



Pergamon

The Leadership Quarterly 12 (2001) 451–483

---

---

The  
Leadership  
Quarterly

---

---

## Team leadership

Stephen J. Zaccaro<sup>a,\*</sup>, Andrea L. Rittman<sup>a</sup>, Michelle A. Marks<sup>b</sup>

<sup>a</sup>*Psychology Department, George Mason University, 3064 David T. Langehall, 4400 University Drive, Fairfax, VA 22030-4444, USA*

<sup>b</sup>*Florida International University, Miami, FL, USA*

---

### Abstract

Despite the ubiquity of leadership influences on organizational team performance and the large literatures on leadership and team/group dynamics, we know surprisingly little about how leaders create and handle effective teams. In this article, we focus on leader–team dynamics through the lens of “functional leadership.” This approach essentially asserts that the leader’s main job is to do, or get done, whatever functions are not being handled adequately in terms of group needs. We explicate this functional leadership approach in terms of 4 superordinate and 13 subordinate leadership dimensions and relate these to team effectiveness and a range of team processes. We also develop a number of guiding propositions. A key point in considering such relationships is the reciprocal influence, whereby both leadership and team processes influence each other. © 2002 Elsevier Science Inc. All rights reserved.

---

### 1. Introduction

Effective team performance derives from several fundamental characteristics (Zaccaro & Klimoski, in press). First, team members need to successfully integrate their individual actions. They have specific and unique roles, where the performance of each role contributes to collective success. This means that the causes of team failure may reside not only in member inability, but also in their collective failure to coordinate and synchronize their individual contributions. Team processes become a critical determinant of team performance, and often mediate the influences of most other exogenous variables.

---

\* Corresponding author. Tel.: +1-703-993-1355.  
E-mail address: szaccaro@gm.edu (S.J. Zaccaro).

Second, teams are increasingly required to perform in complex and dynamic environments. This characteristic applies particularly to organizational teams, and especially to top management teams. The operating environment for today's organizational teams features multiple stakeholders with sometimes clashing agendas, high information load, dynamic situational contingencies, and increased tempo of change. Advances in communication technology have made the use of virtual teams (i.e., teams whose members are not physically colocated) more practical and prominent in industry. These performance requirements heighten the need for member coordination. Further, because of the greater rate of change in today's environment, team members need to operate more adaptively when coordinating their actions.

Team leadership represents a third characteristic of effective team performance. Most teams contain certain individuals who are primarily responsible for defining team goals and for developing and structuring the team to accomplish these missions. These roles exist even in self-managing teams (Nygren & Levine, 1996), although the conduct of leadership roles in such teams varies considerably from similar roles in more traditional teams. However, the success of the leader in defining team directions and organizing the team to maximize progress along such directions contributes significantly to team effectiveness. Indeed, we would argue that effective leadership processes represent perhaps the most critical factor in the success of organizational teams.

Despite the ubiquity of leadership influences on organizational team performance, and despite large literatures on both leadership (Bass, 1990; Yukl, 2002) and team/group dynamics (Forsyth, 1999; McGrath, 1984), we know surprisingly little about how leaders create and manage effective teams. Previous leadership theories have tended to focus on how leaders influence collections of subordinates, without attending to how leadership fosters the integration of subordinate actions (i.e., how leaders promoted team processes). Path-goal theory, for example, represents an excellent example of leadership influences on subordinate outcomes. However, it specifies the leader's role in creating performance expectancies and valences for individual subordinates (House & Mitchell, 1974), not in developing and maintaining effective team interaction and integration.

Most leadership theories that mention team processes treat them as moderators that indicate what leadership behaviors are most appropriate or effective in particular circumstances (e.g., Fiedler, 1964; Kerr & Jermier, 1978; Kerr, Schriesheim, Murphy, & Stogdill, 1974). Accordingly, Hackman and Walton (1986) noted, "we have not found among existing leadership theories one that deals to our satisfaction with the leadership of *task-performing groups in organizations*" (p. 73). Kozlowski, Gully, Salas, and Cannon-Bowers (1996) also stated, "Although there are substantial literatures in both [the team development and leadership] areas (e.g., Levine & Moreland, 1990; Yukl & Van Fleet, 1992), existing models are limited in their ability to provide prescriptions to guide team leadership and to enhance team development" (p. 255).

Alternatively, few team performance models specify leadership processes as central drivers of team processes (e.g., Hirokawa, 1980; McGrath, 1991). Thus, in summarizing future research needs on team performance, McIntyre and Salas (1995) raised some critical questions related to the behaviors that define effective team leadership and the corresponding

knowledge, skills, abilities, and other characteristics that enable such behaviors. These observations point to the need for conceptual models of collective performance that integrate both leadership influences and team dynamics.

In this article, we present a conceptual framework for thinking about leadership effects on team performance. We argue that leadership processes influence team effectiveness by their effects on four sets of team processes: cognitive, motivational, affective, and coordination. We would argue further that a number of environmental, organizational, and team characteristics moderate the magnitude of these effects. In the next section, we present a functional model of leadership processes. We then examine how leaders influence the four aforementioned team processes.

Our examination of leader–team dynamics in this article rests on some central assumptions. First, we clearly presuppose hierarchical teams, having a defined leadership role, with a specified role incumbent. Most organizational teams have such structures. As noted, even most self-managing teams have supervisors who are held accountable by “higher-ups” for team outcomes, and who are likely responsible for selecting team personnel, providing the team with resources and establishing the normative basis for team functioning (Nygren & Levine, 1996; Sundstrom, 1999). Second, our examination in this article tends to focus on action, performing, and production work teams. Sundstrom (1999) cites these teams, as well as service teams, management teams, project teams, and parallel teams, as indicative of the kinds of team forms that operate in organizations. We have developed our conceptual ideas around action teams, but we believe that the propositions offered here extend to other kinds of teams. The difference among team forms probably alters the specific display of particular leadership activities, but we believe that generic leadership functions apply across different kinds of teams.

Third, in a related point, we have not qualified our propositions according to the types of tasks being completed by the team. For example, McGrath (1984) offers a typology of eight different types of group tasks. Our examination of leader-team dynamics reflects primarily research using performance/psychomotor tasks, competitive tasks, and perhaps decision making and intellectual tasks. However, most work teams engage in other kinds of tasks as well (e.g., creativity tasks, planning tasks). Again, we would argue that our generic leadership functions and our propositions apply generally across different team tasks. Task characteristics probably moderate the specific application of these generic functions.

## 2. Functional leadership

One perspective of leadership, the functional leadership approach, specifically addresses in broad terms the leader’s relationship to the team (Fleishman, Mumford, Zaccaro, Levin, Korotkin, & Hein, 1991; Hackman & Walton, 1986; Lord, 1977; Mumford, Zaccaro, Harding, Fleishman, & Reiter-Palmon, 1993; Roby, 1961). As described succinctly by Hackman and Walton (1986, p. 75),

The key assertion in the functional approach to leadership is that ‘[the leader’s] main job is to do, or get done, whatever is not being adequately handled for group needs’ (McGrath,

1962, p. 5). If a leader manages, by whatever means, to ensure that all functions critical to both task accomplishment and group maintenance are adequately taken care of, then the leader has done his or her job well.

This perspective defines leadership as social problem solving, where leaders are responsible for (a) diagnosing any problems that could potentially impede group and organizational goal attainment, (b) generating and planning appropriate solutions, and (c) implementing solutions within typically complex social domains (Fleishman et al., 1991; Mumford et al., 1993; Zaccaro, Marks, O'Connor-Boes, Costanza, 1995; Zaccaro, Mumford, Baughman, Johnson, Marshal-Meis, & Fleishman, in preparation). This definition offers several critical distinctions regarding team leadership. First, it emphasizes leadership as a boundary role linking teams to their broader environment (Katz & Kahn, 1978). Because most team problems originate from their environment, their diagnosis requires that leaders be attuned to developments and events outside of the team (Ancona, 1987; Ancona & Caldwell, 1988). Further, leaders have the responsibility of interpreting and defining environment events for their team.

The second distinction is that leadership typically involves discretion and choice in what solutions would be appropriate in particular problem domains. Team actions that are completely specified or fully elicited by the situation do not require the intervention of team leaders. Leadership is necessitated by team problems in which multiple solution paths are viable and/or requisite solutions need to be implemented in complex social domains through careful planning. Individuals in leadership roles are then responsible for making the choices that define subsequent team responses.

A third distinction is that functional leadership is not defined by a specific set of behaviors but rather by generic responses that are prescribed for and will vary by different problem situations. That is, the emphasis switches from “what leaders *should do* [to] what *needs to be done* for effective performance” (Hackman & Walton, 1986, p. 77). This distinction separates functional leadership perspectives from other models of leader-team interactions that either specify particular leadership behaviors (e.g., task-oriented, relationship-oriented) that are considered optimal in most team situations (Blake & Mouton, 1964; Fleishman, 1953; Katz, Maccoby, Gurin, & Floor, 1951; Likert, 1961, 1967), or would vary in application according to specific team properties and situational characteristics (Fiedler, 1964; Kerr & Jermier, 1978; Kerr et al., 1974). Instead, leadership is defined in terms of problem-solving activities directed at the generation of solutions that advance team goal attainment. Thus, in effect, any behavior pattern that reflects effective goal-directed action by leader role incumbents would constitute leadership (Mumford, 1986).

