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Leadership and Emergent Collective Cognition*

Toshio Murase, Christian J. Resick, Miliani Jiménez, Elizabeth Sanz, and Leslie A. DeChurch

Leadership is ... about the ability to make others feel part of a larger thing. It’s part of being able to articulate the social architecture in a way that others can understand, believe in and follow.

—Kevin Sharer
CEO Amgen (quoted in Bryant, 2009, p. BU2)

Leadership plays a pivotal role in shaping and reshaping the cognitive states that emerge and underpin collective performance. Although both the leadership (e.g., Weick, 1995) and teams (Burke, Stagle, Salas, Pierce, & Kendall, 2006; Randall, Resick, & DeChurch, 2009) literatures have begun to explicitly examine the role of leadership in shaping collective cognition, these two research areas have progressed largely in silos. This chapter develops an integrated framework linking leadership functions to the emergence of collective cognition. We begin by examining the forms of collective cognition that have implications for collective-level success. Next, we propose that six forms of leadership are particularly important facilitators of collective cognition; for each type of leadership, we discuss specific mechanisms that facilitate the emergence of collective cognition and develop propositions intended to stimulate future research. We conclude with a discussion of the practical and theoretical implications.

* The views expressed in this work are those of the authors and do not necessarily reflect official Army or university policy.
EMERGENT COLLECTIVE COGNITION

In recent years, team cognition has become an increasingly central focus of team effectiveness research as both theory and empirical evidence underscore the important roles of team mental models and transactive memory systems for effective team performance. However, since Schneider’s (1975) seminal paper on organizational climate, researchers have been examining the emergence and implications of team or organizational members’ shared perceptions of work environmental factors. A central tenet of this line of theory and inquiry is that the perceptions and knowledge held by individuals emerge to become a property of a team (or even organization) as members interact with one another. These shared perceptions and shared knowledge serve to regulate members’ behaviors and enable individual members to function as a unified entity.

Twenty years of team effectiveness research definitively links team cognitive architectures to their performance capacity (DeChurch & Mesmer-Magnus, 2010a). Although the relationship is moderated by specific underpinnings of cognition, DeChurch and Mesmer-Magnus (2010b) found that team cognition contributes uniquely to team performance after controlling for behavioral processes such as coordination and backup behavior (Marks, Mathieu, & Zaccaro, 2001) and motivational states such as cohesion (Gully, Devine, & Whitney, 1995). The field we now describe under the lexicon of team cognition actually grew out of three relatively independent research streams: the first one on shared team mental models (Cannon-Bowers, Salas, & Converse, 1993), the second one on team transactive memory (Liang, Moreland, & Argote, 1995), and the last one on organizational climate (Schneider, 1975).

In reflecting back on the discovery of mental models in teams, Eduardo Salas remarked that, “20 years ago we began a long journey to understand teams and team performance in naturalistic environments ... we were perplexed why some teams under heavy workload could still maintain performance without communicating. Our explanation was—they have a shared understanding of what is going on and what needs to happen; they have a shared mental model” (E. Salas, personal communication, September 8, 2009).

Indeed, since Salas and his colleagues demonstrated both conceptual and empirical utility of shared mental models (SMRs), the importance of shared memory in teams has been documented (Argote, & Krishnan, 1999). Shared mental representations are “a set of knowledge relevant to the task that is distributed among team members, coupled with a distribution of knowledge of this set of knowledge. Through social interaction, participants in a team (Hinsz, Tindale, & Wittenbaum, 1995) draw on the knowledge of all members to have better coordination, where individual members are able to contribute specific expertise, and all members work as a unified team” (Lewis, 2003).

Team climate is the perception, attitudes, and shared beliefs of team members in the team environment and interaction with the environment (Schein, 2000). The team climate literature emphasizes the role of team-level perceptions and shared beliefs, which can be emphasized such as service climate (Ehrhart, Mayer, Saltz, & Williams, 2004).

Although these research streams have significantly advanced advancement and understanding of team cognition, they offer diagnostic and prescriptive capabilities to clinicians and coaches. They offer diagnostic capabilities for teams to assess their current level of team cognition: nature of emergent cognition. Of the three, the nature of emergent cognition: nature of emergent cognition. Of the three, the nature of emergent cognition: nature of emergent cognition.
Indeed, since Salas and colleagues' original observations, a deluge of both conceptual and empirical research has investigated the role of thinking alike in integrated team performance.

At around the same time, Moreland and colleagues were developing the team transactive memory concept—an extension of Wegner's 1986 notion of shared memory in romantic couples (Liang et al., 1995; Moreland, Argote, & Krishnan, 1996). Transactive memory consists of a differentiated set of knowledge relevant to the team's task that is distributed across team members, coupled with an understanding of who possesses particular sets of knowledge. Through this collective system for encoding and retrieving information, teams have access to a large body of information because members specialize in particular subsets of information needed for teamwork; essentially, this increases the information-processing capacity of the team (Hinsz, Tindale, & Vorrath, 1997). Team transactive memory has been empirically linked to better team processes by allowing team members to have better coordination, reducing the amount of information that individual members are responsible for by knowing which members have specific expertise, and aiding in the sharing of task-relevant information (Lewis, 2003).

Team climate is the perception about the group environment that is shared among team members and develops through socialization and interaction with the environment and one another (Lindell & Brandt, 2000). The team climate literature has demonstrated relationships between team-level perceptions and specific behaviors that those perceptions emphasize such as service-oriented and safety behavior (e.g., Schneider, Ehrhart, Mayer, Saltz, & Niles-Jolly, 2005; Zohar & Livia, 2004).

