The Cognitive Perspective in Strategy:
An Integrative Review

V. K. Narayanan
Lee J. Zane
Drexel University

Benedict Kemmerer
BSH Bosch and Siemens Hausgeraete GmbH

This article integrates the literature on strategic cognition (SC) within a framework that links the antecedents, structure, and process of SC with outcomes. Reviewing the literature from 1993 (two years prior to Walsh's review of managerial and organizational cognition) until 2007, this article identifies three elements of SC structure (organizational identity, strategy frames, and organizational routines) and four SC processes (strategy formulation, strategy implementation, strategic change, and organizational learning). The literature portrays strategy formulation as a complex activity consisting of scanning, sensemaking, and decision making. Strategy imple- mentation is composed of sensegiving, sensemaking, and issue selling. This review identifies five streams of empirical research with three well-developed themes (the antecedents and outcomes of strategy frames, determinants and consequences of strategy formulation, and cognitive con- struction of competitive/industry dynamics) and two emerging themes (the determinants and consequences of strategy implementation and the antecedents and outcomes of organizational identity). This review identifies several opportunities to extend the literature and outlines key methodological implications. Finally, the review addresses the need to build linkages to the ongoing theoretical conversations within strategic management literature.

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In recent years, strategic cognition (SC) has increasingly come to be viewed as a legitimate area for theory building and empirical research in strategic management. During the 1980s, a number of scholars adopted the Carnegie School's behavioral decision theory (BDT; e.g., Cyert & March, 1963) to pioneer a cognitive perspective in strategy as a complement to the rational analytical models, detailing the links between cognition and strategic diagnosis (Dutton, Fahey, & Narayanan, 1983) and strategic decision making (SDM; Hambrick & Mason, 1984; Schwenk, 1984). In the practice of strategy, cognition was featured in books with such tantalizing titles as *The Mind of the Strategist* (Ohmae, 1991). Huff's (1990) methodological tour de force, *Mapping Strategic Thought,* and Walsh's (1995) review of the broader managerial and cognition field laid the initial scholarly foundations, providing cognition-oriented scholars with methods and concepts that fueled their exploration of strategic management. Indeed, in a recent review of the strategy process literature, Hutzschenreuter and Kleindienst (2006) acknowledged that the cognitive perspective is one of the major streams in that literature.

Although reviews of cognition literature are now available (e.g., Hodgkinson & Healey, 2007; Walsh, 1995), given their different agendas, these reviews have subsumed the contributions of SC scholars within the broader stream of managerial and organizational cognition. Some reviews have focused on strategy frames (e.g., Porac & Thomas, 2002) or on competition (Hodgkinson, 1997b), but to date, there has been no major *integrative* review dedicated to the cognitive perspective in strategic management in its entirety. This partly reflects the diversity of scholars who have helped develop this perspective—cognitive scientists, behavioral economists, organization theorists, decision theorists, and of course, strategic management scholars, to name a few. This diversity may have resulted in isolated pockets of theorizing without attendant efforts to synthesize and shape the content and boundaries of this perspective. A review should highlight the uniqueness of SC and galvanize cross-fertilization of ideas.

The primary aim of this article is to provide an *integrative* review of the literature in SC, identifying its *unique* contribution to strategic management literature. In the next section, we offer a view of SC that we elicit from the literature. Next, we summarize the method of review and develop an integrative framework to organize the review. Following that, we use the SC framework first to outline the theoretical and conceptual developments and then to identify and discuss empirical research streams. Next, we summarize the distinguishing themes in SC. Finally, we discuss several directions for future research and the managerial implications from this body of research.

What Is Strategic Cognition?

Although the first use of the term *strategic cognition* may arguably be traced to Schwenk (1988), the term began to appear frequently in the late 1990s (e.g., Hodgkinson & Thomas,

1997) as a convenient way of capturing the cognitive perspective in strategic management. SC focuses on the "linkages between 'cognitive structures' and decision processes in strategic management with respect to strategy formulation and implementation" (Porac & Thomas, 2002: 165). The cognitive structures include top management's beliefs about environment, strategy, business portfolio, and the state of the organization (Porac & Thomas, 2002). These cognitive structures enable sensemaking and interpretation processes during diagnosis and choice, the overlapping phases of strategy formulation. During implementation, organization members engage in sensemaking processes—"the reciprocal interaction of information seeking, meaning ascription, and action" (Thomas, Clark, & Gioia, 1993: 240)—in parallel to managerial sensegiving activities using symbols and labels undertaken to shape meaning; both together lead to a collective interpretation of decisions and then to action.

Thus, the cognitive perspective in strategy, or strategic cognition, ascribes causal importance to structures and processes of cognition in the explanation of strategy and, hence, the competitive advantage of firms. SC highlights how cognitive structures and processes develop in organizations, how these structures and processes generate business definitions and corporate and business strategies, and how they lead to major strategic initiatives.

Over the years, SC research has attracted scholars working at different levels of analysis—individual, group, organizational, and industry. At the individual level, SC scholars have trained their attention to the top manager in an organization, explicitly focusing on the chief executive officer (CEO) or implicitly addressing a strategic firm-level issue (e.g., competitor identification, as in Porac & Thomas, 1994). In both cases, SC scholars have tried to explain how top managers' cognitive structures and processes, when applied to a firm's *specific* strategic context, influence strategic choices. Most group-level analyses in SC are restricted to upper echelons or top management teams (TMTs). Since the TMT members differ in their cognitive structures and processes, SC scholars have grappled with the issue of aggregation (Porac & Thomas, 2002), suggesting that, in addition, contextual factors and social influence processes (Chattopadhyay, Glick, Miller, & Huber, 1999) are needed to explain the structures and processes of thought in these teams. At the organizational level, scholars have portrayed firm strategy in cognitive terms to explain performance (Nadkarni & Narayanan, 2007a). Indeed, in smaller organizations—an entrepreneurial start-up or an organization where the CEO has strong and centralized power—TMT and organizational-level cognition may be subsumed within the CEO's cognitions (see also Staw, 1991). Thus, size and power may calibrate the boundary conditions that necessitate the use of group and organizational levels for the analysis of firm-level strategic choice. At the industry level, the focus has been on how competitor recognition leads to strategic groups (Reger & Huff, 1993) and how cognition affects industry formation (Garud & Rappa, 1994).

SC has grown to be distinct from other related literatures, including some from which it has adopted several concepts and insights. At the individual level of analysis, SC scholars, in spite of their indebtedness to cognitive psychology, are primarily interested in examining cognitive phenomena involved in strategy formulation and implementation, emphasizing (CEO's) cognition in the (strategic) context. SC thus focuses on a limited intellectual space within the broader domain of managerial and organizational cognition. As Porac and Thomas (2002) pointed out, SC departs from BDT by focusing on cognitive representations of environment and organization while fully acknowledging the role of cognitive biases and heuristics.

This has enabled SC scholars to pay attention to topics such as strategic change and implementation. Finally, SC scholars view TMT composition as an important antecedent, unlike TMT researchers who have used TMT characteristics as proxies for cognition (Carpenter, Geletkanycz, & Sanders, 2004; Wiersema & Bantel, 1992; for a critique of this line of research, see Lawrence, 1997). SC directly addresses cognition as an intervening cluster of factors between TMT and strategic decisions and outcomes.

Method

To identify the contribution of the cognitive stream to strategic management, we conducted a literature search of articles published in major academic journals, reasoning that limiting our search in this way would ensure a high level of quality due to the rigorous peer review process. We searched for articles from a set of journals using major databases such as ABI/INFORM Global. These journals were *Academy of Management Journal, Academy of Management Review, Administrative Science Quarterly, Human Relations, Journal of Applied Psychology, Journal of Management, Journal of Management Studies, Management Science, Organization Behavior and Human Decision Processes, Organization Science, Strategic Management Journal,* and *Strategic Organization*. To make the review manageable, we used Walsh (1995) as the starting point of our time frame, but allowing for publication lags, the period covered was from 1993 to 2007.

To be considered as SC, we imposed two conditions on articles; that is, they should (1) focus on a strategic issue *and* (2) explicitly address cognitive structures and/or processes. For example, in the case of works on upper echelons, articles had to deal explicitly with cognitive aspects in a strategic context to be included in the sample; we thus excluded articles that used demographics as proxies for SC. For similar reasons, with regard to cognitively focused articles on organization culture, organization learning, organization change, and decision making, we included only articles dealing with *strategic* issues. Also, in the case of SDM, we included only articles that incorporated an explicit cognitive component. Furthermore, since our focus here is on how cognition scholars have expanded our understanding of strategic management issues, methodology oriented articles were omitted. Similarly, studies dealing with cognitive tools (e.g., cognitive mapping) or decision aids in the strategy-making process (e.g., Eden & Ackerman, 1998) were not included.

We read the tables of contents of the selected journals and examined the article names, looking for a series of keywords such as *cognition, decision-making, routines, identity,* and so on in an attempt to locate articles that had both a substantive cognitive component and were in the area of strategy. To reduce subjectivity in sample selection (David & Han, 2004), we complemented this step with a follow-up of the databases by using search terms relevant to cognition and strategy (e.g., *cognition, decision-making, routines,* and *identity*). The titles were marked with a check (if it looked promising), a question mark (if we were unsure), or unmarked (eliminated). Next, we obtained abstracts for all articles receiving a check or question mark and reviewed them in the same manner (check, question mark, or unmarked). Finally, we obtained the full article for any abstracts receiving a question mark, examined it, and made a determination. The full article for all included articles was then examined. Two

authors independently worked to categorize the articles into research streams or constituents of SC and to identify the methods described in Table 2. Disagreements were resolved through discussion.

In total, we identified 164 articles; approximately 9 articles per year from 1993 to 1999, 23 in 2000, and then approximately 9 articles per year thereafter.

A Framework for Organizing the Literature

According to Ginsberg and Venkatraman (1985), an analytical review scheme is necessary for systematically evaluating the contribution of a given body of literature and discerning patterns. In organizing the literature (following Walsh, 1995), we categorize research by level (individual, group, organization, and industry). But, because our goal is to highlight *strategic* cognition, we adopt a scheme that resembles those of Rajagopalan, Rasheed, and Datta (1993) and Hutzschenreuter and Kleindienst (2006), incorporating three broad categories of factors relevant to SC research: antecedents, SC, and outcomes. We present our integrative framework in Figure 1.
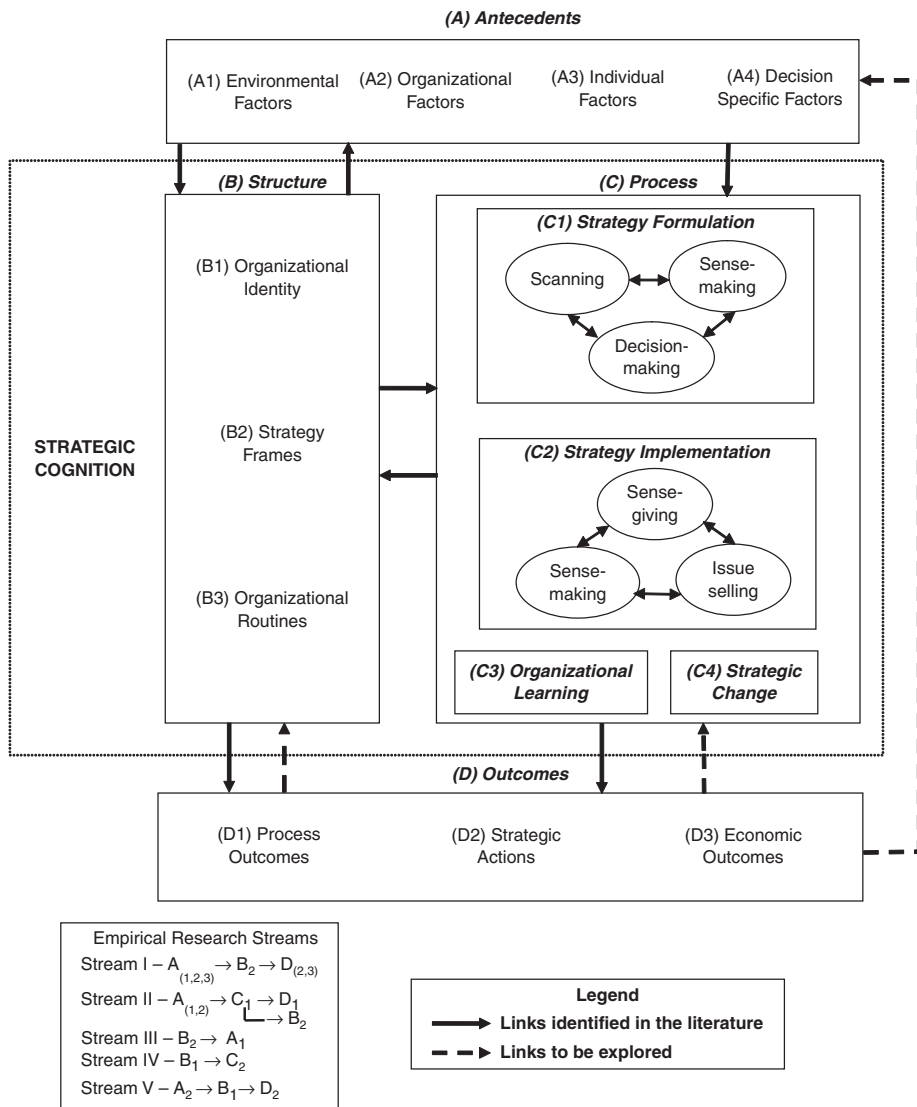
Antecedents. In Figure 1, we identify four antecedents. Following Rajagopalan et al. (1993), we included external environmental factors (e.g., characteristics such as dynamism, industry), internal organizational factors (e.g., scope, size), and decision-specific factors (e.g., decision urgency, decision complexity). We added a fourth antecedent, individual factors (e.g., educational background, experience, decision style, and personality factors), that may influence SC.