We need to add a note of caution here. The definition of functional leadership suggests a tautological relationship — if the group is successful, then the leader can be defined as effective. Or, any action by the leader is effective if the group succeeds. We can suggest several points that may counter this concern. First, the leadership processes that should contribute to effective group performance are dictated by the performance requirements posed by the group task, group environment, and properties or attributes of the team as a whole and its individual members.

Zaccaro and Klimoski (2001) describe seven contextual imperatives that drive the nature of organizational leadership: cognitive, social, personal, political, technological, financial, and

staffing. At the team level, these imperatives call for specific leader activities that are likely to be instrumental for group success, and alternatively define particular leadership responses that will not contribute to group performance. Thus, group effectiveness can be theoretically defined in particular contexts and circumstances as a function of specific leadership actions. In other words, not just any leadership action contributes to group effectiveness. A critical task for researchers in team leadership, then, becomes the definition and validation of the contextual influences that enhance the efficacy of some leadership actions and diminishes others. Some of the propositions offered later in this article represent a step toward this task.

Alternatively, we do not mean to argue that group effectiveness can be explained entirely by leadership action. Member capabilities and skills are likely to explain a large amount of variance in team effectiveness, beyond the influence of team leadership. Likewise, leader effectiveness does not always translate into team effectiveness. Team composition and environmental or resource constraints may severely mitigate leader influence and result in team failure despite leadership efforts. Thus, the central premise of functional leadership theory is that team circumstances prescribe certain necessary leadership activities for success, while negating the utility of other activities. Indeed, effective team leaders often possess skills in defining what the critical leadership activities and responses are for particular team situations (Zaccaro, 2002).

### *2.1. Leader performance functions*

The perspective of leadership as functional social problem solving suggests a core of basic requisite leadership functions that are linked to the effective generation, selection, and implementation of problem solutions. Fleishman et al., 1991 organized these activities into a taxonomy of leadership performance functions having four superordinate dimensions and thirteen subordinate dimensions (see Table 1). The superordinate dimensions are:

- Information search and structuring.
- Information use in problem solving.
- Managing personnel resources.
- Managing material resources.

*Information search and structuring* refers to the leader's systematic search, acquisition, evaluation, and organization of information regarding team goals and operations. Information sources exist both within and outside of the team. Here, the leader's boundary role requirements are most evident. For example, Roby (1961) described vigilance, environmental scanning, and forecasting as key leadership functions linking the team to its external environment. Further, the team leader is responsible for interpreting tasks assigned to the team. In most organizations, for example, direct line supervisors are typically required to translate the vision and strategic intent of company executives into collective action (Zaccaro, 2001b). While this translation is likely to involve multiple leadership activities, a primary one is the acquisition of information regarding a team or unit's mission and the resources required to complete it.

Table 1

Leader behavior dimensions (from Fleishman et al., 1991)

- 
- (1) Information search and structuring
    - (a) Acquiring information
    - (b) Organizing and evaluating information
    - (c) Feedback and control
  - (2) Information use in problem solving
    - (a) Identifying needs and requirements
    - (b) Planning and coordinating
    - (c) Communicating information
  - (3) Managing personnel resources
    - (a) Obtaining and allocating personnel resources
    - (b) Developing personnel resources
    - (c) Motivating personnel resources
    - (d) Utilizing and monitoring personnel resources
  - (4) Managing material resources
    - (a) Obtaining and allocating material resources
    - (b) Maintaining material resources
    - (c) Utilizing and monitoring material resources
- 

*Information use in problem solving* refers to the leader's application of acquired information to problem solving in the service of team goal attainment. After a team mission or goal is established, the leader identifies task needs and requirements, develops and evaluates possible solutions, and plans the implementation of selected solutions. Here, the team leader is responsible for translating an assigned mission into a workable plan that utilizes available team resources and accomplishes several objectives for the team (Fleishman et al., 1991; Hackman & Walton, 1986). First, and perhaps foremost, an effective plan implements the solution that is the *best-fitting one* to the problem domain and the team's goal state. Second, an effective plan provides a strong direction to the team such that team members have a clear representation of performance objectives and outcomes. Third, the plan provides an "enabling performance situation" (Hackman & Walton, 1986), where adequate levels of team members' efforts, knowledge, and skills are elicited and coordinated. Further, the plan employs "task performance strategies that are appropriate to the work, and to the setting in which it is performed" (Hackman & Walton, 1986, p. 82). A major function of team leadership is to communicate solution plans to team members so that they understand the actions required for solution implementation, how these actions need to be coordinated, and what situation constitutes task or mission accomplishment.

The remaining two leader performance dimensions, *managing personnel resources* and *managing material resources*, include leadership activities involved in the actual implementation of developed plans and solutions. These activities are perhaps the most prominent responsibilities of organizational team leaders, particularly at lower company ranks. Managing personnel resources involves obtaining, motivating, coordinating, and monitoring the individuals under one's command. Note, however, that leader responsibilities extend beyond the motivation and orchestration of collective action. Leaders are also responsible for training and developing the personnel resources under their command.

Solution implementation also requires that team leaders procure adequate material resources for team action (Hackman & Walton, 1986). This activity is often neglected in most classifications of leader performance functions (Fleishman et al., 1991). However, the lack of such resources will cripple team efforts, regardless of the motivation of team members and the quality of a leader's solutions and performance strategies (Hackman & Walton, 1986).

These leader performance functions emphasize primarily the leader's recognition and construction of team problems, generation of appropriate solutions, planning the implementation of the best-fitting one, and coordinating and monitoring solution implementation. These functions represent how effective leaders respond when facilitating team goal attainment, particularly in complex and dynamic environments (Mumford et al., 1993). They also represent a good starting point for describing how leaders facilitate team effectiveness. The next point is to specify more clearly how these leadership functions influence the components of team effectiveness.

## 2.2. *Team effectiveness*

Salas, Dickinson, Converse, and Tannenbaum (1992) provided a good working definition of a "team" as:

a distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission, who have been assigned specific roles or functions to perform, and who have a limited life-span of membership (p. 4).

This definition, echoed by other team researchers (Nieva, Fleishman, & Rieck, 1978; Orasanu & Salas, 1993), emphasizes that team members typically have different and unique roles, each representing critical contributions to collective action. This means that there exists a high degree of interdependence among team members. This interdependence requires coordination and synchronization among members and integration of their contributions to achieve team goals. During team action, members need to exchange information and resources, as well as constantly monitor the coordination of their efforts, adjusting individual and team actions when coordination breaks down (Salas et al., 1992). Thus, successful team action requires (a) the identification of appropriate individual member contributions and (b) a plan for the best way these contributions can be combined into an integrated team response (Hinsz, Tindale, & Vollrath, 1997).

Another essential element of this definition is that team interaction is expected to be *adaptive* with respect to environmental conditions. In essence, truly effective teams are those that are able to maintain high levels of collective performance, even as team and environmental circumstances become decidedly adverse. Such high performance requires that teams develop norms and operating procedures that promote individual and collective flexibility and adaptability.

A number of researchers have specified determinants of team effectiveness (Gladstein, 1984; Hackman, 1987; Salas et al., 1992). Based on these models, we suggest that effective teams integrate four fundamental processes: cognitive, motivational, affective, and coordination. We propose that leadership influences on team effectiveness occur in part through

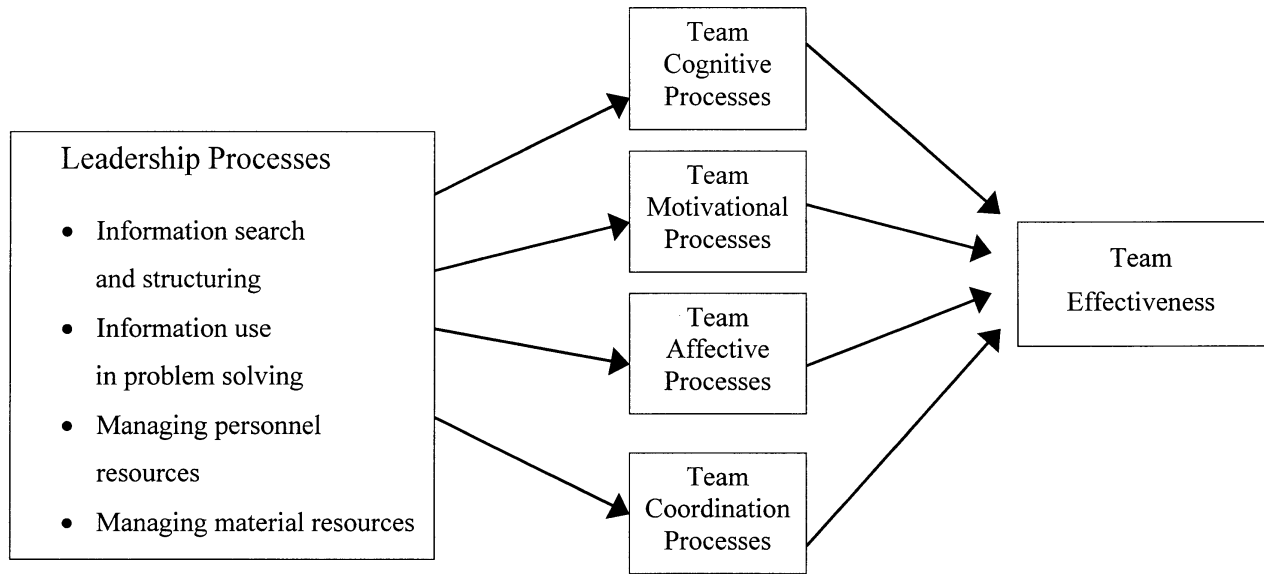


Fig 1. A model of leader performance functions contributing to team effectiveness.

their effects on these four processes. Fig. 1 shows the proposed model of leadership and team effectiveness.