Although these research streams developed somewhat independently, they offer diagnostic and predictive capability in teams. As an integrated construct, team cognition encompasses various arrangements of knowledge that teams use "to make sense of, attribute meaning to, and interpret internal and external events, including affect, behavior, and thoughts of self and others" (Rentsch, Small, & Hanges, 2008, p. 144). A recent meta-analytic integration synthesized these previously disjointed research streams on various emergent cognitive constructs (DeChurch & Mesmer-Magnus, 2010b) in terms of three meaningful underpinnings of team cognition: nature of emergence, form of cognition, and content of cognition. Of the three, the nature of emergence was the most critical moderator of relationships between shared cognition and team performance.
Nature of Emergence

Team cognition originates in team members' (i.e., individual-level) patterned knowledge. In this way, it can be characterized as a bottom-up emergent construct, where new meaning is present at the team level beyond what was apparent in the individual-level cognitive content (Kozlowski & Klein, 2000). Kozlowski and Klein (2000) distinguish different forms of emergence according to the extent to which the higher level emergent construct is different, nonsomorphic in form and function, and patterned in comparison to the individual or lower level content from which it originates. The nature of emergence is a critical distinction between team mental model research and transactive memory research. In essence, these two approaches to the study of team cognition represent different types of emergence. The team mental model concept represents compositional emergence; here, the structure of cognition at the individual level is similar in form to the structured arrangement of cognition examined at the team level. In contrast, team transactive memory represents compilational emergence; the knowledge held by individuals is not patterned in the same way as it is at the team level. The team transactive memory system is composed of individuals' knowledge sets, but the meaningful team-level construct reflects the patterned, differentiated knowledge.

Composition variables are often aggregated using the sum or average of the components from each individual, with researchers justifying the aggregation of such scores due to high interrater agreement indices (Klein & Kozlowski, 2000). This type of emergence has been criticized as having "limited the development of bottom-up multilevel theory and research" (Kozlowski & Klein, 2000, p. 5). In contrast, compilation variables are different at higher levels of analysis than at lower levels of analysis (i.e., individual level). Compilation variables arise from the pattern of cognition among members rather than a simple aggregate. The components of cognition serve the same purpose at each level; however, they are not the same in pattern. Compilation variables are often aggregated using the distribution of component scores, such as the variance of individual scores for a particular component. Importantly, the meta-analytic study by DeChurch and Mesmer-Magnus (2010a) found stronger relationships between cognition and team behavioral processes and performance when cognition was measured as compilational emergence as compared to compositional emergence.

Form of Cognition

Rentsch et al. (2008) posited that team cognition can be classified: personal, transactive, and team cognition (DeChurch & Mesmer-Magnus, 2010b, p. 12; Rentsch et al., 2008). The nature of team cognition is that it does not exist among different constructs and is more of a reaction to stimulus. One example of perceptual cognition is measured climate as a composite of situational readiness to realize the value of completing a task and the patterning of shared perceptions and strength of activity (Lindell & Brandt, 2006; Lindell & Brandt, 2006; Walumbwa & Schaubroeck, 2002). Other examples of perceptual cognition are tokenism (Rentsch et al., 2008)

Structured cognition has been represented by the patterned activities of the actions of the team, and the knowledge or cognition that occurs when individuals or teams are combined to provide a sense of situations and structures (Rentsch et al., 2008). This would be team mental models (Cannon-Bowers, 2000) and Lewis's (2010) model. A recent model has revealed that structured cognition processes are the perception of team cognition that is structured and structured cognition works...
Form of Cognition

Rentsch et al. (2008) posited that there are three categories in which cognition can be classified: perceptual, structured, and interpretive. Although most of the literature to date has examined perceptual and structured cognition (DeChurch & Mesmer-Magnus, 2010b), each form of cognition adds to our understanding of how teams function in dynamic environments.

Focus on team members' beliefs, values, attitudes, perceptions, and expectations is referred to as perceptual cognition. This form of cognition draws from team members' past experiences/observations as the basis for such knowledge construction and is shaped through interactions with one's team members and environment (DeChurch & Mesmer-Magnus, 2010b, p. 12; Rentsch et al., 2008). However, a shortcoming of perceptual cognition is that it does not allow researchers to examine relationships among different constructs (i.e., structure) because perceptual cognition is more of a reaction to stimuli (e.g., event, person, entity). Climate is an example of perceptual cognition. Although most extant research has measured climate as a compositional variable, researchers are beginning to realize the value of compositional variables, and more research examining the patterning of shared perceptions is focusing largely on the direction of perceptions and strength of perceptions (e.g., Dickson, Resick, & Hanus, 2006; Lindell & Brandt, 2000; Schneider, Salvaggio, & Subirats, 2002). Other examples of perceptual cognition include psychological safety (e.g., Walumbwa & Schaubroek, 2009) and perceived similarity (e.g., Huang & Iun, 2006).

Structured cognition has an underlying organizational scheme and is represented by the patterning of knowledge organization, which provides information on cognitive linkages. Schemas are a type of structured knowledge or cognition that direct an individual's attention toward critical pieces of information and enhance an individual's ability to make sense of situations and stimuli based on previously developed mental architectures (Rentsch et al., 2008). Examples of structured cognition would be team mental models (e.g., Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000) and transactive memory systems (e.g., Austin, 2003; Lewis, 2003). A recent meta-analysis of team mental model studies revealed that structured cognition is more predictive of teamwork processes than perceptual cognition; however, both perceptual cognition and structured cognition were equally predictive of team performance.
task procedures, if–then statements, and task component relationships. Moreover, the content knowledge is critical to understanding how to change.

A third content of cognition is the environmental content in recent years. Strategic mental models represent the shared understanding of the environment and the strategic content, such as strategic plans and goals important to the overall plan while also important indicators of team effectiveness is the degree to which teams accomplish its goals. In additional, the team effectiveness is also important indicators of team effectiveness (e.g., Sundstrom, DeMeyer, 2006; Sundstrom et al., 1992) and the relationships between cognitive complexities (e.g., Day, Arthur, & Bell, 2006).