Strategic cognition. SC is discussed in terms of its constituents—structure and process. By *structure,* we refer to the relatively stable characteristics and repeated patterns of behavior, and by *process,* to the (cognitive) activities taking place in organizations.

In the structures of cognition, *organizational identity* is the most *inclusive* concept. The construct organizational identity is confined to the question, "Who are we as an organization?" (Fiol, Hatch, & Golden-Biddle, 1998). It represents organization members' collective understanding of the features presumed to be central and relatively permanent—features that distinguish the organization from other organizations (Albert & Whetten, 1985). *Strategy frame* (Huff, 2006) refers to the knowledge structure that informs strategic decisions, a cognitive template that individuals impose on the information environment to give it form and meaning (Nisbett & Ross, 1980; Walsh, 1995), thus acting as the filters that strategic managers pay attention to and consider relevant for strategy formulation (Huff, 1982). Analogous to heuristics or scripts at the individual level of analysis, *organizational routines* are "recurring patterns of behavior of multiple organizational members involved in performing organizational tasks" (Feldman & Rafaeli, 2002: 311). Routines involve information processing, allowing organizations to function by subdividing attention and economizing on cognition (Cyert & March, 1963; March & Simon, 1958; see also Bromiley, 2005).

Anchored in the view of strategy as a "pattern in a stream of decisions" (Mintzberg, 1978; Simon, 1947), SC portrays *strategy formulation* as a complex activity consisting of scanning,

Figure 1
Strategic Cognition: An Integrative Framework

(A) Antecedents

(A1) Environmental Factors   (A2) Organizational Factors   (A3) Individual Factors   (A4) Decision Specific Factors

(B) Structure   **(C) Process**

STRATEGIC COGNITION

(B1) Organizational Identity

(B2) Strategy Frames

(B3) Organizational Routines

(C1) Strategy Formulation

Scanning   Sense-making   Decision-making

(C2) Strategy Implementation

Sense-giving   Sense-making   Issue selling

(C3) Organizational Learning   **(C4) Strategic Change**

(D) Outcomes

(D1) Process Outcomes   (D2) Strategic Actions   (D3) Economic Outcomes

Empirical Research Streams
Stream I – $A_{(1,2,3)} \to B_2 \to D_{(2,3)}$
Stream II – $A_{(1,2)} \to C_1 \to D_1$
   $\to B_2$
Stream III – $B_2 \to A_1$
Stream IV – $B_1 \to C_2$
Stream V – $A_2 \to B_1 \to D_2$

Legend
→ **Links identified in the literature**
--→ **Links to be explored**

sensemaking, and (strategic) decision making. *Issues*—attention-organizing acts that generate strategic decisions—are conceived to be the pivot around which these processes are frequently discussed. The concept of issues enables SC to order strategy formulation temporally

into the (strategic) diagnosis and (strategic) decision-making stages (Ansoff, 1980; Dutton et al., 1983). *Strategy implementation* in SC refers to an ongoing cycle of *sensegiving* by top managers (e.g. Gioia & Chittipeddi, 1991; Gioia, Thomas, Clark, & Chittipeddi, 1994), *sensemaking* by middle and lower echelons, and *issue selling* by middle managers (Dutton, Ashford, O'Neill, & Lawrence, 2001). A key facet of sensegiving is the architecture and deployment of *labels* (e.g., Jackson & Dutton, 1988). Issue selling is the process by which individuals affect others' attention to and understanding of the events, developments, and trends that have implications for organizational performance (Ansoff, 1980; Dutton & Ashford, 1993). Two other processes have been identified in the SC literature but with less theoretical and empirical attention—*strategic change* and *organizational learning*.

Outcomes. SC has incorporated three types of outcomes—process outcomes (e.g., the quality, speed, and risk characteristics of a decision), strategic actions (e.g., externally and internally oriented actions, such as competitive moves and resource allocation, and the timing of action or delays in action), and economic outcomes (e.g., stock market response, profitability, and revenue growth).

The framework presented in Figure 1 provides a basis for identifying (1) theoretical development and elaboration of concepts that constitute SC and (2) empirical research streams that account for the links between antecedents, SC, and outcomes (cf. Pettigrew, 1997). We take these up successively in the next two sections.

Theory Development and Concept Elaboration in Strategic Cognition

In Table 1, we identify the theoretical literature and the empirical works (primarily case studies) that have developed and elaborated the SC concepts identified in Figure 1.

Organizational Identity

Theoretical development. SC literature has dealt with three facets of organizational identity: relative superiority over markets, mechanisms of maintenance, and linkage to competitive advantage. First, as a cognitive mechanism that facilitates coordination, communication, and learning, organizational identity distinguishes a firm from a market (Kogut & Zander, 1996). Identity favors firm over market, when through identification organizational routines are learned and coordination and communication are facilitated across individuals and groups of diverse specialized competence. However, since identity implies rules for exclusion, some practices and businesses may be notionally *inconsistent* with each other, implying that some technically feasible complements and interesting avenues of innovation and creativity are not permissible within the logic of a shared identity.

Second, organizational identity is socially constructed, and its continuity is maintained by conversations within an organization, *conversation* being a term that embraces a number of other terms employed in the literature: language and rhetoric (Fiol, 2001), narrative texts

Table 1
Studies Focused on Theory Development and Conceptual Elaboration

Theme	Theoretical	Empirical
Organizational identity	Brickson, 2007; Brown & Starkey, 2000; Fiol, 2001; Gioia, Schultz, & Corley, 2000; Hogg & Terry, 2000; Hsu & Hannan, 2005; Kogut & Zander, 1996; Pratt & Foreman, 2000; Reger, Gustafson, Demarie, & Mullane, 1994; Scott & Lane, 2000	Chreim, 2005; Coupland & Brown, 2004; Fiol, 2002; Geppert, Williams, & Matten, 2003; Golden-Biddle & Rao, 1997
Strategy frames	Abrahamson & Fombrun, 1994; Bettis & Prahalad, 1995; Bogner & Barr, 2000; Boyd, Dess, & Rasheed, 1993; Das & Teng, 1999; Dijksterhuis, Bosch, & Volberda, 1999; Fiegenbaum, Hart, & Schendel, 1996; Foss, 2007; Hodgkinson, 1997b; Hodgkinson & Clarke, 2007; Johnson, Smith, & Codling, 2000; Miller, 1993a; Peteraf & Shanley, 1997; Priem, Lyon, & Dess, 1999; Von Krogh & Roos, 1996	Abrahamson & Fairchild, 1999; Clarke & Mackaness, 2001; Fiegenbaum & Thomas, 1995; Gilbert, 2006; Hodgkinson, Bown, Maule, Glaister, & Pearman, 1999; Shepherd, 1999; Stimpert & Duhaime, 1997
Organizational routines	Feldman & Pentland, 2003; Feldman & Rafaeli, 2002; Hayes & Allinson, 1998; Knott, 2003	Feldman, 2000
Strategy formulation	Bogner & Barr, 2000; Corner, Kinicki, & Keats, 1994; Dutton, 1993; Farjoun & Lai, 1997; Gavetti, Levinthal, & Rivkin, 2005; Gavetti & Rivkin, 2007; George, Chattopadhyay, Sitkin, & Barden, 2006; Ginsberg, 1994; Haleblian & Rajagopalan, 2006; Hsieh, Nickerson, & Zenger, 2007; Lampel & Shapira, 2001; McKinley, Zhao, & Rust, 2000; Moussavi & Evans, 1993; Ocasio, 1997; Rindova, 1999; Rindova & Fombrun, 1999.	Fiol, 1994; Gavetti, 2005; Gavetti & Levinthal, 2000; Hodgkinson et al., 1999; Markoczy, 2001; Regner, 2003; Smith, 1995; Tyler & Steensma, 1995; Vaara, Tienari, & Santti, 2003; Wright & Manning, 2004; Yasai-Ardekani & Nystrom, 1996.
Strategy implementation	Dutton & Ashford, 1993; Ocasio, 1997; Sillince, 2002; Tourish & Robson, 2006.	Balogun & Johnson, 2004; Bean & Hamilton, 2006; Fiol, 1994; Gioia & Thomas, 1996; Gioia, Thomas, Clark, & Chittipeddi, 1994; Labianca, Gray, & Brass, 2000; Orton, 2000; Rouleau, 2005; Stensaker & Falkenberg, 2007; Townley, 2002; Ullrich, Wieseke, & Van Dick, 2005; Vaara, 2003; Vaara et al., 2003.
Strategic change	Rajagopalan & Spreitzer, 1997.	Greenwood & Hinings, 1993.
Organizational learning	Akgun, Lynn, & Byrne, 2003; Williams, 2001.	Halme, 2002; Leroy & Ramanantsoa, 1997; Thomas, Sussman, & Henderson, 2001.

Note: Articles that could be included in both Table 1 and 2 appear only in the Table 2.

(Chreim, 2005), and stories (Martens, Jennings, & Jennings, 2007). Organizational identities have thus been described as narratives that provide a sense of organizational continuity.

Third, organizational identity, being distinctive to a firm, may be one of the sources of firm heterogeneity (Brickson, 2007), a concept central to strategy. It influences organizational

interpretations, actions, and potential for change (Dutton & Dukerich, 1991; Pratt & Foreman, 2000; Reger, Gustafson, Demarie, & Mullane, 1994), allowing only a limited set of solutions (see Kogut & Zander, 1996). Strong organizational identities may result in cognitive inertia (e.g., Abrahamson & Fombrun, 1994; Barney et al., 1998; Hodgkinson, 1997a; Reger & Palmer, 1996). Organizational identity may also be crucial to organizational growth and survival (Gioia, Schultz, & Corley, 2000).

Two theoretical debates have surfaced in recent years that have significant implications for theoretical and empirical works. First, some have claimed that identity is less enduring than it is in Albert and Whetten's (1985) definition, and this instability is adaptive (Gioia et al., 2000; Nag, Corley, & Gioia, 2007). The time horizons over which organizational identity can be considered stable and the identification of organizational identity transitions remain unresolved issues. Second, unlike much of the literature, which has portrayed organizational identity as unitary, some have suggested that an organization may have multiple identities (Corley, 2004).

Concept elaboration. Organizational identity has focused on the organizational level of analysis, and the empirical attention has focused on the development of organizational identity, identity conflicts, and mechanisms that create its continuity. Thus, Coupland and Brown (2004) sketched how organizational identities were developed through processes of description, questioning, contestation, and defense between insiders and outsiders in the case of Royal Dutch Shell. Similarly, Golden-Biddle and Rao (1997) provided detailed evidence about identity conflict in the boardroom, some of the conflicts being built in by the multiple roles of the board members. Ullrich, Wieseke, and Van Dick (2005) argued that since organizational identity preserves continuity, mergers and acquisitions often end in failures partly because the change is designed in discontinuous ways.

Case studies have also portrayed the rhetorical devices that underlie changes or continuity in organizational identity. Fiol (2001), highlighting moments across a 10-year period at a high-technology company undergoing a significant identity transformation, illustrated how rhetorical devices shift over the stages of the process. Chreim (2005) documented the discursive strategies employed by individuals to establish confluence (or simultaneous continuity and change). These strategies included the selective reporting of elements from the past, present, and future; the juxtaposition of the "modern and attractive" with the "outdated and undesirable"; the persistent use of expansive labels that allows the addition and subtraction of meanings attached to the labels; and the importation of selected themes from the broader discourses.