### 3. Leadership and team processes

The model in Fig. 1 specifies that the leader performance functions described earlier alter team processes that contribute to team effectiveness. For example, leader information search and meaning making can result in defining the frame of reference that team members use to understand and complete their collective tasks. The performance strategies used by team members are most likely to emerge from leader planning and coordination activities. Likewise, their motivation and choices regarding team effort should be influenced in part by leader exhortation and encouragement. In the next sections, we describe key team processes in more detail and specify how leadership functions may act to facilitate these processes

#### 3.1. Team cognitive processes

A significant development in the recent teams literature has been the increasing application of cognitive theories and models to understand team performance. For example, Cannon-Bowers et al. have argued that effective team coordination and performance depends upon the emergence of accurate *shared mental models* of requisite team strategies and interaction tactics among team members (Cannon-Bowers, Salas, & Converse, 1990, 1993). Such team models help team members anticipate each other's actions and reduce the amount of processing and communication that is required during team performance. The result is better coordination and more efficient collective responses to immediate task requirements



(Minionis, Zaccaro, & Perez, 1995). In addition, other theorists have recently argued that metacognitive and self-correction processes in teams are critical for team performance, especially in situations requiring teams to adapt quickly to dynamic environmental circumstances (Blickensderfer, Cannon-Bowers, & Salas, 1998; Kozlowski et al., 1996).

### 3.1.1. *Team mental models*

Mental models have been defined as “mechanisms whereby humans are able to generate descriptions of system purpose and form, explanations of system functioning and observed system states, and predictions of future system states” (Rouse & Morris, 1986, p. 351). Mental models organize information about systems, the environments within which they operate, and the response patterns required of systems with respect to environmental dynamics (Veldhuyzen & Stassen, 1977). With respect to a team, such mental models developed by individual team members represent knowledge and understanding about the purpose of the team and its characteristics, the connections and linkages among team purposes, characteristics, and collective actions, and the various roles/behavior patterns required of individual members to successfully enact collective action. With well-developed team mental models, team members may be better able to anticipate each other’s actions and reduce the amount of processing and communication required during team performance.

These characteristics of mental models have led several researchers to argue that effective team coordination depends upon the emergence of a *shared* mental model (Cannon-Bowers et al., 1990, 1993; Klimoski & Mohammed, 1994). Shared mental models refer to common understanding established through experience among team members regarding expected collective behavior patterns during team action (Cannon-Bowers et al., 1990, 1993; Kleinman & Serfaty, 1989; Levine & Moreland, 1989). When such models are shared among team members, they may be better able to anticipate each other’s actions and reduce the amount of processing and communication required during team performance.

Cannon-Bowers et al. (1993) suggested that four different kinds of mental models encoded by team members were applicable to team coordination and performance. One includes knowledge about the equipment used by the team in the acquisition of information from its environment or in the monitoring of its own functions (equipment model). This model also includes equipment information necessary for the conduct of collective action. Another model contains knowledge about the purpose of the team and more specifically the task requirements related to this purpose (task model). This model includes task procedures, strategies, and how the task changes in response to environmental contingencies. A third model represents knowledge about team-member characteristics, including their task knowledge, abilities, skills, attitudes, preferences, and tendencies (team model).

The final model, and the one that is perhaps the most significant in terms of regulating team action, encodes information with respect to the individual and collective requirements for successful interactions among team members. Cannon-Bowers et al. (1993) argued that to be effective, team members:

must understand their role in the task, that is their particular contribution, how they must interact with other team members, who requires particular types of information, and so forth.

Related to this, they must also know when to monitor their teammates' behavior, and when to step in, and help a fellow member who is overloaded, and when to change his or her behavior in response to the needs of the team (p. 232).

When shared among team members, this model, called the team interaction model, is particularly crucial to effective *coordinated* action. Equipment, task, and team mental models are presumably crucial building blocks for the team interaction model. That is, the prescribed roles of team members need to emerge from a consideration of (a) the equipment or other materials that team members will use in completing subsequent collective tasks, (b) the specific task requirements that must be addressed through collective action, and (c) the task-relevant characteristics of team members that help define the contributions each can make to successful collective action. The strategies and tactics that emerge from a consideration of these factors, their moderating contingencies, and specific roles of each task member in particular action plans become incorporated into the team interaction model. The quality and elaboration of this model is associated with how well team members will be able to coordinate their subsequent activities.

### 3.1.2. *Team information processing*

The most proximal cognitive influence on team coordination and performance is the collective information processing that occurs when teams confront task and problem situations. A complete review of group information processing models is beyond the scope of this article; interested readers are referred to Hinsz et al. (1997). However, some basic processes include (a) developing a shared understanding of team problem parameters and processing objectives, (b) utilizing individual and shared knowledge structures to define solution alternatives, (c) evaluating and reaching consensus on an acceptable solution, (d) planning and implementing actions that form selected solutions, and (e) monitoring the implementation, outcomes, and consequences of selected solutions (Forsyth, 1999; Moreland & Levine, 1992).

*Collective metacognition* represents a form of team information processing that is critical for team performance in complex environments. Metacognition refers to reflection upon the cognitive processes used in problem solving; in essence, it represents “knowledge and cognition about cognitive phenomena” (Flavell, 1979, p. 906). Sternberg et al. also define metacognitive processes as executive functions that control the application and operation of cognitive abilities and skills (Davidson, Deuser, & Sternberg, 1994; Sternberg, 1985). Collective metacognition refers to individual and collective reflection upon how members constructed team problems, evaluated possible solutions, and implemented selected solutions.

To achieve a high level of expertise that promotes adaptation in a dynamic operating environment, team members need to set aside time to consider, individually and collectively, the consequences of their strategies, how they considered and arrived at a team solution, and how they worked together to implement selected solutions. This is a difficult process to initiate and to complete successfully. When teams have succeeded at a task, members may not see the need for reflecting upon collective information processing and interaction patterns; likewise, when they fail, they are more likely to engage in such reflection, but it may be

focused on “fixing blame,” with negative consequences for subsequent team cohesion and efficacy.

### 3.2. Leadership and team cognitive processes

Fig. 2 extends the leadership–team process model by specifying in more detail the leadership performance functions that influence key components of team cognition. Leader information search and structuring activities provide the grist for meaning making and sense giving to team members, allowing the development of more comprehensive and effective team mental models. In addition, leadership processes likely contribute to the quality and efficacy of collective information processing, especially metacognition. We cover these relationships in more detail in the subsequent sections.

#### 3.2.1. Leadership and team mental models

A major responsibility of the team leader is to facilitate for team members an accurate shared understanding of their operating environment and how, as a team, they need to respond. There has been little, if any, research linking team leadership to the development of effective team mental models. However, shared mental models of expected team and member actions serve as key mechanisms by which leaders structure and regulate team performance. Leaders inculcate in team members an understanding of the team’s mission, the action steps necessary to complete the mission and the role requirements for each member in collective performance. In essence, team leaders convey their own understandings and mental models of the problem situation as derived from their boundary spanning activities. Thus, leadership processes and the quality of a team leader’s mental models become key determinants of subsequent team mental models. Further, team mental models mediate the influence of leadership on team coordination and team performance.