COGNITION, LEADERSHIP, AND TEAM EFFECTIVENESS

The effectiveness of collective action involves the construction of collective knowledge and beliefs as team members work together to achieve goals. Cognitive processes are essential to understanding how teams make sense of the environment and how they interact with each other. The effectiveness of collective action is influenced by the way team members interact and how they coordinate their efforts to achieve common goals. In addition, the role of leadership is critical in shaping team cognition and cognitive processes, which have been identified as critical to performance.
Church and Mesmer-Magnusce exhibited a stronger rela-
gition was structured rather
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task procedures, if-then scenarios, task strategies, task-relevant situations, and task component relationships. As noted by Mathieu et al. (2000), task content knowledge is critical when tasks are dynamic and are susceptible to change.

A third content of cognition, strategic, has been receiving more attention in recent years. Strategic cognition, or strategic consensus, is “the shared understanding of strategic priorities among managers at the top, middle, and/or operating levels of the organization” (Kellermanns, Walter, Lechner, & Floyd, 2005, p. 721). Said another way, strategic consensus refers to the strategies that are to be enacted to reach the team’s goal. Research on strategic content has typically been performed using top management teams. Research has found that not only is a shared understanding of the plans and goals important, but also a shared understanding of the reasoning behind such plans is needed in order for managers to act according to the overall plan while not directly in contact with upper management (Kellermanns et al., 2005). Furthermore, among knowledge-based teams, Randall et al. (2009) found that both the similarity and accuracy of team strategic mental models were predictive of adaptive performance. This brings us to the effects of collective cognition on outcomes beyond team processes, which have been previously noted.

COGNITION, LEADERSHIP, AND EFFECTIVENESS

The effectiveness of collectives is a complex, multidimensional construct involving performance outcomes, behavioral processes such as adaptability, and beliefs such as team satisfaction or viability (Kozlowski & Ilgen, 2006; Sundstrom, DeMuse, & Futrell, 1990). One important indicator of team effectiveness is the extent to which the team is successful at accomplishing its goals. In addition, the team’s ability to successfully coordinate efforts, back each other up, and remain a viable entity in the future are also important indicators of collective effectiveness (Kozlowsky & Ilgen, 2006; Sundstrom et al., 1990). A number of studies have examined the relationships between compositional collective cognition (e.g., Edwards, Day, Arthur, & Bell, 2006; Marks, Sabella, Burke, & Zaccaro, 2002; Resick, Dickson, Mitchelson, Allison, & Clark, 2010) and compositional collective cognition (e.g., Austin, 2003; Lewis, 2003; Zhang, Hempel, Han, &
COGNITIVE ASPECTS OF LEADERSHIP THEORIES

Although numerous leadership theories and approaches submit that leaders influence collective perception and similar cognitive constructions, research on leadership has not yet fully incorporated the advances of team cognition in their empirical inquiry. The next section delves into the five approaches to leadership that have strong theoretical connections to emergent collective cognition. Table 5.1 summarizes the leadership literature and distinct cognitive aspects of the five major theories discussed in the following section.

Behavioral Perspectives

Seminal studies of leadership were conducted by researchers at Ohio State University and University of Michigan, separately, that identified
agnus (2010a) meta-analyzed forms on team performance on is strongly related to both ance indicators. Overall coeffi- emergence are .26 and .42 for objective performance, respec-
different factors such as study levels.
been searching for factors that tion. Among many, leadership sence both collective cognition & Marks, 2001). However, the s found to be more focused on han collective process (Kaiser, hip scholars have defined lead-
tive action in order to achieve s not been alignment between uated knowledge. Research on eam effectiveness through col-
cid but promising area.


theories
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similar cognitive constructions, incorporated the advances of The next section delves into the rong theoretical connections to ummarizes the leadership litera-
five major theories discussed in
ducted by researchers at Ohio agan, separately, that identified

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<td><strong>Cognitive Aspects of Five Major Approaches to Organizational Leadership</strong></td>
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<th><strong>Forms of Leadership</strong></th>
<th><strong>Forms of Cognition Contained in Theory</strong></th>
<th><strong>Summary of Prior Findings</strong></th>
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<tr>
<td><strong>Behavioral</strong></td>
<td>Specific behavioral dimensions influence different types of cognition development such as mental models, team norm, and role ambiguity.</td>
<td>Schneider, Ehrhart, Mayer, Saltz, and Niles-Jolly (2005) found a link between leader behavior emphasizing service climate and staff service-oriented climate. DeChurch, Marks, and Murase (2009) found that leader strategy and coordinating behavior impacted mental model similarity in multiteam systems.</td>
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<td><strong>Strategic</strong></td>
<td>Strategic leadership facilitates followers' identification with a collective level and development of understanding of critical issues among subsystems.</td>
<td>Fiss and Zajac (2006) found that leader sensemaking influenced cognitive frameworks. Wahbumba and Schaubroeck (2009) found that strategic leader ethical leadership influenced the development of psychological safety. Randall, Resick, and DeChurch (2009) found that external leader sensegiving influenced team strategy-focused mental model similarity and accuracy.</td>
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<tr>
<td><strong>Transformational</strong></td>
<td>Transformational leaders encourage followers to self-identify with the task and collective goals and share vision.</td>
<td>Schippers, Den Hartog, Koopman, and van Knippenberg (2008) found that transformational leadership was related to the formation of a shared vision.</td>
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### TABLE 5.1 (CONTINUED)
Cognitive Aspects of Five Major Approaches to Organizational Leadership

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<td><strong>Functional</strong></td>
<td>Functional leadership entails the cognitive leadership process of surveying group conditions and information to design plans and consistently negotiate group conditions (Kane, Zaccaro, Tremble, &amp; Maruda, 2002).</td>
<td>Marks, Zaccaro, and Mathieu (2000) found that leader briefings influenced the accuracy and similarity of team members’ mental models.</td>
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<tr>
<td><strong>Shared Team Leadership</strong></td>
<td>Team members need to have some form of shared understanding/consensus of their fellow team members’ specialized expertise. It is through this shared understanding of each other’s expertise that team members will be willing to trust a team member who takes on the leader role during a task.</td>
<td>Hiller, Day, and Vance (2006) found that shared leadership influenced collectivism attitudes.</td>
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Two dimensions of leader behavior are termed Initiating Structure (I) and Consideration (C). University of Michigan, they show support and acceptance, which indicates behavior aimed at organizational outcomes including organizational performance, subordinates' adaptability, Aditya, 1997; Judge, Piccolo, & Colquitt, 2002).