Measures. In empirical works, organizational identity has been operationalized in three ways: identity, image, and reputation, with image being a wide-ranging concept connoting internal and external perceptions (Gioia et al., 2000) and reputation being outsiders' cumulative judgment about the organization. Identity has been empirically tracked through qualitative inference such as case studies (e.g., Chreim, 2005; Fiol, 2001); through surveys (e.g., Brickson, 2005); and through exploiting natural breaks in organizations, which typically fall into one of two categories. These categories include major strategic decisions such as mergers and acquisitions (Ullrich et al., 2005), spin-offs (Corley & Gioia, 2004), and joint ventures (Salk & Shenkar, 2001), and differences in identity as between corporate headquarters and subsidiaries

and the ensuing conflicts (Geppert, Williams, & Matten, 2003). Image has been obtained from archival sources (e.g., initial public offering prospectuses; Martens et al., 2007) and reputation from rankings (e.g., Benjamin & Podolny, 1999).

Strategy Frames

Theory development. In addition to its direct lineage to the schema construct (Walsh, 1995), strategy frame reflects an evolution of three interrelated streams of thought in SC. First, the concept of strategic choice (Child, 1972), which originally focused on external constraints, was later elaborated to include internal constraints, including managerial cognition (Whittington, 1988). Second, as the research on environments matured from objective and perceived conceptions of environment to explaining the discrepancy between the two (Boyd, Dess, & Rasheed, 1993), with human cognition as one of the mediating filters between the two, the notion of environment as being enacted (Smircich & Stubbart, 1985; Weick, 1995) as opposed to being perceived began to gain attention in the literature. Third, SC scholars attempting to advance theory beyond BDT returned to Dill's (1958) assumption that behavior toward external stimuli is mediated by cognitive representations of those stimuli (Porac & Thomas, 2002), or what is here termed *strategy frames*.

Concept elaboration. Leveraging the theoretical development in managerial cognition literature prior to Walsh (1995), SC scholars have made significant strides in developing empirical portrayals of strategy frames. At the individual level, analyses typically involve the CEO of a firm or the head of an independent unit, such as a business unit within a firm, with business strategy portrayed as a cognitive map (Barr, 1998). At the group level, the focus is on TMT; for example, corporate strategy is characterized as dominant logic (Prahalad & Bettis, 1986; Von Krogh & Roos, 1996), a shared map among the dominant coalition in diversified firms. At the firm level, strategy frames represent the cognitive construction of strategies (Bogner & Barr, 2000; Nadkarni & Narayanan, 2007a).

Strategy frames have been variously represented in the literature as *content*, as *structure,* and less frequently, as *reference points*. Content representations have included corporate or business strategy and models of assessment of a firm's value. First, in a study of relatedness from a cognitive viewpoint, Stimpert and Duhaime (1997) concluded that decision makers view relatedness as a multifaceted concept, incorporating factors (differentiation relatedness, financial relatedness, and commodity relatedness) in addition to product or market relatedness. Second, business strategy has been represented by causal maps (Barr, 1998), which often served as the basis of deriving the structure of the strategy frames. Third, Shepherd (1999), used conjoint analysis to assess the importance of nine factors in venture capitalists' evaluations of entrepreneurial firms, finding considerable consistency between theoretical ideas and the decision policies of venture capitalists. Finally, Mitchell, Smith, Seawright, and Morse (2000) conceptualized frames as scripts.

Several *structural* characteristics of strategy frames have been identified in the literature. At the individual level, Hodgkinson and Clarke (2007) introduced characteristics such as *elaboration* and *interpretation*. At the group level, *homogeneity* versus *heterogeneity* of cognitions

at the upper echelons has been of interest to TMT researchers (Priem, Lyon, & Dess, 1999). At the firm level, Nadkarni and Narayanan (2007b), utilizing Lyles and Schwenk's (1992) insight, operationalized the *core* and *peripheral* elements (with the latter easily changed over time) of strategy frames. Also, building on Porter (1980), Nadkarni and Narayanan (2007a) characterized strategy frames by *focus* and *complexity*. Two constituents of industry-level beliefs have been identified: (1) beliefs about the boundaries of markets and competitive interactions (Hodgkinson & Johnson, 1994; Porac, Thomas, Wilson, Paton, & Kanfer, 1995) and (2) reputational orderings that develop from the social coding and interpretation of inter-organizational differences in performance over time (Porac et al., 1995).

A third element, reference points, has received some attention from individuals, who, wedded to the BDT tradition, are primarily interested in cognitive portrayals of performance. For example, Fiegenbaum, Hart, and Schendel (1996) viewed a strategic reference point as a performance target that is embedded in a reference matrix defined by the three dimensions of internal capabilities, external conditions, and time. Fiegenbaum and Thomas (1995) suggested that strategic groups act as reference points for firm strategies.

Measures. In SC, the concept of strategy frames has received the most empirical attention, partly due to the development of operational measures. The literature has operationalized strategy frames in four ways: hand-drawn causal maps (e.g., Hodgkinson, Bown, Maule, Glaister, & Pearman, 1999) or causal maps derived from archival materials such as the texts of annual reports (Nadkarni & Narayanan, 2007a) and, less frequently, through word counts from annual reports (Kabanoff & Brown, 2008), through surveys (Stimpert & Duhaime, 1997), and through repertory grids (Spencer, Peyrefitte, & Churchman, 2003).

Organizational Routines

Theory development. Although routines were featured in BDT and in theoretical writings (Bromiley, 2005), Feldman (2000) and Feldman and Rafaeli (2002) were among the first to make the theoretical connection to the SC literature. Organizational routines forge connections between people as they engage together in these routines, and thus serve as settings for developing understandings about "both what needs to be done in a specific instance of performing a routine and about the goals of the organization" (Feldman & Rafaeli, 2002: 309). Some routines may flow from pressures of identity; others often reflect formalized decision-making procedures. Since they do not involve deliberate search (Feldman & Pentland, 2003), they are settings in which prevailing strategy frames dominate cognitive processes. Finally, routines may represent the more easily installed or dismantled levers of action in organizations than either identity or frames.

Measures. Although few empirical works have appeared in SC based on routines, several methods of operationalization have been proposed in the literature: simulations with predetermined characteristics of routines (Denrell, Fang, & Levinthal, 2004), ethnographic methods to highlight the interaction between agency and context (Howard-Grenville, 2005), and rule-based grammatical models using archival data (Pentland & Rueter, 1994).

Strategy Formulation

Theoretical development. The SC literature has elaborated the processes of sensemaking and scanning. *Sensemaking* is a unique contribution of SC scholars to the strategy literature. As defined by Weick (1995), sensemaking is social activity that is triggered by something unusual, unexpected, or important—any circumstance that is not routine. Two different types of cognitive processes are at work in sensemaking: *perception* and *enactment* (Smircich & Stubbart, 1985). In the *perception* view, strategists are portrayed as ensnared by bounded rationality (Simon, 1957) and by their incomplete and imperfect perceptions of the environment, underidentification of resources and capabilities, and the idiosyncrasy of strategy frames. An *enacted* view assumes "that organizations and environments are created together . . . through the social interaction process of key organizational participants" where "organizations and environments are convenient labels for patterns of activity" (Smircich & Stubbart, 1985: 726).

The SC literature considers sensemaking a pivotal activity in diagnosis (e.g., Bogner & Barr, 2000; George, Chattopadhyay, Sitkin, & Barden, 2006) and portrays it as being characterized by uncertainty, ambiguity, and political tensions (Miller, Burke, & Glick, 1998). At the individual level, it involves noticing (Sutcliffe, 1994), categorization (Porac & Thomas, 1994), simplification, and use of heuristics (Rajagopalan & Spreitzer, 1997). At the group level, sensemaking involves building consensus in interpretation (Ford & Baucus, 1987). Consensus in interpretations is not a one-dimensional concept (Fiol, 1994) but consists of two component parts: consensus around interpretations embedded in (1) the content and (2) the framing of communications (consisting of the labels people use to convey their pictures of reality). At the organizational level, building on the view that organizations are interpretation systems, the SC literature before Walsh (1995) maintained that since markets are inherently ambiguous, decision makers' perceptions and interpretations "matter" and organizational decisions and actions will be based on the ensuing interpretations (Daft & Weick, 1984; Feldman, 1989).

Theoretical developments in SC have also pointed out the complex nature of scanning processes, with some being strategy frame–driven, whereas others lead to new strategy frames or, in the words of Gavetti and Levinthal (2000: 113), "processes that are forward-looking, based on actors' cognitive map of action-outcome linkages, and those that are backward-looking, or experience based." The notion of bounded rationality offers two different logics of scanning: a backward-looking logic of stimulus response learning and a forward-looking logic of consequences. Some central phenomena lie at the interface of these two logics and can be explained only by considering them jointly (Gavetti & Levinthal, 2000).

In SDM, the interpretive model, which underscores the role of cognition, offers a contrast to the rational and adaptive models of decision making (Rajagopalan et al., 1993). The interpretive model posits SC as the critical link between the context and managerial actions, suggesting that both the structures of cognition and the scanning and sensemaking processes may influence the framing of the decision, alternatives considered, and even the weighting of the criteria employed in decision choice. At the individual level, the SDM literature incorporating a cognitive stem has built upon the rich legacy of developments in cognitive psychology (Tversky & Kahneman, 1974) and BDT (Cyert & March, 1963). At the group level,

Hodgkinson et al. (1999) suggested that direct interventions in decision framing might alter the decisions, highlighting the possibility and potential value of interventions. At the organizational level, theoretical developments have highlighted the role of decision context (Dean & Sharfman, 1996) and also have raised the possibility that decision-specific characteristics also influence the decision process (see Rajagopalan, Rasheed, Datta, & Spreitzer, 1998). With respect to process, Farjoun and Lai (1997) theorized how cognitive biases in similarity judgments skew strategy formulation in the case of business and corporate strategies. Regner (2003) offered the intriguing insight that the process is likely to be deductive at the strategic center, involving an industry and exploitation focus, and inductive at the strategic periphery, including externally oriented and exploratory strategy activities. Finally, in recent years, there has been a nascent interest in the role of intuition (Khatri & Ng, 2000; Nutt, 1998) and analogical reasoning (Gavetti, Levinthal, & Rivkin, 2005) in decision making.

Measures. In empirical works, the threat/opportunity (T/O) interpretation, a facet of sensemaking, has received growing attention, based on Dutton and Jackson's (1987) earlier work. In individual-level works, it has been derived from surveys (Barr & Glynn, 2004; Denison, Dutton, Kahn, & Hart, 1996) in a two-step process, with the first step eliciting an issue-specific scenario and the second being respondents' interpretations of the scenario along a number of dimensions of T/O. At the group level, cognitive diversity has received some empirical attention (e.g., Kilduff, Angelmar, & Mehra, 2000). At the organizational level, Chattopadhyay, Glick, and Huber (2001) coded T/O from interviews, arraying it along two dimensions—control reducing or enhancing, and gain or loss. Scanning has been characterized by its *focus* (external vs. internal; Garg, Walters, & Priem, 2003); *procedural rationality* (the extent to which the decision involves collection of and reliance upon information in decision making (Dean & Sharfman, 1996); and sometimes by *content* or *scope, frequency* and *extent* (Lefebvre & Mason, 1997; Sutcliffe, 1994; Yasai-Ardekani & Nystrom, 1996). In decision making, the weighting of factors in the evaluation of alternatives has been elicited through policy capturing (Tyler & Steensma, 1998), analysis of verbal protocols (Melone, 1994), or conjoint analysis (Shepherd, 1999). Although the intuitive–analytical distinction has been employed in the evaluation of alternatives (Khatri & Ng, 2000; Nutt, 1998), operational measures have yet to be developed.

Strategy Implementation

Theory development. Unlike strategy formulation, where upper echelons were portrayed as central actors, strategy literature recognizes the role of middle management in implementation. Indeed, Floyd and Wooldridge (1996, 2000) model implementation at the organizational level in evolutionary terms, detailing the cognitive processes that are played out during implementation. SC reflects this recognition, portraying implementation as an ongoing cycle of sensegiving by top managers, sensemaking by lower echelons, and issue selling specifically by middle managers.

Theoretical developments have articulated the rationale for the concepts of sensegiving, sensemaking, and issue selling, the key constituents of this complex interplay. During implementation, there is likely to be significant ambiguity for organizations regarding the

strategies and direction of the enterprise. To dispel this ambiguity, top management has to engage in sensegiving, that is, the leadership acts of articulating and providing meaning for the change to the organization to shape organizational interpretation (Gioia et al., 1994). However, lower echelons (including middle managers) also actively interpret events and the actions and words of upper echelons but mostly in the context of past history and current organizational identity (Geppert et al., 2003), which may be discrepant with the direction intended for the firm by the top management.