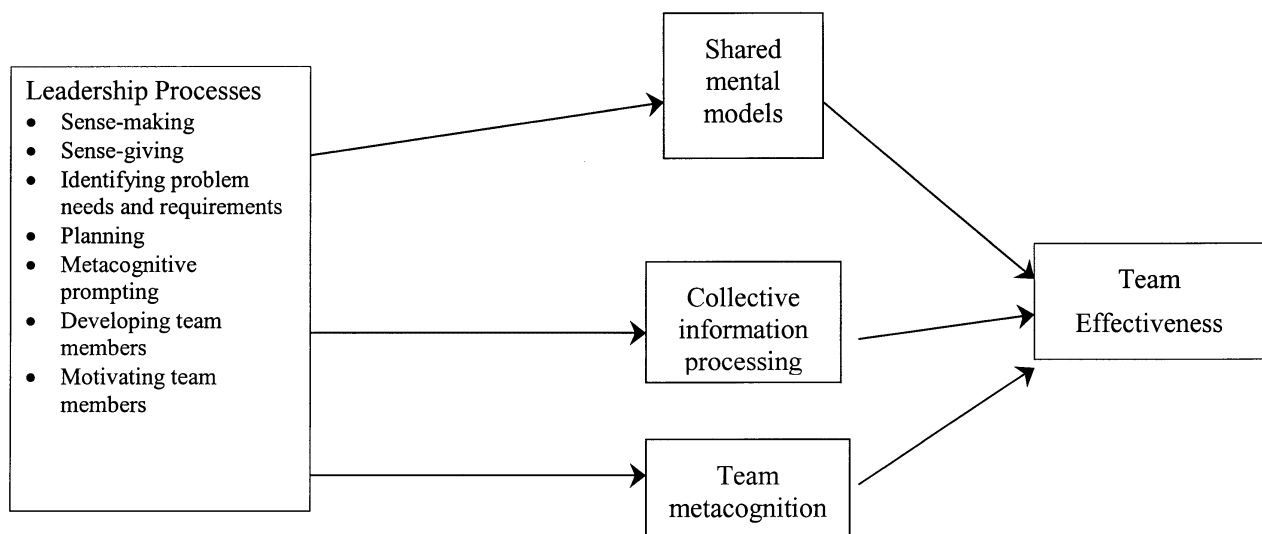


Fig. 2. Influence of leader performance functions on team cognitive processes.

The critical point of this leader–team influence is the leader’s sense-making activities on behalf of the team. Sense making can be defined as being “about such things as the placement of items into frameworks, comprehending, redressing surprise, constructing meaning, interacting in the pursuit of mutual understanding, and patterning” (Weick, 1995, p. 6). Sense-making and sense-giving processes include extracting important environmental cues, placing these cues in a team’s performance context, and embellishing the meaning of these cues into a coherent framework. This framework provides to team members an enriched mental model of cue-response contingencies, linked to environmental events, and includes the meaning or rationale for why certain collective actions are more or less appropriate in different situations. It is this last feature of sense making that produces shared mental models promoting team adaptation in a dynamic environment.

These arguments suggest a process of leader-team performance that begins with the development of a leader’s mental representation of a problem situation. This mental model reflects not only the components of the problem confronting the team, but also the environmental and organizational contingencies that define the larger context of team action. Here, the leader develops a model of what the team problem is and what solutions are possible in this context, given particular environmental and organizational constraints and resources.

The above model emerges from the information search and acquisition leadership functions, and indeed represents how the leader structures (i.e., makes sense of) acquired information. The problem model developed by the leader then drives the development of a team interaction model that encodes how the team ought to respond to the problem situation. The leader forms this second model from his or her understanding of team capabilities and the resources of individual team members in the context of the problem at hand (Zaccaro et al., 1995). This model resembles the team interaction mental model proposed by Cannon-Bowers et al. (1993) as critical for team coordination and performance.

The next step in this process of leader–team performance is the communication of the leader’s mental model of team action to team members. This step is a critical one for team leaders because if they develop a perfect plan for team problem solving, but cannot communicate the model or plan effectively to the team, then the team response is likely to be inadequate. If this communication is successful, then team members are likely to form and share an accurate model of expected behaviors and role requirements in accordance with their assigned mission and the problem they need to confront.

Two recent studies have documented the influence of leader sense making and team communication, or sense giving, on team mental models. Marks, Zaccaro, and Mathieu (2000) manipulated the quality of leader communications to a team performing multiple missions of a computer-simulated military task requiring adaptation. They found that the communication by leaders of enriched task information to the team resulted in more similar and more accurate mental models formed among team members. Both mental model similarity and accuracy influence subsequent team performance. Burke (1999) and Burke and Zaccaro (in preparation) extended this study by looking more closely at the content of leader communications. She examined different levels of leader sense making on team mental models and team adaptation, on the same task used by Marks et al. (2000). She found that

more similar and accurate mental models accrued among team members when team leaders provided information linking environmental cues to appropriate team responses. More importantly, Burke found that teams were most successful in adapting to changing performance conditions when leaders provided along with cue-contingency information, a rationale for such linkages. This embellished sense giving resulted in deeper shared and accurate team mental models, which, in turn, fostered greater team adaptation.

Based on this research, and on the conceptual framework shown in Fig. 2, we propose the following:

*Proposition 1:* The extent and quality of leader sense-making and sense-giving activities is positively related to the accuracy and degree of sharedness in team mental models.

### 3.2.2. Leadership and collective information processing

Team leaders are also responsible for facilitating the information processing activities engaged by the team as it accomplishes its task. The most potent leadership processes that foster collective information processes include encouraging and coaching team members to engage in problem identification, diagnosis, solution generation, and solution selection activities (Kozlowski et al., 1996). Early in the team's development, team leaders may need to model and structure these activities for team members (Kozlowski, 1998, Kozlowski et al., 1996). Kivlighan (1997) demonstrated that leader structuring behaviors were more important early in the group's tenure; consideration and relationship behaviors become more effective as groups become more efficient and experienced on the group task.

As teams mature and move from a training/learning focus to a more action or performance orientation, leader roles shift to fostering team self-management, particularly in terms of problem-solving activities. Kozlowski, (1998) argues that as teams enter performance environments, "leaders are not so much responsible for directing specific team actions as they are responsible for developing the underlying individual and team capabilities that enable teams to self-manage their actions" (p. 134). Tannenbaum, Smith-Jentsch, and Behson (1998) note that leaders can foster team learning in discrete performance episodes by facilitating team planning activities and the metacognitive processes that should follow team performance.

Recent conceptual models, then, emphasize the role of participative leadership in facilitating several phases of collective information processing. They also highlight the coaching, modeling, and encouragement activities of team leadership, rather than directive or structuring activities. Thus, team leaders encourage the team members to take over a number of team leadership information search, structuring, and utilization activities noted in Table 1. The leader can often "take back" several of these processes, including problem construction, the definition of solution alternatives, and implementation planning when team performance environments become particularly complex and multifaceted.

In addition, research has shown that team information processing becomes more centralized (i.e., localized in the leader), when teams are under stress, threat, or are operating under conditions of temporal urgency (Argote, Turner, & Fichman, 1989; Gladstein & Reilly, 1985; Isenberg, 1981). However, even these conditions do not obviate other team

members from information processing responsibilities. Indeed, in constructing team problems, deriving solutions, and planning their implementation, team leaders draw heavily on the functional expertise and diversity within the team. In effect, they coordinate the contribution and combination of team knowledge and information resources; where “gaps” occur, they make interpretations and decisions that move the team along (Hinsz et al., 1997; Kozlowski et al., 1996).

A number of recent studies have documented the importance of participative leaders in fostering effective collective information processing. For example, Kahai, Sosik, and Avolio (1997) found that team leaders who engaged in participative leadership had team members who generated more problem solutions than team leaders who displayed directive leadership. They also found, however, that these effects were true for moderately structured tasks, but were reversed on highly structured tasks (i.e., directive leadership resulted in more solution generation among team members). This suggests that leadership effects on team information processing will depend in part on the nature of the team task.

Forms of participative leadership also facilitate other aspects of collective information processing. Larson, Foster-Fishman, and Franz (1998) reported that leaders who shared problem-solving responsibilities fostered more information sharing among team members than directive leaders. Tesluk and Mathieu (1999) found that when team leaders encouraged team self-management, team members engaged in more problem management actions/strategies to reduce performance barriers than members of teams in which leaders did not encourage self-management. These action/strategies included such information processing as problem diagnosis, solution generation, and implementation; Tesluk and Mathieu found that such actions/strategies were significant determinants of work crew effectiveness.

Based on these studies and the conceptual model in Fig. 2, we propose the following:

*Proposition 2:* Teams with leaders who develop members’ capabilities to do information processing and encourage their participation in team problem solving will engage in more collective information processing than teams with leaders who use a more directive style.

Fostering effective collective “metacognitive” processing in the team, especially after major task engagements (Kozlowski et al., 1996), represents perhaps one of the most potent ways leaders facilitate team effectiveness. Such processing needs to be coupled with collective feedback to and among team members that reflects the conclusions emerging from metacognitive reflection upon team performance processes. While metacognition can remain a latent cognitive process for individual performers and still have potent effects, in teams metacognitive musing must be verbalized in order to produce changes in team members’ knowledge and capacities. Accordingly, team leaders can facilitate collective metacognition by providing critical performance feedback to team members and encourage collective reflection upon team processes. Tannenbaum et al. (1998) argue that such reflection needs to occur within the context of preperformance plans and goals. They describe “prebriefs” and “postaction” reviews as key components of the team learning cycle.