Also influential in the domain of leadership is specifying more narrowly defined leadership behaviors (Yukl, 2002). Yukl et al. (2002) have identified two major dimensions, and Fleishman et al. (1991) have defined and developed a similar cognitive model to describe three behaviors that synergize planning and organization, clarify roles and responsibilities. These behavioral categories are the core of Fleishman et al. (1991) behaviors: planning and organizing. These behavioral categories are making followers’ cognition. In turn, these cognitive variables are thought to influence leadership behaviors.

Role clarification is defined as the sharing of group goals (Yukl, 2002). Planning involves objectives, priorities, assignments of activities (Yukl, 2002). Once teams understand their unique function and directions, they can exert energy. However, leaders must coordinate specialties. In planning, members need to be clear in what functions and how they fit into different points. Recognition of memory because in a planning context, the leader has a unique role and how they are connected.
two dimensions of leader behavior. At Ohio State, these dimensions were termed Initiating Structure (IS) and Consideration (C), whereas at the University of Michigan, they were termed relationship oriented, which shows support and acceptance of subordinates, versus task oriented, which indicates behavior aimed at attainment of the group's goal. These dimensions of leader behavior are positively linked to many valued organizational outcomes including subordinate performance, group and organizational performance, subordinate job attitudes, and turnover (House & Aditya, 1997; Judge, Piccolo, & Ilies, 2004).

Also influential in the domain of leader behavior are taxonomic efforts specifying more narrowly defined behaviors (Yukl, Gordon, & Taber, 2002). Yukl et al. (2002) have proposed a taxonomy of 12 behavioral dimensions, and Fleishman et al. (1991) developed 13 behavioral categories. Both the Yukl et al. (2002) and Fleishman et al. (1991) taxonomies include behaviors that guide followers to understand the environment and develop a similar cognitive schema. In particular, Yukl et al. (2002) describe three behaviors that should promote collective cognition: planning and organization, clarifying roles and objectives, and informing. Similarly, Fleishman et al. (1991) include two emergent cognition-relevant behaviors: planning and coordinating and communicating information. These behavioral categories are directly aimed at influencing and changing followers' cognition. In turn, the teams literature provides various cognitive variables that make theoretically sound linkages to those leadership behaviors.

Role clarification is defined as specifying responsibilities and setting up goals (Yukl, 2002). Planning is defined as making decisions about objectives, priorities, assignments of responsibilities, and coordination of activities (Yukl, 2002). Once leaders have identified separate, distinct actions, they must develop a plan that considers timely coordination (Morse & Wagner, 1978). Leaders and members must clearly understand their unique function and contribution to the team. With clear directions, they can exert energy on information critical to their roles. However, leaders must coordinate such individuals with different specialties. In planning, members recognize which members are specialized in what functions and how they should coordinate with one another at different points. Recognition of interdependence improves transactive memory because in a planning process, members must understand each unique role and how they are connected to accomplish a mission (Zhang
et al., 2007). In addition, leaders must manage information internal and external to the team. Identifying and relaying appropriate information to members enhances coordination timing and members' unique roles. As the environment changes, leaders need to update their agenda and develop a new coordination plan. As they adjust their plans, leaders must engage in communication with members to alter their collective cognitions and make them fit the changing environment (Morgeson, 2005). Leaders must allocate information to the right members based on their responsibilities to avoid having members cognitively overloaded (Littlepage, Hollingshead, Drake, & Littlepage, 2008). As members obtain unique information that may not be shared with others, their cognitive schema will be altered. These three leader behaviors interact with each other to create conversion and differentiation in members' knowledge at the team level.

**Proposition 1:** Team leader planning behavior positively influences team members' development of task-, team-, and strategy-focused compositional forms of emergent cognition.

**Proposition 2:** Team leader role clarification behavior positively influences team members' development of compositional forms of emergent cognition.

**Proposition 3:** Team leader informational communication behavior positively influences team members' development of task-, team-, and strategy-focused compositional forms of emergent cognition.

**Strategic Leadership**

Understanding the impact of strategic leadership is a core goal of organizational science research because senior executives can and do have a company-wide impact and mistakes can lead to catastrophic consequences. Strategic leadership theory and research focus on individuals at the apex of an organization, and topics can range widely from traits to behaviors to even the succession process (e.g., Jensen & Zajac, 2004; Nutt, 1987; Tushman & Rosenkopf, 1996). Upper echelon theory and an argument for legitimizing the use of observed data of executives' traits by Hambrick and Mason (1984) have spawned many studies that explore how top managers' traits influence their actions. Researchers have found empirical evidence that the characteristics and actions of strategic leaders are related to more disequilibrium, resources, performance, as well as the relationships within the organization (e.g., Nadler, Smith, Martorana, & Gates, 2010; Hiller, 2009).

Strategic leaders must consider their constituents at multiple levels (Eisenhardt, 2001). Formulating effective strategies involves constructing a collective sense of a collective action. Cognitions are formed in at least two stages. First, leaders and managers focus on different aspects of collective diversity among top leaders and generate and extend strategies. In addition, companies with competitive consequences if the leader does not manage them at the operational level. The main function of strategic leadership is the recognition of strategic patterns among constituents and strategies. Executives must also recognize and cultivate collective intelligence (e.g., Arrow, 1993) to maintain and bring about synergizing new policies and resources in dynamically changing environments (Zajac, 1997).