Middle managers actively undertake efforts to influence implementation by framing their preferred alternatives in the language of the TMT's strategy frames; that is, they engage in issue selling (Dutton et al., 2001). Because no issue is inherently important or strategic, individuals' claims about what matters determine, in part, which change initiatives are activated (Dutton & Ashford, 1993). Issue selling shapes an organization's investment of time and attention and thereby shapes, in part, the actions and changes that ensue. Issue sellers are "players" (Ocasio, 1997) who use a repertoire of moves to sell issues and affect top-level decision makers' attention. In contrast to sensegiving, which relies on downward communication, issue selling involves upward influence and communication. Issue selling helps to rewrite implementation as a more emergent and pluralistic process than it is typically assumed to be in the more traditional "upper echelons" perspectives (e.g., Finkelstein & Hambrick, 1990; Hambrick & Mason, 1984).

Concept elaboration. A significant body of ethnographic evidence has accumulated on the importance of sensegiving in implementation (e.g., Gioia et al., 1994). The lesson for managers from these works is that managerial leadership is crucial during implementation, where cognitive and political processes are continually intertwined (Gioia et al., 1994). Vaara (2003) illustrated these proceses in an empirical examination of a postmerger case, revealing considerable ambiguity concerning the roles of the different units and cultural confusion and misunderstandings, reinforcing ambiguity.

Two facets of sensemaking by lower echelons have been revealed in grounded theory examinations. First, there are individual differences in the interpretive responses of middle managers, with Stensaker and Falkenberg (2007) identifying five responses—convergent response, divergent response, unresolved sensemaking, creative response, and noncompliance— and showing how these shape organizational-level responses. Bean and Hamilton (2006) reported a similar finding at the lower levels. Some employees adopted the frame provided by leaders, whereas others rejected it. Second, employees are sensitive to the discrepancy between the words and actions of top managers. Labianca, Gray, and Brass (2000), through content analysis of interview data, examined the cognitive barriers to empowerment. They concluded that the resistance was fueled by skepticism about top management commitment to the new decision-making schema, especially because the employees judged managerial actions to be inconsistent with their new espoused framework.

Most studies portraying sensemaking by lower echelons are at the organizational level. Whereas the earlier ethnographic studies portrayed both the dialectical nature of the implementation process and the intertwining of the cognitive and emotional responses of the organization as a whole (Orton, 2000), the later studies focused on the role of middle management

in specific implementation projects such as postacquisition integration (Vaara, 2003), organizational restructuring (Balogun & Johnson, 2004), or spin-offs (Corley & Gioia, 2004).

With respect to issue selling, Dutton and Ashford (1993) suggested that sellers would be more successful if they sold their issues as strategically important, if the management of their organizations were capable of responding, and if there were payoffs for the organizations. They also proposed that sellers thought about the importance of *presentation* and *bundling*. Following this logic, Dutton et al. (2001) found that a seller's sense that the issue must conform to the logic of a business plan involved a more complex selling recipe than simply providing compelling facts.

Measures. Unlike the concept of issues (Dutton et al., 2001), SC implementation works have been mostly case studies, which have led to a cognitive portrait of strategy implementation; specific measures for theory testing have yet to emerge.

Strategic Change and Organizational Learning

Two other processes are identified in the cognition literature, but with less theoretical and empirical attention—strategic change and organizational learning. In their review of the literature, Rajagopalan and Spreitzer (1997: 57) defined strategic change as "the combination of changes in the content of strategy as well as changes in environmental/organizational conditions brought about by managerial actions in the process of change" and established the existence of a *cognitive lens* (in addition to rational and learning) in this literature. They identified several features of this lens: recognition of the role of managerial actions and noneconomic outcomes, and change as an iterative process. Further, there is considerable overlap between change and learning. Their classification—evolutionary and transformational change, with only the latter involving change in knowledge structures—may, however, provide a way of distinguishing between the two.

Case studies first highlight the *temporal dimension* involved in strategic change. Considerable time is needed to notice and interpret environmental changes, define organizational response, and consequently institutionalize desired behaviors. Greenwood and Hinings (1993) document a tendency of organization structures to move toward archetype coherence; they conclude that changing from one archetype to another is less common than archetype stability. Second, different types of cognition–action linkages are manifest in strategic change. While cognitive change can induce, and can be induced by, behavioral change, sometimes changes in either cognition or behaviors can occur in isolation of each other (Inkpen & Crossan, 1995; Leroy & Ramanantsoa, 1997). Halme (2002) also revealed that cognitive-level environmental learning did not inevitably precede behavioral change but occurred in the course of action.

In his now classic essay on organizational learning, Huber (1991) identified four constructs and processes associated with organizational learning (knowledge acquisition, information distribution, information interpretation, and organizational memory) and explicitly recognized the role of framing and strategic frames (in his terms, "cognitive maps"). Similarly,

March (1991) distinguished between exploration and exploitation, linking these learning modes to strategic actions such as resource allocation. Both these scholars offer powerful insights to incorporate organizational learning in SC, but theoretical developments along these lines have been relatively slow to emerge. In a case study, Thomas, Sussman, and Henderson (2001) articulated the concept of strategic learning, characterized by information gathering that relies on diverse experts for interpretation and validation.

In addition to the various concepts that constitute SC, the framework (see Figure 1) also provides a basis for identifying empirical research streams that account for the links between antecedents, SC, and outcomes. We take this up next.

A Review of Empirical Research Streams

From the articles in our review, we can identify three well-developed research streams—strategy frames, strategy formulation, and competitive/industry dynamics. Two others—strategy implementation and organizational identity—have attracted some attention but are not broadly developed. Additional areas are in the emergent stage and have not yet reached the critical mass required to be labeled a research stream. We discuss the five streams in order of their development and finally enumerate the emerging areas. Both the streams and emerging areas are summarized in Table 2.

Stream I: Antecedents and Outcomes of Strategy Frames

The strategy frame concept has received significant empirical attention at the individual, group, and organizational levels of analysis.

At the *individual level,* most works have employed primary data, with causal mapping being frequently used to construct strategy frames. These works suggest that individual, strategic, and environmental factors are likely to be related to, but are not sufficient to explain, the structural characteristics of frames. Markoczy (1997) concluded that although individual characteristics influence executive beliefs, they are no substitute for cognition, a conclusion echoed by Jenkins and Johnson (1997). The latter attributed causal maps to intentions, with performance-based concepts found more commonly among intentional entrepreneurs than among their counterparts emphasizing control and personal fulfillment. Calori, Johnson, and Sarnin (1994) demonstrated that the more diversified a firm, the more complex the map of the CEO. Hodgkinson and Johnson (1994) found significant differences in mental models held by managers both within and between companies in the same industry, attributing the diversity to the roles actors perform in their organizations. Mitchell et al. (2000) reported consistency in cognitive scripts across cultures. Hodgkinson (1997a), in a longitudinal field study of the U.K. residential estate industry during a period of high volatility following a significant downturn in the property market, reported that the actors' mental models of competitive space remained stable, advancing evidence of cognitive inertia. However, given the lack of control for key environmental and organizational factors, these studies are far from conclusive.

Table 2
Empirical Studies Demonstrating Linkages

Study	Sample	Method	Key Finding
Stream I: Antecedents and outcomes of strategy frames			
Barr, 1998	6 large, U.S.-based, pharmaceuticals with 10+ years history	O / Arc-CM	Organizational paradigms and mental models influence the timing of strategic change.
Barr & Huff, 1997	6 large, U.S.-based pharmaceuticals with 10+ years history	O / Arc-CM / CL	Likelihood of change increases with multiple perceived effects of environmental change.
Boland et al., 2001	53 MBA students at a private U.S. university who are managers	I / EX	Different knowledge representations prime recipients with different schemata and thereby differentially affect their decision making.
Calori, Johnson, & Sarnin, 1994	CEOs of 26 French and U.K. firms from brewing, auto, banking, and publishing	I / Int-CM	Differences in causal maps are related to differences in diversification.
Chattopadhyay, Glick, Miller, & Huber, 1999	371 executives from top management teams (TMTs) at 58 strategic business units of publicly traded firms	I-G / Sur	Upper-echelon cognitions may be better explained by social influence processes than by functional experience.
Danneels, 2003	44 Belgium retail contacts	O / Int / CS	Firms should balance the enacted process of tight coupling (with customers) with a deliberate effort at loose coupling, as tight coupling comes at the price of increased commitment and restricted vision.
Hodgkinson & Johnson, 1994	23 senior managers from 2 U.K. grocery retailing firms	I / Int / TM	There are differences in the taxonomic mental models held by managers both within and between companies, within the same industry.
Hodgkinson, 1997a	206 (Time 1) and 114 (Time 2) U.K. residential realtors	I / Sur / MS	Respondents' individual and collective cognitions remain highly stable, despite a significant downturn in the property market.
Inkpen & Crossan, 1995	58 North American senior managers involved in 40 U.S.–Japanese joint ventures	I-G-O / Int-Arc	A rigid set of managerial beliefs associated with an unwillingness to cast off or unlearn past practices can severely limit the effectiveness of organization learning.
Jenkins & Johnson, 1997	30 sole trader or owning partners of independent U.K. retail stores	I / Int-CM	Intentions are related to causal maps.
Knight et al., 1999	Mix of 76 public and private high-tech firms in the U.S. and Ireland with mean of 225 employees	G / Int	There are weak negative relationships between demographic diversity and strategic consensus. Adding interpersonal conflict and agreement seeking as intervening group process variables improves the model.
Lampel & Shamsie, 2000	70 joint ventures initiated by General Electric between 1984 and 1993	O / Arc	The early failure of joint ventures can be linked to a shift away from dominant logic.
Löwstedt, 1993	Three Swedish engineering firms	O / Int-Arc-Sur / CS	Organizing frameworks of individuals are related to emerging informal organization structure.
Markoczy, 1997	91 Hungarian managers from manufacturing firms	I / Int-CM	Individual characteristics are not a substitute for cognition.
Miller & Shapira, 2004	64 U.S. part-time MBA students	I / Sur	Specific biases affect subjective valuations of options.

(continued)

Table 2 (continued)

Study	Sample	Method	Key Finding
Stream I: Antecedents and outcomes of strategy frames			
Mitchell, Smith, Seawright, & Morse, 2000	753 business owners, entrepreneurs, and midlevel managers from Canada, U.S., Mexico, China, Japan, Australia, and Chile	I / Sur	Cognitive scripts are associated with the venture creation decision.
Nadkarni & Narayanan, 2007a	225 CEO letters to shareholders from manufacturing firms	O / Arc-CM	Complex strategic schemas promote strategic flexibility and success in fast-clockspeed industries, and focused schemas foster persistence in slow-clockspeed industries.
Short & Palmer, 2003	119 annual shareholder letters in the U.S. restaurant industry	I / Arc / DA	CEOs who integrate external referents into their performance sensemaking efforts tend to be from larger and more highly performing organizations.
Tsang, 2002	208 letters to shareholders from 147 companies in Singapore	O / Arc / LA	The general self-serving attribution pattern found in the original study is confirmed in Singapore as well.
Stream II: Determinants and consequences of strategy formulation			
Decision making			
Hough & Ogilvie, 2005	749 managers attending executive leadership training programs	I / Sim	iNtuiting/Thinking managers are more decisive and make higher quality strategic decisions than iNtuiting/Feeling, Sensing/Feeling, or Sensing/Thinking managers.
Khatri & Ng, 2000	281 senior managers in 56 computer, 97 banking, and 68 utility companies in the U.S.	I / Sur	Intuitive processes used in decision making are positively associated with performance in unstable environments and negatively so in stable environments.
Melone, 1994	3 CFOs and 5 VPs of corporate development in diversified foods	I / FE	Organizational roles affect ratings of acquisition candidates.
Nutt, 1993	168 decision cases from 44 public-, 26 private-, and 98 third-sector organizations	O / Int	Decision makers use ineffective tactics in almost three of four decisions and fail to consider context when selecting a tactic. The mismatch of tactic to situation seems to occur because decision makers prefer to use low-effort tactics.
Nutt, 1998	317 decision cases: 41% profit, 59% not-for-profit	O / Int-Sur	Decision makers use evaluation tactics with a poor track record in nearly half of their decisions. To improve success, decision makers should use bargaining and analytic tactics more often.
Olson, Parayitam, & Bao, 2007	85 TMTs from U.S. hospitals	G / Sur	Task conflict mediates the relationship between cognitive diversity and decision quality; competence-based trust moderates the relationship between cognitive diversity and task conflict.
Simon & Houghton, 2003	55 small firms in the computer industry in Georgia, U.S.	I / Int-Sur / CA	Overconfidence is positively related to the introduction of pioneering (risky) products.
Tyler & Steensma, 1998	61 top executives from 16 U.S. industries	I / Sur (Scenarios)	Executives with a technical education place more weight on the opportunities provided by the alliance than do those with other types of education.
Wally & Baum, 1994	151 CEOs from manufacturing in York County, Pennsylvania	I / Sur (Scenarios)	CEO's cognitive ability, use of intuition, tolerance for risk, and propensity to act are positively associated with speedy decisions.