Prebriefs are team meetings prior to initiating performance that “provide an opportunity to the team to confirm its performance strategies, clarify team members’ roles and expectations, discuss anticipated events, and focus on key performance issues” (p. 250). Postaction reviews reflects the “systematic process of sharing observations and interpretations about team functioning (i.e., processes) and performance” (p. 252). To the degree that postaction reviews include reflection upon how team members engage in collective information processing, then they reflect collective metacognitive processes as well. We would argue that effective team leaders develop the basis for effective engagement of these two processes by team members. They do so by developing key member capabilities to perform these tasks, motivating team members complete prebriefs and postaction reviews, and providing feedback (and “feedforward”) information to facilitate these processes.

What specific leader behaviors facilitate this team learning process? Tannenbaum et al. (1998) offer the following prescriptive leadership activities (pp. 253–259):

- Provide a self-critique early in the postaction review.
- Accept feedback and ideas from others.
- Avoid person-oriented feedback; focus on task-focused feedback.
- Provide specific, constructive suggestions when providing feedback.
- Encourage active team member participation during briefings and reviews and not simply state one’s own observations and interpretations of the team’s performance.
- Guide briefings to include discussions of “teamwork” processes, as well as “task work.”
- Refer to prior prebriefs and team performance when conducting subsequent debriefs.
- Vocalize satisfaction when individual team members or the team as a whole demonstrate improvements.

Tannenbaum et al. examined these leader behaviors in a training study and found that teams with leaders who were trained to display these behaviors were more likely to engage in collective metacognitive processes (i.e., more likely to engage in discussions about teamwork behaviors, to critique themselves, and to offer suggestions to others). Teams whose leaders encouraged collective metacognitive processes outperformed teams whose leaders did not engage in such behaviors.

Based on these results, we suggest the following:

*Proposition 3:* Teams with leaders who develop and motivate member metacognitive capacities and provide appropriate performance feedback are more likely to engage in effective collective metacognition than teams with leaders who do not display these leadership behaviors.

### 3.3. *Team motivational processes*

Team effectiveness is grounded in members being motivated to work hard on behalf of the team. This motivation derives in part from the cohesion of the team and from its sense of collective efficacy.

### 3.3.1. *Group cohesion*

Group cohesion has been defined in two general ways. The first refers to “the degree to which the members of a group desire to remain in the group” (Cartwright, 1968, p. 91). This aspect of cohesion refers to the attractiveness of the group for the individual member. It reflects the degree to which group membership is linked to personal rewards (Thibaut & Kelly, 1959). The second definition refers to how resistant the group is to disrupting influences (Gross & Martin, 1952). This aspect reflects a degree of member integration or “bonding” in which members share a strong commitment to one another and/or to the purpose of the group.

Theorists also have argued that both an individual’s attraction to the group and the group’s resistance to disruption can have either (or both) a social focus or task focus (Carron, 1982; Carron, Widmeyer, & Brawley, 1985; Hackman, 1976; Tziner, 1982; Zaccaro, 1991; Zaccaro & Lowe, 1988; Zaccaro & McCoy, 1988). For example, social cohesion represents the intensity and number of friendships among members of the group (Festinger, Schachter, & Back, 1950). Task-based group cohesion results when task accomplishment provides for both the personal and collective attainment of important goals (Festinger et al., 1950). This cohesion occurs from the necessity of individuals to work together to achieve desired outcomes when such outcomes are unattainable through individual achievement (Tziner, 1982). Thus, reaching valued goals requires a commitment and task focus that is shared by all group members (Hackman, 1976).

This shared commitment separates task cohesion from individual task motivation. In task-cohesive groups, members care about the success of other group members because their own goal attainment is often inextricably bound to collective achievement. They will exert strong effort on behalf of the group and their fellow members to facilitate group success. When faced with adversity or possible failure, members of high task-cohesive groups will persist at the task. Thus, the need for collective effort and commitment provides the basis for both the value of group membership to the individual and the group’s strength of integration.

More importantly, when faced with adversity or possible failure, members of high task-cohesive groups: (a) are likely to be more committed to the task and devote more effort to its accomplishment; (b) set and enforce more stringent performance norms that compel such effort (Zaccaro & McCoy, 1988); and (c) plan more efficiently and develop more appropriate performance strategies (Hackman, 1976; Hackman & Morris, 1975). These effects follow directly from the definition of cohesion as the group’s resistance to disruption (Carron et al., 1985; Gross & Martin, 1952). Zaccaro, Gualtieri, and Minionis (1995) provided evidence demonstrating this supportive role of task cohesion; they found that when temporal urgency increased for team members, groups high in task cohesion significantly outperformed their counterparts in low cohesion teams. Indeed, they performed as well as teams not experiencing any temporal urgency.

### 3.3.2. *Collective efficacy*

High cohesiveness is likely to be a function of members’ beliefs that, together, they can effectively accomplish the tasks they need to for their team to be successful. Such beliefs have been labeled *collective efficacy* (Bandura, 1986) and defined as a team property that reflects the members’ confidence that collectively they can perform a particular task or mission well



(Zaccaro, Blair, Peterson, & Zazanis, 1995). As members feel more confident in their team's capabilities, they are more motivated to work hard for the team, persist in the face of collective obstacles, and are willing to accept more difficult challenges. Such teams also set more difficult goals and are more committed to these goals (Weldon & Weingart, 1993). Consequently, under extreme adversity, highly efficacious teams should perform better than groups having low collective efficacy.

A common theme in this literature is that higher collective efficacy enhances the likelihood that team members will approach, persist at, and ultimately succeed on difficult team tasks. A rationale for the influence of collective efficacy can be derived from an extension of the resource allocation model (Kanfer & Ackerman, 1989) to team performance processes. The resource allocation model has been used to explain attention allocation by individuals to different tasks in performance situations. When in such situations, individuals make choices first about whether to allocate attention and resources to goal attainment and task performance. Such choice making reflects *distal motivational processes*. Once the choice is made to allocate resources to performance (i.e., to engage the task; Kanfer & Ackerman, 1989), individuals then decide on the amount and distribution of attention and effort among performance requirements. This second choice process reflects *proximal motivational processes*. Proximal motivational processes are regulated in part by the judgments and beliefs individuals have about their competency to achieve desired performance levels (i.e., their self-efficacy).

Similar processes operate in teams when confronting performance tasks. Teams decide to allocate resources to performance and engage the task. Then, decisions are made among team members about where to allocate team resources across performance requirements. We argue that an important extension of the resource allocation model to team performance is that the allocation of "team attention" to performance reflects not only a cognitive process occurring within team members, but also an interpersonal process occurring across team members. The allocation of team effort influences communication dynamics among team members and increases (or decreases) their correspondence with team performance. In effect, team resource allocation toward or away from the task influences the degree of process loss (Steiner, 1972) that is reflected in team communication.

Strong collective efficacy beliefs result in a higher likelihood that team members will engage the task and choose to allocate attention and team resources to its accomplishment (i.e., such beliefs influence distal motivational processes). We would also argue that collective efficacy is linked to the degree of process loss exhibited in team communication—specifically, high efficacy increases the correspondence between particular team communication processes and team performance. This influence reflects proximal motivational processes that regulate team action in the face of emerging team goal–performance discrepancies. Strong efficacy beliefs heighten team members' attention to performance cues, in particular, whether the team is meeting the subgoals necessary for overall success. Such beliefs facilitate a more fine-grained attunement to changes in ongoing performance conditions, leading to corresponding changes in team communication processes. The result is that the frequency of certain communication patterns is linked to increased or decreased performance.

### 3.3.3. Performance norms

Both task-based cohesion and collective efficacy are associated with strong work norms. Some groups establish a climate that compels hard work from their members. Norms develop in such groups that call for strong effort and higher performance from all group members. Once established, these norms are enforced by the members themselves; when deviations occur, members will communicate in various ways with the nonconforming individual to bring him or her in line with group work expectations (Festinger et al., 1950).

### 3.4. Leadership and team motivation

Fig. 3 indicates the influences of specific leader functions (from Table 1) on team motivational processes. In essence, leaders raise team motivation both directly by a number of motivational strategies, and indirectly through their planning, coordinating, personnel development, and feedback behaviors.

A central responsibility of team leaders is to raise the collective efficacy of the team (Kane, Zaccaro, Tremble, & Masuda, in press). If team members believe their team is capable of achieving its goals, i.e., being successful, they are more likely to choose to engage the task (Zaccaro 1996; Zaccaro, Blair, Peterson, & Zazanis, 1995). Bandura (1982) suggested that efficacy beliefs emerge in part from (a) a history of successful achievement, (b) observations of modeled behaviors that lead to successful performance, and (c) persuasion and social influence processes. Effective leaders will likely use these strategies to build task confidence in the teams (Kozlowski et al., 1996). They model appropriate task strategies, allowing newly developing teams (or new team members) to acquire collective task competencies. They also model teamwork, or how team members should work together. By their actions, such leaders establish the acceptable interaction patterns in the team. For example, if they model and promote idea exchange, constructive criticism, and mutual support, the team is likely to feel more efficacious with respect to its assigned tasks.