Sensegiving and development are strategic mechanisms that enhance the team on critical issues. Executive leaders' development allows them to influence the convergence of their cognitive schema (e.g., the understanding of priorities and goals; Zajac, 1990). Executive leaders are often making certain collective cognitions about their culture (Kaplan et al., 2009; Schein, 2004).

A culture is a set of shared values, beliefs, and norms that determine the routines, practices, and behaviors of team members.
are related to more distal outcomes such as firm strategy and performance, as well as the relationships with and the performance of teams within the organization (e.g., Chatterjee & Hambrick, 2007; Peterson, Smith, Martorana, & Owens, 2003; Resick, Whitman, Weingarden, & Hiller, 2009).

Strategic leaders must coordinate actions and effort from multiple constituents at multiple layers to attain organizational outcomes (Lord, 2001). Formulating effective strategies is important but not sufficient. Constructing a collective mental schema is equally as necessary for any collective action. Cognitive diversity influences effectiveness of strategy at least in two stages. First, members at the top have diverse functions, which lend them different lenses to view the business world and make them focus on different parts of information. Studies show that cognitive diversity among top managers inhibits development of comprehensive and extensive strategic planning (Miller, Burke, & Glick, 1998). In addition, companies with well-developed strategies sometimes face negative consequences if they cannot implement them. Middle and first-line managers must understand the meaning of strategies in order to implement them at the operational levels (Balogun & Johnson, 2004). Thus, the main function of strategic leadership is to develop similar, collective cognition among constituents at different levels and cultivate support for strategies. Executives must provide a vision and framework (Balogun & Johnson, 2004; Fiss & Zajac, 2006; Rapert, Vellquette, & Garretson, 2002) and cultivate collective identity (Lord & Brown, 2001; Shamir, House, & Arthur, 1993) to maintain and orchestrate subsystems while institutionalizing new policies and regulations and developing adapting structures to dynamic environments (Bernard, 1938).

Sensegiving and development of culture have been found to be important mechanisms that enhance convergence of individual cognitive schema on critical issues. Executives' vertical communication with top middle managers allows them to be involved in strategic planning, enhances convergence of their cognitive schema with top managers, and improves the understanding of priorities (Rapert et al., 2002; Wooldridge & Floyd, 1990). Executive leaders also use culture as a vehicle to develop and maintain certain collective cognitive patterns in their organizations (Giberson et al., 2009; Schein, 2004).

A culture is a set of socially constructed rules and values shared by members that determines thought process, perceptions, and behaviors
the ability to influence collective cognition (Giberson et al., 2009) and unit climate by networking (Gazi, 2008). Schippers, Den Hartog, (2008) and Jansen, George, Van der Vegt, and Frings (2006) found that leaders who engaged in TL behavior enhance collective cognition. Furthermore, because these behaviors have been found to impact followers' cognitive schemas, their organizations (Resick et al., 2005) may have a cascading effect on teams throughout the firm.

Although many studies have investigated the impact of TL on followers' collective cognition, the evidence that promote team outcomes by encouraging followers to adopt a shared vision, it does not fully encompass what is considered the more commonly studied TL behavior: providing leadership for others to develop, and create a shared vision among team members which simply implies that a leader persuades team members to align with his or her vision, but it does not necessarily mean that the process as the degree of agreement between followers adopt is accurate. Future research should focus on the extent and nature of the effects of TL behaviors on collective cognition.

**Proposition 5:** TL behaviors positively influence team members’ strategy-focused compositional and perceptual forms of emergent cognition.

**Functional Leadership Theory**

Functional leadership has been defined and often neglected in the traditional leadership literature (Walumbwa, & Weber, 2009; Hooijberg et al., 2009). A functional approach to leadership suggests that fulfillment of team needs in order to achieve group goals is the key to effective leadership (Zaccaro et al., 2001). Unlike traditional leadership theories, functional leadership theory posits that effective leadership can be fulfilled by any member who...
have shown that leaders play a significant role in shaping culture (Giberson et al., 2009; Lau, 2015). Leaders use culture as a tool to send values and to integrate individual members in an organization. Members in an organization determine whether behaviors or their values that influence collective cognition (Baum, Bardes, & Salvador, 2009; Jansen, George, Van den Bosch, & Volberda, 2008) found that leaders who engaged in TL behaviors had followers with similar team vision. Furthermore, because transformational leadership may have a cascading effect on leadership at lower levels and teams throughout the firm.

Although many studies have looked at the mechanisms leaders influence that promote team outcomes, the linkage between TL and followers' collective cognition has yet to be investigated. Although shared vision encompasses followers adopting a leader's vision and working toward that vision, it does not fully encompass collective cognitive processes. One of the more commonly studied TL behaviors is the ability for TL to influence and create a shared vision among followers. We argue that shared vision simply implies that a leader persuades or encourages the follower to agree with his or her vision, but it does not incorporate important aspects such as the degree of agreement between followers or whether the vision followers adopt is accurate. Future research should focus on the impact TL behaviors have on collective cognition and, more specifically, how leaders who inspire a shared vision among followers can help teams develop collective cognition.

**Proposition 5:** TL behaviors positively influence team members' strategy-focused compositional forms of emergent cognition.

**Functional Leadership Theory**

Functional leadership has been developed uniquely in the teams literature and often neglected in the traditional leadership literature (e.g., Avolio, Walumbwa, & Weber, 2009; House & Aditya, 1997). The main distinction from other leadership approaches is its focus on leadership behaviors that fulfill team needs in order to attain goals instead of traditional leadership definitions focusing on what leaders should do (Morgeson, 2005; Zaccaro et al., 2001). Unlike traditional models of leadership, this role can be fulfilled by any member who is capable of executing requirements for
the team function (Lord, 1977; Morgeson, Lindoerfer, & Loring, 2009). Relative to the other leadership approaches, the literature is still scant. More research is necessary to fully understand what behaviors functional leaders engage in and how members occupy this role or share it.

