. Organizing for high reliability: Processes of collective mindfulness. R. I. Sutton, B. M. Staw, eds. *Research in Organizational Behavior*. JAI Press, Stamford, CT, 81–123.