Team efficacy also emerges from leaders who exhort their members to work hard and do well. This is related to the empowerment processes of transformational and inspirational leaders (Bass, 1985; Burns, 1978). By their actions (see Bass, 1985; House, 1977; House &

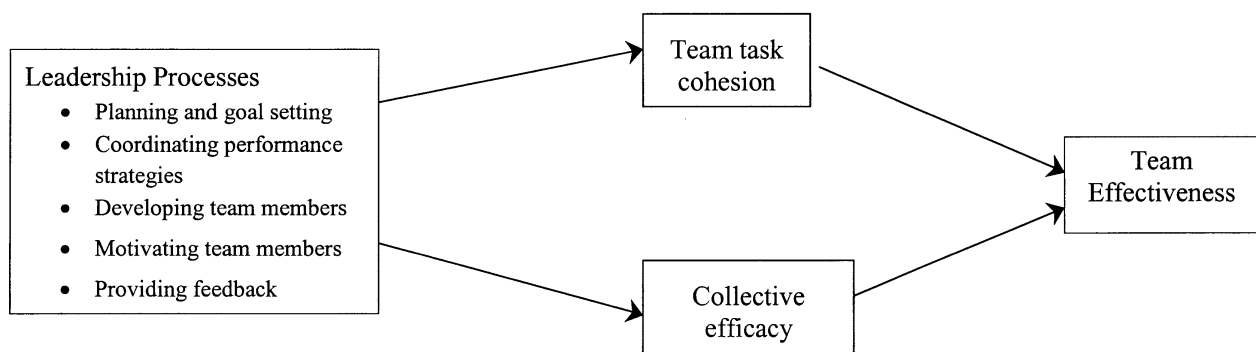


Fig 3. Influence of leader performance functions on team motivational processes.

Shamir, 1993 for a delineation of these actions), such leaders fuse each member's personal goals with the team or organizational mission. Team members identify at a personal level with the purpose and goals of the collective as a whole and are therefore more committed to their accomplishment (House & Shamir, 1993). Thus, transformational leadership is fundamentally directed at aligning the motive states of individual members with the purpose of the team as a whole (Burns, 1978; House & Shamir, 1993).

Finally, team efficacy emerges from the leader's effective accomplishment of the leadership functions listed in Table 1. These functions enhance the likelihood that leaders and their teams will build a history of successful accomplishment and increase their sense of competence. Kane et al. (in press) reported evidence for this association. They examined the leader's efficacy to complete leadership functions, the goals and strategies they establish for the group, their display of leadership functions, and their group's cohesion, collective efficacy, and performance on a simulated manufacturing game. They found that the leader's sense of efficacy and the goals and strategies they established influenced how they interacted with the team. Their goals and subsequent team-directed actions, in turn, influenced the team's collective efficacy. These leadership processes also had direct effects on the team's cohesion (after controlling for prior performance) and subsequent performance. Finally, to demonstrate the adaptiveness of these processes, Kane et al. varied the complexity of the team's operating environment. They found that leadership influences on the team were stronger under higher team complexity.

Other studies have demonstrated significant linkages among leadership behavior, team efficacy and team performance. Pescosolido (2001) found that informal team leaders had greater influence over the development of team efficacy than nonleaders, and that this influence was strongest early in the group's tenure. He suggested that this early influence was a function of the leader's own efficacy regarding the team, and of the leader's meaning-making behaviors that contribute to the reduction of ambiguity early in the team's tenure. Chase, Lirgg, and Feltz (1997) also reported a positive association between a leader's efficacy for the team and the team's subsequent performance. Chase et al. argued that the leader's efficacy expectations influence how he or she interacts with the team, the goals set for the team, and the kinds of performance skills that are focused on in team training.

Taken together, these findings and the model in Fig. 3 suggest the following:

*Proposition 4:* Teams whose leaders set high-performance goals, exhort and encourage members to adopt and achieve these goals, provide performance strategies to achieve these goals, and model appropriate performance strategies will display higher team efficacy and cohesion than teams with leaders who do not engage in such activities.

### 3.5. *Team affective processes*

Team effectiveness is also determined by the affective climate within the team. Barsade and Gibson (1998) contrast a "top-down" or "group as a whole" perspective versus a bottom-up perspective of group emotion. A top-down perspective argues that group dynamics or processes create an emotional tone that is fairly homogenous across group

members. This tone can be extreme in some instances and muted in others. A bottom-up perspective examines group emotion as an additive function of individual members' emotional states.

Barsade and Gibson describe four examples of the top-down perspective. One is group emotion as an overwhelming and encompassing force that carries group members to emotional extremes. The emotional tone of the group arises not from a sum of individual emotions, but rather from an exponential escalation of emotional tones expressed in group interactions. Barsade and Gibson note two processes that drive such emotional tone. The first is an impulsivity in which groups as a whole make decisions more readily and without the level of consideration that individuals alone would apply. The second is a social imitation process where individuals mimic the emotional expressions of fellow group members, creating a mass contagion, and reiterative dynamic that exacerbates extreme emotional expressions. In most cases, such extremes of collective emotion are likely to greatly reduce team effectiveness.

Group emotions as a top-down phenomenon can also act to mute or dampen individual affective expression in groups. Barsade and Gibson (1998) describe this effect as one of normative control. Group members moderate or constrain the active expression of their emotions particularly in settings where such expressions can be highly destructive (e.g., meetings with superiors, interactions with clients and customers). The muting of extreme emotional expression is expected to facilitate team interaction and presumably allow for an easier exchange of ideas.

Barsade and Gibson (1998) describe group cohesiveness as part of the emotional climate of the group. Earlier in this article, we described team task cohesion as a component of the team emerging from, and contributing to, team motivational processes. However, Barsade and Gibson describe cohesion also in terms of interpersonal liking (Lott & Lott, 1965), as a positive affective "glue" that holds the team together. Zaccaro and Lowe (1988) found that while task cohesion facilitated team performance on a task where member products were summed, interpersonal cohesion had mixed results, producing both higher task commitment and higher process loss. Barsade and Gibson note that this aspect of cohesion as an emotional glue, binding members to the team, provides the force that can be exerted on team members to conform to team norms (Festinger, 1950; Festinger et al., 1950). Thus, the effects of group emotion in the form of team liking ought to depend upon the direction of group performance norms (Berkowitz, 1954, 1965; Festinger, 1950; Festinger et al., 1950; Schachter, Ellertson, McBride, & Gregory, 1951; Seashore, 1954).

Finally, Barsade and Gibson (1998) note that group emotional state can act to signal both phases of group development and key transitions periods in team performance episodes. For example, Tuckman (1965) and Tuckman and Jenson (1977) described a "storming" stage in group development where team members disagree over team procedures and norms, express discontent with many aspects of team functioning, and team norms and goals grow out of the resolution of these conflicts. Gersick (1988a, 1988b) describes a model in which teams cycle through phases of team performance (see also Marks, Mathieu, & Zaccaro, 2001); she notes that at particular points in the teams' performance cycles, team emotions will escalate as members become concerned about meeting performance expectations. These effects of team emotions can be beneficial for team effectiveness if they result in processes that foster more

effective group interactions. Thus, according to Tuckman, if members successfully negotiate their storming period, they enter a “norming” phase in which team interactions are more structured, patterned, and team members are more cohesive.

The alternate perspective offered by Barsade and Gibson (1998) examines team emotion in terms of “how the emotions of individual group members combine to create group-level emotion, and how group emotion can be seen as the sum of its parts” (p. 88). They describe effects of mean emotions of group members, the variance in member emotional states, and the effects of extremes among members.

Most of the research studies reflecting a bottom-up perspective have focused on mean level of affect in groups, including several that have examined the effects of average team affect on key outcomes. For example, a positive mood among team members can foster more cooperation, more participation, less conflict, and stronger social cohesion (Carnevale & Isen, 1986; Rafaeli & Sutton, 1989; George, 1996). Collective negative moods result in more internal conflict and less willingness by team members to work with each other, i.e., participate in team activities (George, 1996). The result can be the impairment of motivational and coordination processes in teams, lower prosocial behavior, and lower group performance (George, 1990a, 1990b). Affective climate can also influence group information processing. Collective positive mood can increase the amount of information that is processed in teams, as well as the creativity of member contributions (George, 1996).

Teams performing under stressful conditions can be highly susceptible to emotional distress across team members. As team environments become more aversive (i.e., more time-urgent, stressful, complex, ambiguous), team members obviously need to maintain a collective calm. If the team succumbs to stress, member interactions become more narrowly focused among a subset of the team, information becomes increasingly less shared among team members, decision alternatives are not fully explored, and decision making accuracy declines (Argote et al., 1989; Gladstein & Reilly, 1985; Isenberg, 1981). Likewise, members become less committed to collective decisions (Frye & Stritch, 1964). Teams are not likely to be able to avoid environmental stressors; to be effective, they need to develop collective coping mechanisms that foster continued effectiveness, even under stress.