Researchers have proposed different models that indicate linkages to collective cognitive processes. Lord (1977) has proposed 13 behavioral dimensions for task-related and socioemotionally related behavior, and Morgeson et al. (2009) have identified 13 behavioral dimensions based on the team taxonomy of Marks et al. (2001), whereas Zaccaro et al. (2001) have used Fleishman et al.'s (1991) 13 behavioral dimensions to explain linkages to collective cognition. Among these models, we find substantial overlap of distinct functional behaviors that can be linked to collective cognition. They recognize the importance of planning and sensemaking and identification of problems and needs. Zaccaro et al. (2001) have explicitly delineated theoretical linkages between these behaviors and team cognitive processes such as shared mental models, collective information sharing, and team metacognition. Other research suggests that functional leadership leads to enhanced convergence on collective cognition (Marks, Zaccaro, & Mathieu, 2000; Morgeson et al., 2009).

Studies have supported the effect of functional leadership on collective cognition. Mission analysis provides a main framework within which members form expectations, priorities, and tasks. Identification with leaders makes members accept the same understanding of strategy and priorities. Like other leadership approaches, sensemaking behavior and the leader exchanging information with followers process help develop similar understanding of priorities (Donnellon, Gray, & Bougon, 1986; Morgeson, 2005). The teams literature has provided empirical support for direct effect of leader's behaviors on collective cognition. Because members have unique cognitive schema due to their functional training and experiences, it is important for them to construct a similar mental model that guides the coordination of their actions effectively (Mathieu et al., 2000). Leader briefing behavior has been found to influence the development of shared mental models in teams and multiple teams (DeChurch, Marks, & Murase, 2009; Marks et al., 2000). In addition, teams must work as a unified entity in a dynamic environment. As the environment changes, they must change their patterns of coordination and adapt (Harrison, Mohammed, McGrath, Florey, & Vanderstoep, 2003). Thus, leaders must clarify any confusion about mental change and develop a sensemaking approach (Lant & Hewlin, 2002). With leaders that can all share to into the team cannot function (Lant & Hewlin, 2002). Because functional leadership satisfies team needs (Morgeson et al., 2009) for the theoretical linkages on the leadership approach. Functional leadership satisfies the needs of members and show important by engaging in role clarification.

Proposition 6: Team leaders involving (a) mission analysis, (b) influence team members, (c) focused compositional forms, and (d) emergent forms of emergent cognition.

Shared and Distributed Leadership

With the prevalence of work teams, the concept of leadership have become complex, beyond the conventional view of leadership as a leader by a more established leader or shared leadership is viewed in a collective take on or transfer responsibility in order to take advantage of each team member's expertise contributions. In other words, the leadership is the needs of the team at a specific time, member's expertise contributes, “steps up” and takes on the leader.
Thus, leaders must continuously schedule meetings where they can clarify any confusion about member roles that arises due to environmental change and develop a new strategic plan to facilitate coordination (Lant & Hewlin, 2002). Without a central member giving a framework that they can all share to interpret the environment in a similar manner, the team cannot function (Marks et al., 2000; Morgeson, 2005). Leader sensegiving has been found to positively influence the similarity and accuracy of strategic mental models, which in turn influence the extent to which teams adapt to a dynamic environment (Randall et al., 2009). Because functional leadership is defined in terms of behaviors that satisfy team needs (Morgeson et al., 2009), sources of empirical supports for the theoretical linkages overlap with those for the behavioral leadership approach. Functional leadership must differentiate specialty across members and show important issues on which members have consensus by engaging in role clarification and planning.

Proposition 6: Team leaders who engage in functional leadership behaviors involving (a) mission briefings, and (b) team preparation positively influence team members’ development of task-, team-, and strategy-focused compositional forms of emergent cognition and compilational forms of emergent cognition.

Shared and Distributed Leadership

With the prevalence of work teams in organizations, nontraditional forms of leadership have become commonplace. These forms of leadership go beyond the conventional view that a single member of a team is appointed as a leader by a more established member of the organization. For instance, shared leadership is viewed in team settings where multiple members of a collective take on or transfer the “leader” role among team members in order to take advantage of each member’s strengths in an effort to attain the overall team goal (Burke, Fiore, & Salas, 2003; Hiller, Day, & Vance, 2006; Pearce & Conger, 2002). In shared leadership, the empowerment of multiple team members is based on expertise relevance and context. In other words, the leadership is disseminated between members based on the needs of the team at a specific time in its life cycle. Thus, when a team member’s expertise contributes to the overall team goal, that individual “steps up” and takes on the leadership role. Similar to shared leadership is
distributed leadership, which acknowledges that leadership is composed of a collection of behaviors that can be rotated among the members of the group (Barry, 1991; Erez, LePine, & Elms, 2002). Distributed leadership does not require a member to emerge based on the expertise he or she possesses and how it contributes to the team goal. Instead, distributed leadership occurs when the team members dispose of it. It can come about when the existing leader is overwhelmed with his or her responsibilities, or it can be predetermined by the team, such as with a set schedule. Thus, distributed leadership enables team members to rotate leadership responsibilities, such as coordination and acting as liaisons to other teams (Erez et al., 2002).

Although new to the field of leadership, shared leadership and distributed leadership have been found to be associated with collectivism attitudes (e.g., focus on group welfare, success, and loyalty; Hiller et al., 2006). In addition, shared leadership and distributed leadership have been linked to a number of important team outcomes, such as increased organizational citizenship, member satisfaction, team effectiveness, and team performance (Carson, Tesluk, & Marrone, 2007; Erez et al., 2002; Hiller et al., 2006).

Limited research has focused on the relationship between shared and distributed leadership and collective cognition. Burke et al. (2003) proposed the influence of collective cognition on shared leadership, suggesting that the more team members have overlapping mental models, the stronger the team’s understanding of when a team member should rise as the team leader. Teams function in a complex network where diverse members contribute unique information to the decision-making task and thus require collaboration and coordination among these members for successful performance. The impact leaders can have in shaping the knowledge sharing, task understanding, and coordination within a team is a critical key that researchers need to investigate. Thus, how shared and distributed leadership can detract or contribute to team performance is another avenue that must be considered. Does the impact of having multiple leaders over time actually strengthen a team’s collective cognition, or do distinct perspectives actually break it down? We believe that as teams exchange leadership roles, they are more inclined to have a better understanding of other team members’ task responsibilities. This, in turn, will translate to the development of better collective cognitive processes.