(continued)

Table 2 (continued)

Study	Sample	Method	Key Finding
Stream II: Determinants and consequences of strategy formulation			
Influence of scanning on interpretation			
Bhardwaj, Camillus, & Hounshell, 2006	DuPont Company	O / Arc / CS	The search process influences growth possibilities discovered, and the pursuit of growth possibilities is accompanied by the creation of new knowledge and new capabilities.
Greve & Taylor, 2000	Radio stations in 157 U.S. markets	O / Arc	Innovations cause organizations to search for opportunities and threats implicit in observed innovations, with innovations in large or nearby markets having greater effect.
Kuvaas, 2002	162 TMT members of 73 large newspaper firms in Norway	I / Sur (scenarios)	Scanning externally increases assessment of controllability.
Thomas, Clark, & Gioia, 1993	CEOs of 156 public access hospitals in Texas	O / Arc-Sur (scenario)	Top managers' attention to high levels of information during scanning was found to be related to their interpretations of strategic issues as positive and as implying potential gains.
Tripsas & Gavetti, 2000	Polaroid	O / Int-Arc / CS	Turnover in the TMT is an important driver of change in strategy frames.
Scanning			
Dean & Sharfman, 1996	52 strategic decisions from 24 manufacturing firms in 16 industries.	G / Int-Sur	Procedural rationality is positively related to decision effectiveness, while political behavior is negatively related. Procedural rationality has a greater impact in unstable environments.
Elenkov, 1997	141 medium-size (single-business) manufacturing firms in Bulgaria	I / Int	Uncertainty in the environmental sectors is positively associated with the use of personal and external modes of scanning among Bulgarian managers.
Garg, Walters, & Priem, 2003	105 CEOs in U.S. manufacturing	I / Sur	In dynamic environments, CEO attention to the task sectors and to internal innovation-related functions is associated with high performance, while scanning of general sectors and internal efficiency-related functions are beneficial in stable environments.
Lefébvre & Mason, 1997	84 CEOs of small manufacturing firms in Quebec, Canada	I / Int	A more aggressive technology policy in small- and medium-size enterprises leads to greater realized innovative efforts, which in turn are positively related to export performance and, to a lesser extent, to financial performance.
Miller, 1993b	36 U.S. companies, medium and large size	O / A	Succession events tend to be followed by diffusion of authority and, in the context of poor performance, by increased organizational information processing.
Sutcliffe, 1994	65 TMTs from various industries	G / Sur -Arc	Scanning and decentralization enhance the accuracy of executives' perceptions of instability.

(continued)

Table 2 (continued)

Study	Sample	Method	Key Finding
Stream II: Determinants and consequences of strategy formulation			
Sensemaking			
Barr & Glynn, 2004	MBA students, 89 from high-UA (uncertainty avoidance) and 127 from low-UA countries	I / Sur / CFA	Compared to low-UA cultures, individuals from high-UA cultures are significantly more sensitive to controllability in perceiving strategic issues. However, other cultural value dimensions (individualism, masculinity, power distance) do not have similar effects.
Chattopadhyay, Glick, & Huber, 2001	284 actions by 92 manufacturing and service organizations in the U.S.	Org / Int-Sur	Control-reducing threats lead to conservative, internally directed actions (consistent with the threat-rigidity hypothesis), while likely losses lead to riskier externally directed actions (consistent with prospect theory).
Denison, Dutton, Kahn, & Hart, 1996	320 CEOs of Midwestern U.S. firms	I / Sur	Global business experience and perceived capability are significant predictors of the perception of foreign investment in the U.S. as an opportunity, while firm size is related to an interpretation of threat.
Kilduff, Angelmar, & Mehra, 2000	35 simulated firms (run by 159 managers from 14 countries) in Europe	G / Sim-Sur	Cognitive diversity in teams affects, and is affected by, changes in firm performance, but there is no evidence of any effect of demographic diversity on measures of cognitive diversity.
Miller, Burke, & Glick, 1998	(1) 38 U.S. CEOs, (2) 106 Texas hospital administrators, (3) 79 TMTs of business units	G / Sur	Cognitive diversity among executives inhibits rather than promotes (1) comprehensive examinations of current opportunities and threats and (2) extensive long-range planning.
Sharma, 2000	99 large firms in the Canadian oil and gas industry	O / Sur	Differences in managerial interpretations are influenced by organizational context.
Stream III: Cognitive construction of competitive/industry dynamics			
Competition			
Greve, 1998	200 U.S. commercial radio stations	O / Arc / EH	Markets nearby and of similar size are likely to experience mimetic adoption of formats. Innovations personally observed by decision makers, or reported to them by contacts, are more influential than mass media.
Porac & Thomas, 1994	29 managers in U.S. retail firms	I / Int - Sur	Firms (1) recognize only a small number of competitors (2) based on size, performance, proximity, typicality, and similarity.
Industry			
Anand & Peterson, 2000	26 weekly charts for U.S. commercial music industry	X / Arc / CS	Changes in scope, methodology, or political tone with which market information is presented can provide a major jolt to the participants' understanding of their field.
Garud & Rappa, 1994	U.S. cochlear implant industry	X / Int-Sur-Arc / CS	There is a reciprocal interaction between beliefs, artifacts, and routines, leading to two cyclical processes: reinforcing of beliefs by evaluation routines and institutionalization developing from shared cognition of evaluation routines.

(continued)

Table 2 (continued)

Study	Sample	Method	Key Finding
Stream III: Cognitive construction of competitive/industry dynamics			
Nadkarni & Narayanan, 2007b	38 CEO letters to shareholders from six companies in two industries	O-X / Arc / CM	Results suggest that events personally observed by decision makers or reported to them by corporate contacts are more influential than events reported via mass media.
Phillips, 1994	96 informants in 12 U.S. organizations from fine arts museums and California wineries	X / Int / CS	Participants in various industries have distinct assumptions regarding conceptualizations of topics such as membership, competition, the origins of "truth," the purpose of work, and the nature of work relationships.
Porac, Thomas, Wilson, Paton, & Kanfer, 1995	89 managers in Scottish knitwear	X / Sur / CS	A collectively understood industry model of organizational forms has become part of the macrocultural belief system of industry participants. Geographic segmentation evolves around local traditions and skill sets.
Reger & Palmer, 1996	Top managers in U.S. financial services: (1) 25 in Arizona and (2) 24 in Illinois	I / Int / CM - RG	Even during a period of significant environmental upheaval, managers rely on cognitive maps that reflect obsolete industry boundaries rather than configurations representative of the new deregulated marketplace.
Strategic groups			
Johnson & Hoopes, 2003	N/A	X / Sim	Firms and managers focus attention on nearby competitors, leading to biased estimates of the competitive environment and resulting in stable strategic groups.
Labianca, Fairbank, Thomas, Gioia, & Umphress, 2001	Top managers at 372 U.S. colleges and universities	O / Sur-CONCOR analysis	University (industry) subgroups are based on attributes such as reputation, image, and identity. Upward comparisons are associated with greater strategic change, while downward comparisons are associated with greater perceived external threat.
Osborne, Stubbart, & Ramaprasad, 2001	400+ letter to shareholders from 22 pharmaceutical firms	X / Arc / CM	Mental models and performance are involved in a recursive process of competitive enactment, which contributes to strategic group stability.
Reger & Huff, 1993	23 top managers from six bank holding companies	X / Int / CA	Strategic groups are based on shared perceptions about strategic commonalities by industry participants.
Spencer, Peyrefitte, & Churchman, 2003	20 U.S. hospital administrators	X / Int / RG	Task and institutional environments influence cognitive strategic group formation.
Stream IV: Determinants and consequences of strategy implementation			
Corley, 2004	U.S.-based global technology service provider being spun off from parent organization	O / Int-Arc / CS	Those higher in the hierarchy tend to see organizational identity in light of the organization's strategy, whereas those lower in the hierarchy tend to see it in light of the organization's culture.
Dutton, Ashford, O'Neill, Hayes, & Wierba, 1997	Midlevel managers at a Midwestern U.S. telecom company; 30 for study 1, 118 for study 2	I / Study 1: Int; Study 2: Sur	Top management's willingness to listen and a supportive culture are positive contributors, and fear of negative consequences, downsizing conditions, and uncertainty are negative contributors to favorability of context for issue selling.

(continued)

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Table 2 (continued)

Study	Sample	Method	Key Finding
Stream IV: Determinants and consequences of strategy implementation			
Dutton, Ashford, O'Neill, & Lawrence, 2001	82 issue-selling accounts: 13 VP and 29 directors in a U.S. hospital	O / Int / CS	Contextual knowledge is critical to execution of issue selling; managers actively shape the issue-selling microprocesses that contribute to organizational change.
Fiss, & Zajac, 2006	123 large publicly traded German companies	O / Arc	In framing strategic change, firms realize positive market responses to institutionally appropriate frames of change.
Glynn, 2000	13 interviews with constituents: the Atlanta, Georgia, orchestra	O / Int-Arc / CS	The construction of core capabilities and resources lies at the intersection of identification and interpretive processes in organizations.
Maguire & Hardy, 2005	29 interviews: Canadian community organizations and pharmaceutical firms	O / Int-Obs / CS	In implementing collaborative strategy, champions engage in identity work.
Ravasi & Schultz, 2006	40 people from Bang & Olufsen	O / Int-Arc / CS	Organizational culture is a central construct in understanding the evolution of organizational identities in the face of environmental changes, suggesting that culture preserves a sense of continuity as organizational identity.
Salk & Shenkar, 2001	40 TMT members of a British–Italian joint venture	O / Int-Arc-Obs / CS	Organizational culture is a source of cues supporting sensemaking action carried out by leaders and a platform for sensegiving actions aimed at affecting internal perceptions.
Tetlock, 2000	259 managers from six private and public U.S. organizations	I / Sur (scenarios)	Political ideology and cognitive style are predictors of the value spins that managers place on decisions regarding accountability relationships between supervisors and employees.
Stream V: Antecedents and outcomes of organizational identity			
Identity			
Brickson, 2005	1,126 participants from 88 U.S. organizations: legal services and nonalcoholic beverage	O / Sur / MM	Findings suggests that the roles external images and organizational culture play in affecting organizational responses to identity threats may be more complementary than the current literature on organizational identity would suggest.
Golden, Dukerich, & Fabian, 2000	81 CFOs, 81 CMOs, and 188 physicians from U.S. acute care hospitals	I / Sur (scenarios)	Professionals and managers conflict because they interpret "identical" issues differently.
Nag, Corley, & Gioia, 2007	34 members of a high-tech R&D firm	O / Int-Arc / CS	The intersection of organizational identity, knowledge, and practice can hinder the development of new knowledge and undermine the broader strategic effort.
Voss, Cable, & Voss, 2006	Managing and marketing directors of 113 nonprofit theaters	O / Sur	Leaders' disagreement about organizational identity is related to performance (revenue and net income)—performance is lowest when disagreement is extreme.

Table 2 (continued)

Study	Sample	Method	Key Finding
Stream V: Antecedents and outcomes of organizational identity			
Image			
Martens, Jennings, & Jennings, 2007	169 initial public offering prospectuses from semiconductor, biotechnology, and Internet firms	O / Arc	Storytelling invokes identity constructions and story elaboration and impacts resource acquisition above and beyond previously emphasized factors.
Reputation			
Benjamin & Podolny, 1999	10,000 affiliation decisions by 595 U.S. wineries over 10 years	I / Arc	Actors occupying high-status positions obtain greater benefit from subsequent high-status affiliations than do actors occupying low-status positions.
Martins, 2005	98 ranked U.S. graduate schools of business	O / Arc-Sur-Int	Managers who believe that their schools' rankings are discrepant from their own perceptions are more likely to undertake change, moderated by perceptions of the strategic impact of the rankings and by the external orientation of organizational identity.
Emerging areas			
Denrell, Fang, & Levinthal, 2004	N/A	O / Sim	Socially interdependent knowledge is fragile and likely to be disrupted by turnover of personnel. Turnover more proximate to the solution is particularly problematic.
Howard-Grenville, 2005	1,500-person group in a semiconductor firm	O / Int-Arc-Obs / CS	Individuals and groups approach routines with different intentions and orientations, suggesting that agency shapes particular routine performance. Organizational routines are seen as capable of being adapted to the situation and a potentially important source of endogenous change in organizations.