### *3.6. Leadership and team affect*

Fig. 4 indicates the proposed linkages between leader behavior and team affective processes. There has been little empirical research examining the influence of the leader on group emotion. The studies that have been completed examined leader influences on team performance under stress. Most of these studies demonstrated that team members are likely to display less emotional reaction to stressors if leaders provide clear team goals, clear specification of member roles, and unambiguous performance strategies (Isenberg, 1981; Mintz, 1951; Strauss, 1944; Sugiman & Misumi, 1988).

An important role of team leaders is to moderate the degree of affect in the team by fostering a climate where disagreements about team strategies can be aired constructively. Amason (1986) examined cognitive conflict and affective conflict in top management

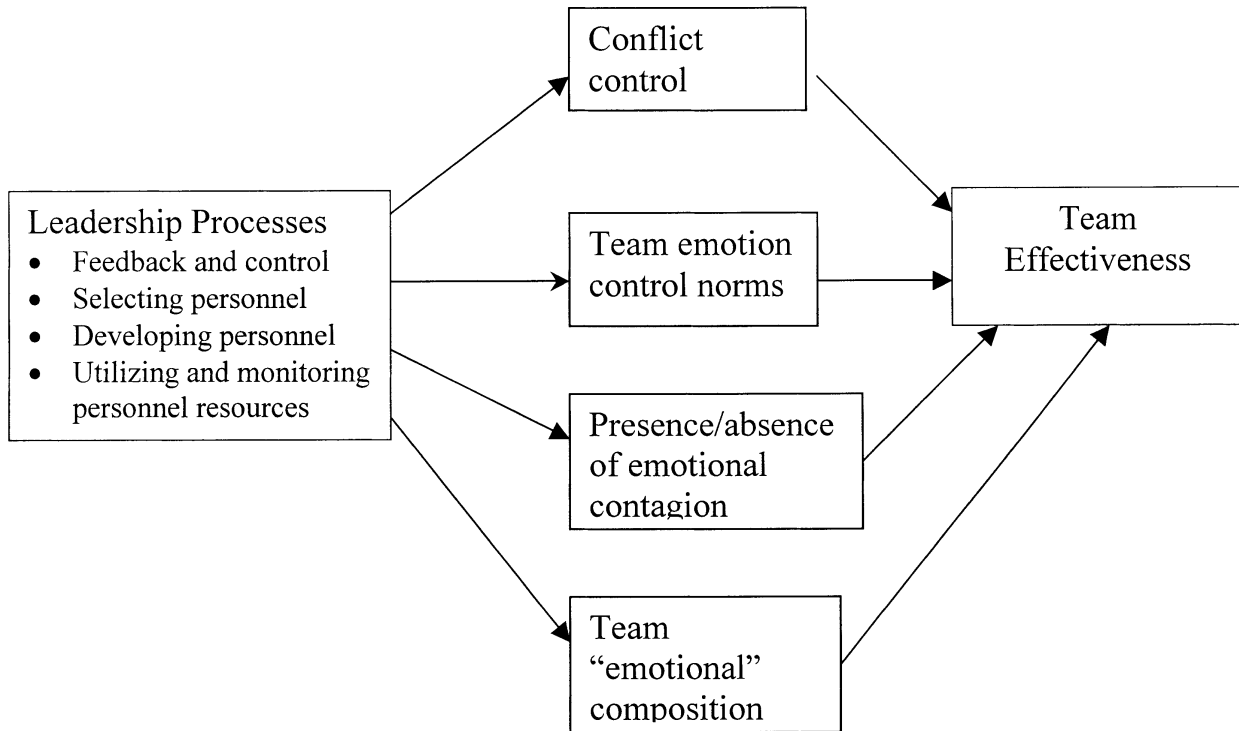


Fig 4. Influence of leader performance functions on team affective processes.

teams. Cognitive conflict refers to conflict among team members that “is generally task-oriented and focused on judgmental differences about how best to achieve common objectives” (p. 127). Such conflict is considered helpful to team decision quality because it results in diversity and integration of multiple perspectives. Affective conflict “tends to be emotional and focused on personal incompatibilities or disputes” (p. 129). Such conflict inhibits decision consensus, impairs decision quality, and contributes to lower unit effectiveness (Katz, 1977).

Amason provided support for these proposed differences between cognitive and affective conflict from surveys of 48 top management teams in food-processing companies and from a second sample of five furniture manufacturing companies. He found that cognitive conflict was positively related, and affective conflict negatively related to the quality, understanding, and acceptance of top management team decisions. Thus, for leaders to help teams be more effective, they need to manage the climate of the team so that cognitive conflict is supported but affective conflict is discouraged.

The top-down perspective of group emotion described by Barstade and Gibson suggests several other means by which leaders can influence group emotion and therefore team effectiveness. They note that impulsivity and imitation processes can create a contagion phenomenon where emotions run wild and out of control. The provision of clear and strong direction by team leaders can modulate such emotional contagion (Strauss, 1944; Sugiman & Misumi, 1988). Barstade and Gibson also note that group emotional tone can be modulated as well by the existence of strong established norms that prescribe appropriate and inappropriate displays of emotion. Leaders have a significant role in establishing team norms (Zander,

1971); therefore, they can facilitate healthy emotional climates in teams by fostering and encouraging norms moderating emotional expression.

Using the bottom-up perspective, Barsade and Gibson (1998) suggest the existence of team members who, by virtue of their own personality, mood, and influence, can disproportionately worsen the emotional tone of the team. This suggests that leaders and managers may be able to influence a team's affective climate through member selection. For example, managers who establish temporary project teams are likely to attend carefully to the "emotional content" of the team, and who will or will not be able to avoid affective conflict. Alternatively, leaders may use counseling and developmental approaches to address emotionally problematic team members. Thus, leaders can shape the team's affective climate proactively by personnel selection and development strategies.

These ideas and findings, as well as the model in Fig. 4, suggest the following propositions:

*Proposition 5:* Teams whose leaders provide clear performance goals, role assignments, and performance strategies will react less emotionally to stressful circumstances and display less emotional contagion than teams whose leaders provide little or no structure and direction.

*Proposition 6:* Teams whose leaders establish and encourage emotional control norms will display less affective conflict than leaders who do not establish such norms.

### 3.7. Team coordination processes

Team effectiveness depends fundamentally upon how well team members can coordinate their actions. This aspect of team performance was the basis for a taxonomy of team performance functions, described by Fleishman and Zaccaro (1992), which classified activities required for effective team coordination and integrated performance. This taxonomy has gone through several iterations (Cooper, Shiflett, Korotkin, & Fleishman, 1984; Nieva et al., 1978; Shiflett, Eisner, Price, & Schemmer, 1982) until its current form, which contains the following seven superordinate dimensions:

- Orientation functions.
- Resource distribution functions.
- Timing functions.
- Response coordination functions.
- Motivational functions.
- Systems monitoring functions.
- Procedure maintenance functions.

*Orientation functions* refer to processes by team members to acquire and exchange specific information required for task accomplishment (cf. Lanzetta & Roby, 1960). Task coordination requires that team members engaging in collective action have knowledge of each other's resources and constraints, of the collective task goals and mission, of environmental characteristics and constraints, and of the priority given to the accomplish-

ment of specific tasks. This information exchange occurs both in the planning of team solutions and during the execution of team actions. *Resource distribution functions* are activities such as the assignment of members to specific tasks during collective action, the distribution of requisite material resources across subtasks, and balancing task load across members. While such tasks are clearly aspects of team planning, during the execution phase these functions center on the shifting of role and task assignments in response to changing environmental and team conditions.

These functions reflect in part the “combination of contributions” processes that fundamentally underlie small group performance (Hinsz et al., 1997; Steiner, 1972). Hinsz et al. define as the two aspects of this model:

- (a) the identification and application of the important contributions (resources, skills, abilities, and knowledge) group members bring with them to the group interaction and task and (b) the processes involved in the way these various contributions are combined (aggregated, pooled, or transformed) to produce group-level outcomes (p. 56).

Orientation functions reflect the identification of member contributions in line with task demands and the exchange of resources information among team members. This produces a shared understanding of team resources. Resource distribution functions reflect how members choose to combine these resources, producing a shared understanding of team strategies and tactics.

*Timing functions* include those activities by team members to coordinate the pacing and speed of task accomplishment. Team pacing incorporates activities regulating the speed of task completion for the team as a whole, as well as for each individual team member. *Response coordination functions* refer to the specific sequencing of member activities and their timing relative to the occurrence of other team actions. *Motivational functions* are activities geared toward procuring the commitment of members to team task accomplishment and their willingness to work hard on behalf of the group. Unlike the activities linked to other team performance functions, many of these activities are most likely to occur long before team task accomplishment. That is, teams establish early in their tenure the performance norms and reward systems that will generally apply to most team tasks. However, these structures may be altered in subtle ways when teams confront specific tasks. Likewise, motivational functions during task execution may take the form of exhortations and encouragement when teams are performing under difficult circumstances.