Proposition 7: Shared and distributed leadership positively influence team members' collective cognitive processes.

Proposition 8: Shared leadership positively influences team members' collective cognitive processes.

APPLIED IMPLICATIONS

Stogdill (1950) defined leadership as "the qualities of an organized group that guide the achievement" (p. 4). Although the importance of leadership and training programs to improve one’s quality or skills to increase performance (Carson, Tesluk, & Marrone, 2007; Erez et al., 2002; Hiller et al., 2006).

Based on recent meta-analytic studies, the understanding of leaders’ influence on team processes must be complex and leader-centered. Leaders must possess collective cognitive mechanisms to coordinate the collective cognition of individual actions. Collective cognition is the sum of the collective actions and efforts to achieve the team's goals (DeChurch & Mesmer-Magnus, 2010). Drawing on Morgeson, DeRue, and Karau’s model, leaders must help members by defining the mission, establishing clear goals, and training for action. Training for collective cognition seems to be an important consideration (see Table 5.2 and Figure 8.1).
Proposition 7: Shared and distributed leadership within a team positively influence team members’ development of task- and team-focused compositional forms of emergent cognition.

Proposition 8: Shared leadership and distributed leadership within a team positively influence team members’ development of computational forms of emergent cognition.

APPLIED IMPLICATION

Stogdill (1950) defined leadership as “the process of influencing the activities of an organized group in its efforts toward goal setting and goal achievement” (p. 4). Although this classic definition explicitly recognizes the importance of leadership on collective actions, the leadership literature and training programs tend to focus on developing skills that enhance one’s quality or skills to influence followers’ affective components (Day, 2000; DeChurch, Hiller, Murase, Doty, & Rohre, 2009). Although these training programs improve leaders’ behaviors, the essence of leadership should be recognized in the extent to which leaders orchestrate followers’ actions and efforts to achieve a collective goal and orchestrate individual actions to achieve it.

Based on recent meta-analytic findings, we should expand our understanding of leaders’ influence beyond simply motivational and behavioral team processes (DeChurch & Mesmer-Magnus, 2010a). To achieve higher goals, leaders must realize or be trained on how to influence collective cognitive mechanisms that enhance orchestration and coordination of individual actions. Years of team literature suggest that collective cognition is the key to smooth coordination among members (DeChurch & Mesmer-Magnus, 2010a; Mohammed, Ferzandi, & Hamilton, 2010). Drawing on the model of Marks et al. (2001), Morgeson, DeRue, and Karam (2010) summarize that in the transition phase, leaders must help members establish similar cognitive schemas by defining the mission, establishing expectations and goals, and planning for action. Training focused on leadership behaviors that influence collective cognition seems to be promising but understated. Many leadership behaviors have been proposed and linked to collective cognition (see Table 5.2 and Figure 5.1). Thus, for practitioners to fully take
### Table 5.2

**Linking Forms of Leadership and Emergent Cognition**

<table>
<thead>
<tr>
<th>Leadership Forms</th>
<th>Specific Variables</th>
<th>Emergent Cognition</th>
<th>Proposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior</td>
<td>Planning</td>
<td>Compositional</td>
<td>1. Team leader planning behavior positively influences team members' development of task-, team-, and strategy-focused compositional forms of emergent cognition.</td>
</tr>
<tr>
<td></td>
<td>Role clarification</td>
<td>Compilational</td>
<td>2. Team leader role clarification behavior positively influences team members' development of compilational forms of emergent cognition.</td>
</tr>
<tr>
<td></td>
<td>Communicating information</td>
<td>Compositional</td>
<td>3. Team leader informational communication behavior positively influences team members' development of task-, team-, and strategy-focused compositional forms of emergent cognition.</td>
</tr>
<tr>
<td>Strategic</td>
<td>Sensemaking</td>
<td>Compositional and perceptual</td>
<td>4. Strategic leader sensemaking behavior positively influences team members' strategy-focused compositional and perceptual forms of emergent cognition.</td>
</tr>
<tr>
<td>Transformational</td>
<td>All core transformational</td>
<td>Compositional</td>
<td>5. TI behaviors positively influence team members' strategy-focused compositional forms of emergent cognition.</td>
</tr>
<tr>
<td>Functional</td>
<td>Briefing behavior and preparation</td>
<td>Compositional and compilational</td>
<td>6. Team leaders who engage in functional leadership behaviors involving (a) mission briefings, and (b) team preparation positively influence team members' development of task-, team-, and strategy-focused compositional forms of emergent cognition and compilational forms of emergent cognition.</td>
</tr>
<tr>
<td>Shared</td>
<td>Role clarification</td>
<td>Compositional and compilational</td>
<td>7. Shared and distributed leadership within a team positively influence team members' development of task- and team-focused compositional forms of emergent cognition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8. Shared and distributed leadership within a team positively influence team members' development of compilational forms of emergent cognition.</td>
</tr>
</tbody>
</table>

**Conclusions**

We have much to celebrate with the leadership literature that has accumulated over the years, particularly in the foundational research and writing of the leadership literature (e.g., Hell et al., 2001). In this chapter, we have reviewed and synthesized the work on leadership and emergent cognition, and the various forms of leadership that impact on emergent cognition. The relationship between leadership and emergent cognition is complex and multifaceted, and understanding this relationship is critical for effective leadership in organizations. We have explored the advantages of emergent cognition in leadership, and how leadership can be used to foster emergent cognition in teams. We have also discussed the implications of our findings for future research and practice in leadership. Overall, this chapter has provided a comprehensive overview of the current state of knowledge on leadership and emergent cognition, and has highlighted the need for further research in this area.
advantage of this research, we must identify specific linkages from different behaviors to appropriate types of team cognition. Future research focusing on the effects of leadership on collective cognition can help us add another piece to the puzzle that will allow us to strengthen the impact of teams and, furthermore, of organizations.