Note: In the Method column: I = individual; G = group; O = organization; X = industry; Int = interview; Arc = archival; Sur = survey; Obs = observation; Sim = simulation; CS = case study; CM = causal mapping; RG = repertory grid; EH = event history; EX = experiment; FE = field experiment; MM = multilevel modeling; MS = multidimensional scaling; CFA = confirmatory factor analysis; CA = content analysis; CL = cluster analysis; TM = taxonomic mental model; DA = discriminate analysis; LA = log-linear analysis.

Short and Palmer (2003) used annual shareholder letters as the source of data to study reference points (or "benchmarks" or "comparators"). The study related the size and age of the firms to the use of external referents, concluding that CEOs use a wide variety of primarily internal referents but that CEOs of larger and more highly performing firms and younger organizations integrate external referents into their performance sensemaking efforts. Thus, unlike research that has used shareholder letters to operationalize organizational-level cognition, Short and Palmer use these letters as indicators of cognition at the individual level (in their case, the CEO's cognition).

Three individual-level studies in our sample have examined outcomes. In an experimental study, Boland, Singh, Salipante, Aram, Fay, and Kanawattanachai (2001) concluded that, in priming managers, particular knowledge representations, such as those presenting concrete and unambiguous knowledge, were more effective in producing decision responses than were general representations. It is possible that unlike Hodgkinson's (1997b) study of stable frames, frames that effectuate individual decisions may be sensitive to specific contextual influences. In another, Miller and Shapira (2004) demonstrated the role of cognitive biases in option-pricing models, highlighting deviations from the normative option-pricing models in finance. A third study (Löwstedt, 1993) concluded that interpretive processes modify formal structures to a substantial degree, thereby providing an alternate explanation to the earlier studies (e.g., Walton, Brief, & Austin, 1985) that found relatively weak linkages between cognition and formal structure.

At the *group level,* Knight et al. (1999) reported weak relationships between demographic diversity and strategic consensus. However, Kilduff et al. (2000; also discussed in Stream II), echoing Markoczy (1997), found *no* relationship between demographic and cognitive diversity. Chattopadhyay et al. (1999) focused on group process, marshaling empirical evidence to the effect of social influence on executive beliefs.

Finally, at the *organizational level,* in addition to the influence of environmental and organizational factors on various facets of strategy frames documented prior to Walsh (1995), researchers have addressed the issue of performance as mediated by strategic actions. This line of work has relied heavily on archival sources. First, some have traced the strategic actions of firms. Events not interpreted as affecting central concepts in the firm's strategic frame do not lead to a change in action (Barr & Huff, 1997). Indeed, Barr (1998) linked changes in causal maps to the timing of strategic actions. Lampel and Shamsie (2000) showed that the design of joint ventures follows a pattern that is consistent with the presence and influence of dominant logic and that the early failure of joint ventures can generally be linked to a shift away from this dominant logic. These conclusions are far from generalizable since they were conducted in a single industry (Barr & Huff, 1997) or a single company (Lampel & Shamsie, 2000).

In a large sample study that included antecedents and outcomes with industry as a moderator, Nadkarni and Narayanan (2007a) showed that the complexity of frames promoted strategic flexibility and success in fast-clockspeed industries, whereas focus of strategic schemas fostered strategic persistence, which is effective in slow-clockspeed industries. This study applied structural equation modeling to archival data, with strategy frames derived by casual mapping procedures from annual statements.

Not surprisingly, a finding at multiple levels of analysis (individual, group, and organization) is that a rigid set of managerial beliefs, associated with an unwillingness to cast off or unlearn past practices, can severely limit the effectiveness of organization learning (Inkpen & Crossan, 1995).

This stream of research could benefit from multilevel models, incorporating multiple antecedents, moderators, and mediators (cf. Rajagopalan et al., 1993). We may make two additional observations. First, although Smircich and Stubbart (1985) distinguish between objective, perceived, and enacted environments, the distinction between perceived and enacted environments often is left implicit or not addressed in the empirical literature. This may be because most empirical works have been conducted in mature industries, where the opportunities for observing enactment may be limited. An exception may be Nadkarni and Narayanan (2007b), who suggested that fast-clockspeed industries are cognitively constructed. In other words, the constructivist version of enactment may be most visible in high-velocity industries.

Second, the empirical findings in this stream generally suggest that something akin to the "law of requisite variety" (Ashby, 1958; Huber & McDaniel, 1986; Lengnick-Hall & Sanders, 1997) is at work, with a significant correlation between antecedents and strategy frames. Thus, the content of strategy frames reflects the environmental, strategic, and organizational contexts of the firm. The structures of the frames tend to match the turbulence and dynamism of the environment: More complex and heterogeneous frames correspond to environments that are more volatile. Thus, these findings are generally consistent with contingency views of organizations.

Stream II: Determinants and Consequences of Strategy Formulation

The SC literature on strategy formulation has extended the lines of work identified by Walsh (1995) on scanning, sensemaking, and decision making but has opened up two additional lines of inquiry: the influence of scanning on (1) interpretation and (2) knowledge structures or strategy frames.

Scanning. Various dimensions of scanning have been linked to environmental characteristics and different outcomes. Sutcliffe (1994) reported that both environmental instability and munificence are linked to the extent and frequency of scanning. Dean and Sharfman (1996) found that although environmental variables were not related to procedural rationality, the latter was related to decision effectiveness, even after controlling for environmental favorability and quality of decision implementation. Lefebvre and Mason (1997) reported that once the effects of strategic orientation are controlled, scanning was not related to technology policy decisions. As illustrated by Elenkov (1997), attention to specific environmental sectors may be country specific, with Bulgarian firms paying attention to the political or legal environment, unlike the U.S. firms reported by Daft, Sormunen, and Parks (1998). Garg et al. (2003) extended the earlier work of Daft et al. in a study that stands out for its careful sampling and questionnaire construction, as well as for the authors' meticulous efforts to ensure the reliability of organizational-level measures. They found that CEO attention to

(1) the task sectors of the external environment and the innovation-related internal functions in dynamic environments and (2) the general sectors of the external environment and the efficiency-related internal functions in stable environments produced higher performance, especially sales growth. The inclusion of performance outcomes in their study is noteworthy. However, their results on antecedents are more credible than on performance consequents because the link between scanning and performance is likely to be mediated by the intertwined processes of sensemaking and decision making—as illustrated by Lefebvre and Mason (1997)—and strategic actions, neither of which Garg et al. could accommodate in their study.

Sensemaking. At the individual level, the works on the determinants of interpretation of an issue as a threat or opportunity during the diagnosis stage have been accumulating, thanks to the previous work of Dutton and Jackson (1987). Denison et al. (1996), in a study that controlled for industry, found that CEOs with more global experience and capabilities saw foreign investment as an opportunity, while firm size (larger) was related to an interpretation of threat. Barr and Glynn (2004) proposed that uncertainty avoidance (UA) affects the degree to which individuals associate controllability attributes with threat and opportunity. They found that individuals from high-UA cultures (e.g., Japan) associated the lack of controllability with threat, and those from low-UA cultures (e.g., United States) associated the presence of controllability with opportunity. Although this line of work has coalesced around the T/O construct, a number of decision-specific factors and antecedents not incorporated in these studies may explain assessment of controllability. These results are at best suggestive, not conclusive.

At the group level, Miller et al. (1998) suggested that the cognitive diversity of the TMT inhibits rather than promotes comprehensive examinations of opportunities and threats, thus providing some indirect evidence for the connection between TMT and firm performance. Kilduff et al. (2000), in a MARKSTRAT simulation study, provided evidence to the effect that (1) demographic diversity is not related to cognitive diversity and, perhaps more importantly, (2) interpretative ambiguity (a component of cognitive diversity within their study), which measured agreement about causes of performance, had a significant effect on subsequent performance (market share and profitability).

Complex studies have begun to emerge at the organizational level. Sharma (2000) obtained multiple responses from each organization and utilized structural equation modeling in a study that focused on T/O interpretations and found (1) the antecedent influence of intraorganizational context and (2) T/O's association with environmental strategies. In a well-crafted study, Chattopadhyay et al. (2001) distinguished the controllability (from the threat-rigidity hypothesis) and gain/loss (from prospect theory) dimensions of T/O, finding that control-reducing threats lead to conservative internal actions and that likely losses lead to riskier external actions. This study is unique for its efforts to link T/O interpretation to strategic action (and not to performance) and its relatively sophisticated use of moderators—strategy type and slack resources.

Decision making. Similar to Shepherd (1999), two works have derived the weights placed by decision makers and linked them to antecedents, primarily their past experience or current

organizational position. Melone (1994) discovered that chief financial officers emphasized financial matters over strategic ones, while vice presidents took a more balanced view. Similarly, Tyler and Steensma (1998) reported that top executives with a technical education placed more weight on the opportunities provided by technology alliances than did those with other types of education. These works continue the tradition of Dearborn and Simon (1958) but have extended it to the strategic context.

A second line of SC work has examined decision-making processes, emphasizing the intuitive–analytical distinction (Hough & Ogilvie, 2005; Khatri & Ng, 2000; Nutt, 1993, 1998; Wally & Baum, 1994). At the individual level, Wally and Baum argued that comprehensiveness has both cognitive and organizational structural aspects, providing evidence that along with structural factors, a CEO's cognitive ability and use of intuition are associated with speedy decisions. Similarly, Hough and Ogilvie found that managers with iNtuiting/Thinking preferences (as measured by the Myers-Briggs Type Indicator) made the highest quality decisions. The employment of intuitive synthesis in SDM appears to be greater in an unstable environment than in a stable environment. In a stable environment, intuitive synthesis has a negative relationship or no relationship with organizational performance, whereas in an unstable environment, intuitive synthesis is positively associated with organizational performance (Khatri & Ng, 2000).

In a series of studies, Nutt (1993, 1998) found that analytical inference produced better decisions in the evaluation of alternatives during organizational decision making. It is possible that his sample of firms represented stable industries. Nonetheless, Nutt's work is noteworthy for its methodological rigor. Nutt created a database of cases on decisions through interviews with multiple informants and used coders to convert them into a quantitative database for hypothesis testing.

At the group level, Olson, Parayitam, and Bao (2007) found that cognitive diversity promoted task conflict during decision making, which mediated the effects of cognitive diversity on decision outcomes. Finally, in a study of high-technology firms, Simon and Houghton (2003) related overconfidence in the decision process to a strategic action, in their case the introduction of pioneering products.

Influence of scanning on interpretation. Gioia and his colleagues (Thomas et al., 1993), in their qualitative study, revealed a complex set of relationships between scanning and interpretation. Scanning, which captures the top manager's attention, related to the manager's interpretation of issues as positive and when judged controllable had a positive change on service offerings. Sutcliffe (1994; see earlier in the section on scanning) also reported the influence of external scanning on perceptions of environment but added the information-processing characteristics of teams as a moderator of this relationship. Longer tenured, more homogeneous teams generally achieved more accurate perceptions. Finally, Kuvaas (2002) portrayed a reciprocal relationship between scanning and interpretation. External environmental information generates assessment of controllability, but TMTs with higher information capability search for less data during interpretation.

Influence of scanning on strategy frames. Organizational-level studies have highlighted the role scanning plays in changing strategy frames. In their study of digital imaging in Polaroid,

Tripsas and Gavetti (2000) noted that although scanning is typically directed by strategy frames, turnover in TMT may create a learning environment and the ensuing scanning may influence the strategy frames of managers. Greve and Taylor (2000) argued that innovations are difficult to interpret using existing strategy frames; they may lead to further scanning, which in turn may lead to adoption of innovations or, more likely, nonmimetic change. Their work suggests that innovations in large or nearby markets have a greater effect on the rate of nonmimetic change than do innovations by large organizations. In a longitudinal case study of corporate entrepreneurship at DuPont, Bhardwaj, Camillus, and Hounshell (2006) concluded that both the process and content of scanning are accompanied by the creation of new knowledge structures—in our terms *strategy frames*—and new capabilities.

We may make four observations about this stream of empirical research on the determinants and consequences of strategy formulation. First, this stream has adopted either the entity (individual, group, or organization) or a decision as the unit of analysis. In the latter case, the lack of decision-specific factors as controls makes findings difficult to generalize. As underscored earlier by Rajagopalan et al. (1998), future work needs to specify the relationships between the two units of analysis. Second, unlike the contingency formulations that have fueled explorations of antecedents and strategy frames, multiple theories (information-processing, behavioral decision, and prospect theories and the threat-rigidity hypothesis) have animated the search for linkages between antecedents, strategy formulation, and outcomes in SC. Third, for outcomes, process research focuses directly on other processes (e.g., as in Thomas et al., 1993), where scanning influences issue interpretations, or on intermediate outcomes such as quality of decision (Olson et al., 2007). Finally, this stream makes an important contribution, revealing the existence of frame breaking (Bhardwaj et al., 2006; Greve & Taylor, 2000) in addition to the previously identified frame switching (Louis & Sutton, 1991).