**CONCLUSIONS**

We have much to celebrate when it comes to the body of scientific evidence that has accumulated over the past few decades regarding the nature and importance of both leadership and collective cognition. Although we have come a long way, greater attention needs to be devoted to understanding the linkages between leadership and collective cognition. Despite the fact that the leadership literature has proposed theoretical and empirical linkages between the two (e.g., Fiss & Zaheer, 2006; Morgeson et al., 2010; Weick, 1995; Zaccaro et al., 2001), recent reviews summarizing 20 years of leadership (DeChurch, Hiller, et al., 2009) and 15 years of shared mental models research (Mohammed et al., 2010) indicate that relatively few studies
have examined the relationships between various forms of leadership and various forms of collective cognition. In this chapter, we present a set of propositions to guide empirical research in this area. Implicit in this set of propositions is the need for multilevel methodologies to examine the leadership cognition relationships within and across organizational levels. Also implicit in this set of propositions is the need for time-lagged designs to examine temporal issues associated with the emergence of collective cognition, emergence of shared leadership, and the importance of various leadership functions, processes, and behaviors.

Kozlowski and Klein (2000) have argued that emergence cognition should be characterized as compositional and compilational in form. This distinction is particularly important for understanding how various types of cognition form and emerge at higher levels. In this chapter, we examine the linkages between leadership and the development and emergence of both compositional and compilational forms of cognition. We further argue that the empirical study of this alignment is critical to the continued evolution of the leadership and collective cognition literatures.

To perform effectively and become or remain viable, members must share strategic objectives and expectations but also maintain their own unique perceptual lens arising from their roles and functions. The challenge for leaders is to satisfy complex demands for developing and maintaining conversion as well as diversion on collective cognition. These demands come from various sources: (a) strategic objectives and plans; (b) internal resources, capabilities, and weaknesses; (c) individual and collective task responsibilities; (d) social norms and expectations; and (e) beliefs about the unit itself. These areas represent various forms of collective cognition, each of which plays some role in enhancing the interactions or ultimate effectiveness of the collective unit. Developing conversion on these sources may not always be beneficial for the team because it may lead to negative consequences such as groupthink (Janis, 1971). Research on relationships between specific leadership behaviors and types of collective cognition will significantly advance the understanding of collective process influencing its performance.

Leadership has long been considered a unique property of teams (Stogdill, 1950), and both leaders’ influence and power have been recognized for a long time. However, leadership in the teams literature is often overlooked, as is the relationship between leadership and collective cognition. However, recent studies provide some indication that organizational science researchers are paying attention to leadership and collective cognition (Kanfer et al., 2009). This is an encouraging development and team cognition researchers already have established roles and functions and behaviors that are important to the development of specific forms of collective cognition. Raju and Salas posited that team cognition is like a work puzzle we needed to fully solve. Our team cognition proposes that understanding of how different forms of collective cognition influence teamwork.

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between various forms of leadership and cognition. In this chapter, we present a set of typologies in this area. Implicit in this set are level methodologies to examine the within and across organizational levels. is the need for time-lagged designs and the emergence of collective cognition, and the importance of various behaviors.

argued that emergence cognition is a process and not just a single event. This understanding how various types of behavior emerge within and among the levels. In this chapter, we examined and presented second a form of cognitive processes. We further alignment is critical to the continued cognitive and behavioral literatures. to remain viable, members must share and also maintain their own unique roles and functions. The challenge for developing and maintaining collective cognition. These demands (a) social objectives and plans; (b) internal processes; (c) individual and collective task of expectations; and (e) beliefs about various forms of collective cognition, impacting the interactions or ultimate development conversion on these sources team because it may lead to negative dissonance. Research on relationships and types of collective cognition, understanding of collective process influence.

Considered a unique property of teams is that influence and power have been recognized in the teams literature is often seen leadership and collective cognitive. An indication that organizational science researchers are paying greater attention to the linkages between leadership and collective cognition (e.g., Giberson et al., 2009; Randall et al., 2009). This is an encouraging trend, and we encourage both leadership and team cognition researchers to examine the specific leadership functions and behaviors that play a role in the formation and emergence of specific forms of collective cognition. In the 1990s, Cannon-Bowers and Salas posited that team cognition was a critical piece of the teamwork puzzle that we needed to further consider. Many studies have examined team cognition and demonstrated its utility. Therefore, our next step is to integrate the knowledge and capabilities from both the leadership and collective cognition fields in order to develop a better understanding of how different forms of team cognition can be developed and influence teamwork.

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6

Elaborating Cognitive Simplicity

Joan R. Rentsch and Paul Harvey

Through selection, socialization, and social processes, individuals working together develop complex interpretations of events, environments, and so on. Some of these interpretations can smooth interactions, reduce conflict, and facilitate knowledge transfer (e.g., Dyer & Nohria, 1997). Delise, & Hutchison, 2000). If these interpretations are shared and typified to the extent that people trust them, they, themselves, control their meanings, and are not controlled by them (e.g., Bransford, 1992). Researchers, who have studied the development of such shared levels of analysis, and whose interest centers on the degree of similarity, climate, culture, and so on.

A fair amount of research has explored how these shared meanings and outcomes associated with these shared meanings have been elaborated in ways that are effective (e.g., Rentsch, Small, & Harvey, 2010). This chapter explores how groups and teams use these shared meanings to create and maintain their sense of coherence and shared understanding of events, environments, and so on. In this chapter, we will explore how these shared meanings can be represented in terms of cognitive simplicity. This notion of cognitive simplicity is associated with the use of methods for operationalizing shared meanings.