Stream III: Cognitive Construction of Competitive/Industry Dynamics

Another intriguing set of works has focused on the collective cognitive construction of competitive and industry dynamics, departing from the perspective of these as determinants of firm behavior. Questions such as "How do firms recognize competitors?" and "How do they emerge as groups?" (see also the review by Hodgkinson, 1997b) animate this stream of work. The empirical works have identified the mechanisms of formation of competition, industry, and strategic groups.

Competition. The mental models of *competition* held by firms in an industry are typically arranged as hierarchical cognitive taxonomies. This allows firms to recognize only a relatively small number of competitors (Porac & Thomas, 1994). This recognition is anchored in certain discernible characteristics of competitors: size, performance, proximity, typicality, and similarity (Greve, 1998; Porac & Thomas, 1994). The resulting narrow view of competitors leads to cognitive oligopolies, that is, a mutually defined set of competitors (Porac, Thomas, & Baden-Fuller, 1989) that psychologically segments an otherwise larger market. However, in contrast to economic models, rivalry is not necessarily symmetric. Whereas small firms may view large ones as competitors, the large firms may disregard the influence of smaller firms.

Industry. Another line of work portrays industry itself as cognitively constructed. One set of empirical works focused on developing a cognitive conception of industry. Phillips (1994) demonstrated that industries differ in terms of beliefs about competition, membership, origins of truth, purpose of work, and nature of work relationships. Porac et al. (1995) illustrated how a collectively understood model of organizational forms has become part of the belief system of participants in the Scottish knitwear industry. Using causal maps, Reger and Palmer (1996) illustrated how managers relied on obsolete industry boundaries unrepresentative of the newly regulated markets they studied. Anand and Peterson (2000) examined how in established markets, creation, distribution, and interpretation of information—changes in scope, method, or tone of presentation of market information—could provide a jolt to participants' understanding of their field.

A second set of works has focused on the construction of industries. Garud and Rappa (1994) revealed the two cyclical processes in the early stages of the cochlear implant industry: one at the firm level and the other at the collective level, each reinforcing the other. Nadkarni and Narayanan (2007b) found that in stable industries, firms might behave as if their responses are determined, but in dynamic industries, firms collectively construct industries. Hence, at least in "fast cycle" industries, industry dynamics may be viewed as being determined by collective construction processes of incumbent firms.

Strategic groups. Reger and Huff (1993), building on the argument that decision makers' perceptions and cognitions can be expected to influence industry evolution, advanced a cognitive perspective on strategic groups, showing that industry participants shared perceptions about strategic commonalities among firms and clustered competitors in subtle ways not reflected in the academic literature.

Recent works attribute cognitive processes to the stability of strategic groups. In a study of the pharmaceutical industry, Osborne, Stubbart, and Ramaprasad (2001) found that both cognitive groups (clustered by themes in the letters to shareholders) and strategic groups (clustered by performance) converged as predicted by the literature and that the earlier mental models and later performance were linked, concluding that the recursive relationship between mental models and performance contributed to strategic group stability. Johnson and Hoopes (2003) argued that competitive pressures and bounded rationality induce agents to focus on nearby competitors, leading to biased estimates of the competitive environment. Since these estimates correlate with estimates of nearby firms, clusters of firms with similar beliefs—cognitive strategic groups—emerge and remain stable. Spencer et al. (2003) reported a similar finding in hospitals, arguing that cognitive groups focus attention.

With the exception of Nadkarni and Narayanan (2007b), works in this stream have linked cognition directly to competitive/industry dynamics, without focusing on strategic actions that may intervene in the relationships. Thus, the proposition that firms influence industry evolution will have to wait for convincing evidence.

Stream IV: Determinants and Consequences of Strategy Implementation

Organizational identity is the primary determinant of strategy implementation identified in the literature, facilitating and constraining strategy implementation as the strategic management

activity moves from upper echelons to include middle management and lower level employ-ees. Corley (2004), in the context of a spin-off, reported that upper echelons were much more attuned to strategy shifts, whereas lower levels held on to identity for meaning. Organizational identity operates in two ways: for the upper echelons, as a tool of implementation, and for the lower levels, as a determinant of the progress of implementation.

At the lower levels, organizational identity is a stabilizing force and hence a factor contribut-ing to the resistance to change. Ravasi and Schultz (2006) illustrated how identity maintains operations by guiding lower level individuals' interpretations of an issue and motivation for action on it. During implementation, other identities such as professional (Glynn, 2000) or national (Salk & Shenkar, 2001) may conflict with organizational identities, creating delays. Champions engage in identity work during implementation, identifying with their respective constituencies for legitimacy (Maguire & Hardy, 2005). Finally, since identity's influences are asymmetric, strategy implementation processes involved in integration (e.g., mergers and acqui-sitions; see Vaara, Tienari, & Santti, 2003), creation (e.g., joint ventures; see Salk & Shenkar, 2001), or dissolution (e.g., spin-offs; see Corley, 2004) are quite different from one another.

To date, the empirical work has identified some of the factors that contribute to issue sellers' decisions to sell an issue. For example, Dutton, Ashford, O'Neill, Hayes, and Wierba (1997) examined the contextual cues that issue sellers used in assessing whether or not to undertake issue selling. Other studies have examined the claims individuals make about the needs of particular identity groups (Dutton et al., 2001) as a type of organizational issue. These studies have started to uncover the role of *intraorganizational contex*t in shaping how claims are made about what issues are important.

Tetlock (2000), in a remarkable study, concluded that political ideology and cognitive style are consistent predictors of the "value spins" that managers place on decisions, suggest-ing that sensegiving is not merely internally oriented but may have external audiences as well. The study is remarkable in that it employed scenarios depicting decision making at the micro-, meso-, and macrolevels of analysis and supplemented the large sample-based mul-tiple regressions with qualitative data, allowing the author to conclude that intuitive theories of good judgment cut across levels of analysis.

A majority of the studies have been organizational-level case studies, which preclude generalizations but provide a base on which to ground theories and test hypotheses. Nevertheless, this focus on strategy implementation in the SC literature stands in sharp contrast to the lack of attention to this topic that Hutzschenreuter and Kleindienst (2006) lamented about in the strategy process literature. The influence of identity, the processes of sensegiving by top management, and its counterpart, issue selling by middle management, are concepts *unique* to SC. Viewed as a leadership act, sensegiving, by which top managers provide meaning to the organization, may be linked to the emerging cognitive conception of leadership (Lord & Emrich, 2001; Podolny, Khurana, & Hill-Popper, 2005), providing a bridge between the strategy implementation and leadership literatures.

Stream V: Antecedents and Outcomes of Organizational Identity

All operationalizations of organizational identity—identity, image, and reputation—are beginning to attract empirical scrutiny. In a study of identity orientation, Brickson (2005)

reported that professional (legal) service firms were more "relational" in orientation than breweries and that cooperative breweries were more "collectivist" than noncooperative ones. Golden, Dukerich, and Fabian (2000) traced differences in identity orientation to professionalization, finding that chief medical officers and doctors had similar orientations but differed from those of chief financial officers. Extreme differences in perceptions of identity between managing and marketing directors of theaters contributed to poor performance in a study by Voss, Cable, and Voss (2006), and organizational identity inhibited attempts to graft knowledge (Nag et al., 2007).

Two studies examined the effects of attempts to manage image. In one, Martens et al. (2007) argued that storytelling is one way to communicate identity to external stakeholders and showed that, in the case of entrepreneurial firms, storytelling was effective in resource acquisition. In another, Fiss and Zajac (2006) suggested that firms use specific framing language that fits their divergent stakeholder preferences but that doing so decouples espoused and actual implementation to elicit favorable market responses.

Similarly, studies on reputation have also focused on outcomes. Martins (2005) demonstrated that reputation rankings of business schools, discrepant from schools' own identities, create pressures for organizational change. In addition, Benjamin and Podolny (1999) linked reputation and pricing.

We may make three observations about this developing stream. First, organizational identity may be one of the sources of firm heterogeneity (Brickson, 2007), a concept central to strategy. Second, although there has been some recent questioning of the identity-based view of competitive advantage (Fiol, 2001), few empirical works have explicitly explored this idea. Third, organizational identity may be a source of cognitive inertia, and hence, it should feature prominently in any theory of strategic change.

Emerging Areas

The SC literature on organizational routines, organizational learning, and strategic change is very much in the nascent stages of development. Denrell et al. (2004) attributed personnel turnover to inefficient search routines, and Howard-Grenville (2005) attributed intentions, moderated by the power of individual and organizational context, to the persistence and flexibility of routines. Although Miller (1993b) had earlier traced the Icarus paradox to the increasing simplicity of causal maps due to positive reinforcement through success, to date, organizational learning and strategic change, both structure-altering processes, have attracted surprisingly limited interest among SC scholars.

We may make two broad observations about the SC literature that has developed since Walsh (1995) provided his now classic review of the (broader) managerial and organizational cognition field. First, except in the case of some well-developed concepts (e.g., strategy frames or SDM), the theoretical development and concept elaboration during the period of this review have yet to be exploited in empirical works. For example, the processes of sustaining organizational identity, organizational routines, or sensegiving—all concepts fairly well elaborated in theory—await empirical research. Second, when compared with Walsh's work, this SC literature (while definitionally narrower than Walsh's), has crystallized Walsh's knowledge structure into three constituents (organizational identity, strategy frames, and

organizational routines) and has displayed greater interest in processes, especially strategy formulation and implementation.

Both the theoretical and conceptual development and the empirical research streams enable us to summarize the uniqueness of the SC perspective.

What Strategic Cognition Research Has
Contributed to the Study of Management

The review above suggests that five significant themes have emerged from the SC literature:

1. The SC literature forcefully highlights the role of *human agency* in the strategic conduct of a firm, taking a step beyond the strategic choice concept of Child (1972). Environments are not merely perceived but enacted, sometimes in an adaptive sense but nonetheless viewed through the prism of strategy frames, but at other times actively constructed by the actions of firms. Thus, the SC literature vividly portrays three key leadership functions at the strategic level: cognitive construction of industries, architecture of firm strategy, and orchestration of meaning for the organization.
2. The SC literature suggests that during the "fuzzy front end of decision-making," the structure and process of cognition has a significant influence on the *framing of decisions* before they reach the choice stage, and in this SC complements the economic foundations of strategy.
3. For SC scholars, *implementation* is not merely the design of a formal system but a vibrant set of processes. This contrasts significantly with Hutzschenreuter and Kleindienst's (2006) rational school of strategy process. Thus, a body of evidence is accumulating on the importance of sensemaking and sensegiving in strategy implementation and strategic change (e.g. Gioia et al., 1994). Indeed, unlike the rational school literature, SC has focused more on actual implementation rather than on planning-driven approaches.
4. SC research provides evidence for *cognitive inertia* (e.g., Abrahamson & Fombrun, 1994; Hodgkinson, 1997a; Reger & Palmer, 1996), perhaps as a result of strong organizational identities (Barney et al., 1998). It is likely that basic cognitive and psychological processes also contribute to cognitive inertia, reinforce organizational identities, and render managers reluctant to alter or discard dysfunctional identities. Managerial frames thus often lag behind changes in the internal or external environment, making strategic change problematic.
5. Although upper echelons are central in strategy, the SC literature suggests that, in addition to their personal characteristics, strategy frames, organizational identity, and organizational routines are *proximal predictors* of strategic action.

As we have shown above, the SC literature has come a long way in the past three decades, and this cumulative body of work now constitutes a *distinct school* in strategy with its own vocabulary. While we celebrate these accomplishments, much remains to be done; we next turn to desirable future directions.

Suggestions for Future Research

Based on our review of SC, we discuss below several implications for SC theory development and research methods and for connecting to related strategy theories.

Implications for Theory Development

To date, the SC literature has developed a rich and diverse base of research. Future research can continue to benefit from the use of intervening and interactive effects models and the use of multiple antecedents and moderators as suggested by Rajagopalan and colleagues (Rajagopalan et al., 1993; Rajagopalan et al., 1998); in addition, we will highlight three areas for theoretical attention.

Opportunities for further development. We identify four major opportunities for further development. First, because collective cognition in SC appears to have arrived at adolescence, significant opportunities exist for theoretical and empirical works. For one, only a limited number of group-level works appears in our review. TMT constitutes the group level of interest in SC, and the extant research about the antecedents and outcomes of cognitive diversity are confusing. Although accessing top managers and CEOs of medium and large organizations is a challenging task, this TMT topic requires much more focused research. Here, SC scholarship can benefit from theories of group cognition relevant for strategic contexts (Huber & Lewis, 2010). Also, at the organizational level, the link between lower level sensemaking and strategic action that requires coordination is a murky one. While some have emphasized the need for shared cognition as a basis for action (e.g., Moussavi & Evans, 1993), others have emphasized that only certain meanings have to be shared (e.g., Corner, Kinicki, & Keats, 1994; Fiol, 1994). In the case of intraorganizational action, the specific institutional contexts may dictate the importance of shared cognition as a means of coordination. For example, the linkage may be strong in "pattern maintenance" organizations (e.g., the universities studied by Gioia et al., 1994) relative to "production" organizations (Katz & Kahn, 1966) where top decision makers can employ coercion, manipulation, and exchange relations to induce intended behavior (Poole, Gioia, & Gray, 1989).

Second, strategic change, organizational learning, and routines are areas that cry out for theoretical and empirical works, given the current paucity. Rajagopalan and Spreitzer's (1997) work on strategic change, Huber's (1991) categorization of learning processes, and March's (1991) distinction between exploratory and exploitive learning offer convenient starting points for this line of research. These processes require clarity in conceptual distinction and a longitudinal perspective, which may necessitate recourse to archival materials. Finally, at this stage, it would be useful to have a number of qualitative studies on routines to ground our theoretical arguments, pertaining to the connections between routines and other facets of SC.

Third, SC has been slow to address the role of intuition and creativity in decision making (see, for exceptions, Khatri & Ng, 2000; Nutt, 1998; Wally & Baum, 1994) and to connect to the literature on managerial discretion (e.g., Carpenter & Golden, 1997). Dane and Pratt (2007) have offered a viable set of links between intuition, schemas, and decision making that may provide a starting point for incorporating intuition in SC. Similarly, Ford and Gioia (2000) and Drazin, Glynn, and Kazanjain (1999) dealt with the role of creativity in organizations, and their ideas may be fruitfully adapted to develop the cognitive facet of SDM. Managerial discretion has been a central construct in management theory, and the degree to which it is objective or cognitively constructed offers another avenue for extending the reach of SC literature.

Finally, now that demographic variables have been found *not* to explain SC (Kilduff et al., 2000) satisfactorily, we are left with an incomplete picture of the development of knowledge structures. We suspect this picture will require complex, multilevel models (to be discussed later) that incorporate individual, group, and environmental influences and are sensitive to local organizational conditions. Disentangling the effects of antecedents and organizational learning (Huber, 1991) on the development of strategy frames remains a crucial research issue for the future.

Theoretical puzzles. Two theoretical puzzles stand out. The first pertains to the linkage between strategy frames and strategy formulation. The literature has suggested that strategy frames influence strategy formulation, but case studies also suggest that under certain conditions scanning can break existing strategy frames. Theoretical and empirical works need to identify the process of frame breaking and the conditions under which it occurs.

Second, the extant literature views strategic action as mediating the linkage between SC structures (primarily strategy frames) and performance. However, performance feedback can, in turn, also alter SC structures. Further, there is evidence in the literature for different linkages between cognitive and behavioral changes. Behavioral change may induce cognitive change, each may occur independent of the other, or they may be reciprocally related (Bartunek, 1984; Inkpen & Crossan, 1995; Leroy & Ramanantsoa, 1997). Eliciting the conditions for different kinds of linkages is a needed future direction.

Implicit assumptions. The SC literature has assumed that decision makers or organizations work with *unitary* strategy frames or organizational identities. But strategy frames are domain specific, CEOs and organizations may indeed hold multiple strategy frames, and they may switch from one frame to another depending on various triggers (Gilbert, 2006; Louis & Sutton, 1991). Indeed, switching between frames may be different from the frame breaking identified in the strategy formulation literature. Similarly, organizational identity is differentiated by level or region (Corley, 2004; Geppert et al., 2003), but there may also be multiple identities (Corley, 2004). Theoretical possibilities opened up by relaxing the assumption of a single frame or organizational identity are often overlooked in much of the literature. We may be theoretically better off by adopting a position that we can only get a partial glimpse of strategy frames or identity, and these glimpses are context dependent and purpose driven. Such a position may be conceivably developed if we assume that decision makers (organizations) work with a number of partially linked strategy frames (identities), each frame (identity) being activated under different conditions.

Methodological Implications for Future Work

Although many of the themes identified by Rajagopalan et al. (1993) continue to have relevance for SC literature, our review reveals three additional implications pertaining to constructs, measures, and research designs.

Construct validity. Since researchers have pursued the characteristics of SC structures and processes of interest to them, there have been limited efforts to assess the construct validity

of key concepts employed in the literature. As an illustration, Shrivastava and Schneider (1984) identified five elements of cognition—cognitive elements, cognitive operators, reality tests, domain of inquiry, and articulation and codification—using the work of Holzner and Marx (1979: 102-103). The first two elements address the content, structure, and reference points of strategy frames at the individual level, and the degree of articulation addresses group and organizational levels. In the SC literature, neither strategy frames nor organizational identity incorporates reality tests or domain of inquiry. This is true for other elements of SC as well. A key methodological challenge, therefore, is to pay attention to construct validity so that we can accumulate the findings meaningfully.

Measures. Since SC has benefited from scholars operating at different levels of analysis, one unintended consequence has been the use of *similar measures* in empirical research at different levels. For example, annual reports have been used to capture cognition at the firm level (e.g., Barr & Huff, 1997) and in other cases as the cognition of the CEO (e.g., Short & Palmer, 2003). Since levels represent interrelated phenomena, one should expect some overlap among constructs that are operationalized at different levels. That is, sharply differentiating individual CEO cognitions from TMT or organizational cognition, and organizational from industry, will continue to be challenging; nonetheless, a significant challenge for future work is to sort out measurement approaches at each level.

Research designs. Our review suggests that SC research designs should be sensitive to contextual and multilevel influences. In a recent essay, Bamberger (2008: 841) underscored this insight for the management field in general, highlighting the need to incorporate context directly into theories and urging scholars to "sacrifice comforts afforded by staying within that paradigm most tightly linked to the phenomena of interest, identifying surrounding (higher level) or nested (i.e., lower level) phenomena associated with other paradigms that are likely to influence their focal constructs or relationships." The SC literature will be strengthened by multilevel studies that allow for incorporation of insights from different levels. Also, SC may benefit from complementing the search for general theories with an approach that seeks to delineate SC in different contexts (cf. Bamberger, 2008). These contextual differences may be captured by industry velocity, periods of innovation or of technology emergence, or different stages of a firm (Galbraith & Nathanson, 1980). The SC literature is well positioned to exploit this strategy by focusing on theories at multiple levels that share a cognitive agenda.

Engaging the Ongoing Theoretical Conversations

SC development during the past decade has benefited from the legacy of several established theories that could be leveraged in empirical studies. As the cognitive stream reaches maturity, it may be possible to engage the ongoing theoretical conversations in strategic management. We illustrate this possibility with three examples.

Competitive dynamics. SC scholars are uniquely positioned to contribute to theories of competition that lie at the heart of competitive strategy. Empirical analyses of the dynamics

of competition have focused primarily on strategic actions (e.g., Chen, 1996; Chen & Hambrick, 1995) to the exclusion of cognitive issues. Both in game theory and in its use by Porter (1980) in his prescriptive model of competitor analysis, "understanding competitors" is a key activity. By definition, this is very much a cognitive process. How the cognitive process evolves over the course of competitive dynamics is an important question that deserves close attention by SC scholars. This line of work could benefit from the fully elaborated models of competitive dynamics (Chen, Su, & Tsai, 2007) now available in the literature and could be accomplished through the employment of causal mapping from archival sources of data. Also, SC scholars are well positioned to sketch the asymmetric competition between large and small firms. Cognition scholars have not yet portrayed the cognitive processes that enable small firms to outwit their large rivals through disruptive technologies (Christensen, 1997). SC research not only can benefit from but also can enrich this literature by providing a nuanced view of this competition.

Complementarities of strategy as practice. SC also can enhance the theoretical conversations currently taking place in the emerging strand of strategy as practice. During the past few years, strategy as practice has witnessed significant scholarly activity (Jarzabkowski, Balogun, & Seidl, 2007). SC shares with this group of scholars a fundamental belief in the primacy of human agency in the construction and enactment of strategy. It is clear that this approach is best conceptualized as a complement to SC (Whittington, 2006). Conversely, given the commonality of some key fundamental beliefs, SC scholars will find it useful to examine cognition embedded in strategy as practice, to the mutual benefit of both theoretical perspectives. Efforts such as the dual-process framework (Hodgkinson & Clarke, 2007) illustrate some of these possibilities.

Link to competitive advantage. The development of the literature to date has brought us to the doorstep of tracing competitive advantage to the structures and processes of cognition. During the past decade, resource-based views (Barney, 1991), which have gained prominence in the strategic management literature, have suggested that resources and capabilities are the source of firms' competitive advantage. The SC perspective has a natural affinity with these views, which may facilitate theoretical development more easily than in the case of industrial organization economics. These structures of cognition explain the heterogeneity of decisions made in organizations and, consistent with the dynamic capabilities view (Teece, Pisano, & Shuen, 1997), the emergence and operation of capabilities (Narayanan, Colwell, & Douglas, 2009).

Managerial Implications

Thus far, we have mainly discussed the contributions and challenges ahead with respect to strategic management *theory*. However, the cognitive perspective on strategic management also holds a real and tangible promise to inform strategic management practice.

First, in the complex environment of the 21st century, the management of large diversified firms continues to pose great challenges. Recently, Lampel and Shamsie (2000) demonstrated

how the development of a strategy frame (or in their words, "dominant logic"; Prahalad & Bettis, 1986) can help firms to reconcile the need for direction and control at the corporate level with the need for flexibility and speed at the business-unit level. Lampel and Shamsie showed how Jack Welch used a strategy frame as a corporate management tool and demonstrated empirically how the frame affected joint-venture decision making at General Electric.

Second, the cognitive research stream consistently finds evidence for the phenomenon of cognitive inertia (e.g., Abrahamson & Fombrun, 1994; Hodgkinson, 1997a; Reger & Palmer, 1996), perhaps as a result of strong organizational identities (Barney et al., 1998). Apparently, managerial frames often lag behind changes in the internal or external environment. This has important implications for management practice. Cognitive inertia is something managers need to pay attention to in order to avoid endangering their competitive position or missing opportunities. Intel is a classic example of a company that continued to invest in businesses (e.g., DRAM) long after they were no longer central to the company strategy because top management persisted in viewing Intel as a memory company (Barney et al., 1998; Burgelman, 1994). Similarly, Greyhound did not exploit its dominant position in parcel transport because it considered itself a bus company. Further, General Mills operated mills long after they were no longer of strategic importance (Barney et al., 1998). The lesson from all of these cases is that top managers need to be proactive in challenging their own often hidden assumptions and beliefs about the company, the environment, and the keys to competitive success. However, managers who can learn to recognize cognitive inertia in their competitors, or who can overcome industry-wide inertia faster than the competition, can exploit the situation to gain at least temporary or first-mover advantages.

Third, SC highlights the coordination function of shared cognition, thereby extending the list of coordination mechanisms enumerated by organization design scholars (e.g., Galbraith, 1977). For managers, language, concepts, and symbols are major implementation tools throughout the strategy implementation process.

Fourth, a very tangible outcome of the cognitive research stream within strategic management is the development of decision aids (e.g., causal mapping techniques) that help managers overcome cognitive biases and limitations in SDM (e.g., Eden & Jones, 1984; Hodgkinson et al., 1999). The usefulness of one of these techniques, namely, causal mapping, was recently empirically investigated by Hodgkinson et al. They found that a causal mapping intervention reduced framing bias (effects of framing potential outcomes of decision alternatives in positive or negative terms) in senior managers as well as in students, suggesting that cognitive decision aids can improve decision quality.

These selected examples highlight the practical value of the cognitive research stream within strategic management. As the theoretical development of the cognitive perspective continues to progress, we can expect more, and more concrete, recommendations for the practicing manager.

Conclusion

In this article, we have integrated the literature in SC within a framework that links SC to antecedents and outcomes, capturing SC by both its structure and process. We have identified

five empirical research streams from the literature and highlighted their contributions to strategic management theory and practice. We have argued that collectively this research forms a distinct cognitive perspective on strategic management. Finally, we have discussed some of the uncharted territories and unresolved issues that must be tackled if the cognitive perspective is to maximize its contribution to strategic management. Nearly two decades ago, Mintzberg (1990: 145) observed, "This school is characterized more by its potential than by its contribution." Today, the cognitive perspective is characterized by *both:* by significant contributions to strategic management and by considerable potential for future development and discoveries.

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