The two remaining team performance functions refer to activities regarding the monitoring and maintenance of ongoing team actions, and the adjustment of those actions when they become dysfunctional. *Systems monitoring functions* include those actions directed at the detection of errors in the nature and timing of member activities. *Procedure maintenance functions* refer to the team monitoring to ensure compliance with established performance standards. The emphasis here is more on team maintenance than on error detection. Both sets of functions include activities related to the adjustment of member actions in response to team derailment. These monitoring and adjustment activities are critically important for team performance, particularly for teams confronting dynamic and ambiguous situations. Indeed, when comparing the relative contributions of several functions, Gualtieri, Parker, and



Zaccaro (1995) found that monitoring activities were most instrumental for team decision-making effectiveness.

To be effective, these team coordination functions need to become fairly automatic behavior patterns displayed by team members, individually and collectively, as teams confront tasks. Likewise, if teams need to operate in highly dynamic and complex conditions, then the application of these functions needs to be adaptive. In essence, teams need to balance two countervailing necessities in such environments: the need to standardize how team members contribute and combine their resources and the requirement that they remain flexible as task conditions become more dynamic.

This balance is created through “regulatory mechanisms” established within the team. These mechanisms refer to operating procedures established to govern the activation, occurrence, intensity, and monitoring of team performance functions. These procedures become encoded in team memory and new members are socialized to adopt and accept these procedures. Examples of such mechanisms include team performance norms, communication rules, and trained strategies shared by team members about how to accomplish routine team functions.

An important consideration in teams that are effective in dynamic environments is that regulatory mechanisms have “built-in” operating procedures that promote adaptability. For example, team members may establish different communication and decision-making rules that are triggered by certain crisis situations. Likewise, team strategies may be encoded that specify how team member roles are to change as performance situations change.

### 3.8. Leadership and team coordination processes

Fig. 5 indicates the proposed effects of leadership on team coordination processes. Leadership influences on the development and maintenance of successful team coordination processes may be characterized in stages (Kozlowski et al., 1996). First, leaders need to facilitate the identification and combinations of contributions from team members that are most likely to lead to task success. This facilitation means developing their awareness of what resources are available to the team. As suggested by Fleishman et al.’s (1991) functional leadership taxonomy, leaders should follow such identification by planning how to effectively combine and integrate these resources.

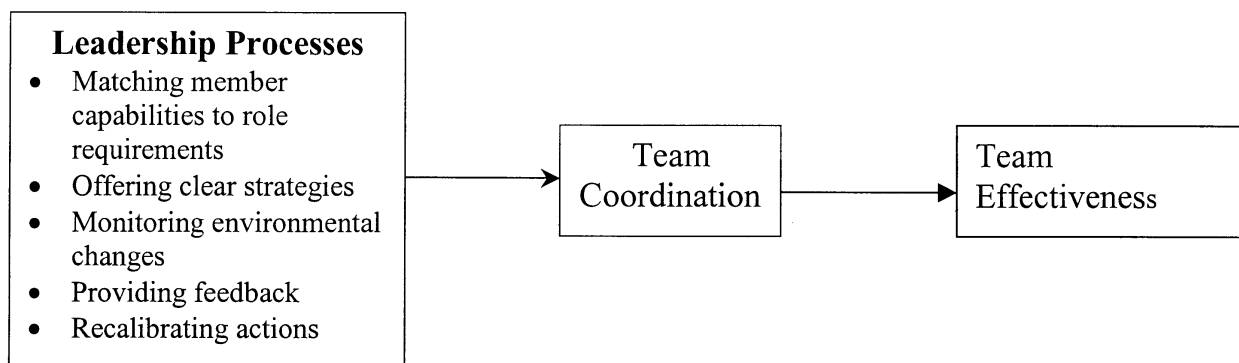


Fig 5. Influence of leader performance functions on team coordination.

The second step is for leaders to provide training, instruction, and opportunities for team members to learn the roles and tasks that need to be integrated into effective teamwork. The focus is not as much on learning individual roles, but rather on developing the interaction patterns necessary for team success. Finally, the team leader needs to facilitate the development of mechanisms that regulate and standardize these patterns. Ideally, once these mechanisms are established, they are reinforced by the team members while monitoring team interactions and dynamics.

These steps produce regulated coordination patterns in the team. However, they do not necessarily foster team effectiveness under dynamic conditions adaptation; indeed, they may cause the team to become more rigid in its responses within a dynamic environment, particularly if these patterns were successful on earlier tasks. When team complexity increases to the point where established interaction patterns are not sufficient, the team leader needs to reconsider team resources, recombine them into more viable coordination patterns, and reorient team regulation mechanisms (Kozlowski et al., 1996). In addition, to promote team adaptation, team leaders need to promote the display of flexibility and creativity among team members, albeit within the confines of team task requirements and environmental conditions.

These ideas and the model in Fig. 5 suggest the following proposition:

*Proposition 7:* Teams whose leaders match individual member capabilities to role requirements, offer clear performance strategies, monitor and provide feedback on the accomplishment of these strategies, and recalibrate team member actions when environmental conditions change, will be better coordinated and more effective than teams whose leaders do not display such activities.

#### **4. Team influences on leader effectiveness**

In this article, we have focused exclusively on the influence of the leader on team effectiveness. However, one of our central arguments is that this is a reciprocal influence, where team processes influence leader effectiveness. For example, a high level of distributed expertise in teams facilitates several of the leadership functions described by Fleishman et al. (1991). Functionally diverse teams can help leaders interpret environmental ambiguity and reduce uncertainty.

In top management teams, where environmental complexity is typically higher than for lower level leaders (Zaccaro, 1996), Jacobs and Jaques (1987) describe two central uncertainty reduction mechanisms. First, when authority relationships are weakened, or at least suppressed, lower ranking individuals are likely to contribute more readily to the identification of meaningful patterns in the organization's environment. In a strong authority arrangement, conformity pressures would result in such individuals adopting with little question the patterns discerned by their superiors, even if such patterns are inaccurate. Second, if the top executive team is constructed with individuals of varying functional expertise, the team as a whole has considerably more resources to develop more complex representations of the organization's operating environment.

These factors led Jacobs and Jaques to suggest, “it would in theory be possible for a corporate collegium to deal with more highly complex environments than could individuals” (p. 44). Indeed, several empirical studies confirm the positive influence of diverse top management team demographics on organizational processes and outcomes (Bantel & Jackson, 1989; Hoffman & Hegarty, 1993; Kech & Tushman, 1993; Priem, 1990; Wiersema & Bantel, 1992).

Expert teams can also help leaders be more effective by assisting them in the acquisition of information in their boundary spanning roles (i.e., by acting as part of their information networks). Ancona and Caldwell (1988) identified several boundary-spanning roles for group members centered on the acquisition of information necessary for group effectiveness. By contributing as part of the leader’s information network, team members expand the surveillance resources of the team.

## 5. Summary

In this article, we have specified a number of fundamental components of team effectiveness. These are succinctly categorized in terms of cognitive, motivational, affective, and coordination processes. In spite of vast literatures in both leadership and team dynamics, there are few conceptual frameworks of how leaders contribute systematically to team effectiveness. Accordingly, we have described several of these contributions in the context of a broad team effectiveness model. We have also suggested that as teams become more experienced and achieve a significant level of expertise, other members take over more of the leadership functions, while designated leaders retain their boundary spanning responsibilities. Finally, we have briefly outlined several means by which teams influence leader effectiveness.

Existing theories of leadership and team dynamics tend to minimize the contributing influences of each of these processes on the other. Such minimization leads to a less than complete understanding of collective decision making and performance. In teams such as military units, or those in more traditional organizational forms, which are typically organized in a strong hierarchical structure, a major portion of the variance in performance may reside in factors associated with leadership. The failure to understand this relationship can limit the training and development of such teams and leaders, respectively. Alternatively, as many organizations move from a traditional hierarchical structure to a more team-based one, team processes have an increasingly important influence on leader and organizational effectiveness. Such influences need to be considered more carefully and modeled in theories of organizational and strategic leadership.

## References

- Amason, A. C. (1986). Distinguishing the effects of functional and dysfunctional conflict on strategic decision-making: resolving a paradox for top management teams. *Academy of Management Journal*, 39, 123–148.
- Ancona, D. G. (1987). Groups in organizations: extending laboratory models. In: C. Hendrick (Ed.), *Group processes and intergroup relations* (pp. 207–230). Newbury Park, CA: Sage.

- Ancona, D. G., & Caldwell, D. F. (1988). Beyond task and maintenance: defining external functions in groups. *Group and Organization Studies*, 13, 468–494.
- Argote, L., Turner, M. E., & Fichman, M. (1989). To centralize or not to centralize: the effects of uncertainty and threat on group structure and performance. *Organizational Behavior and Human Decision Processes*, 42, 58–74.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37, 122–147.
- Bandura, A. (1986). *Social foundations of thought and action: a social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bantel, K. A., & Jackson, S. E. (1989). Top management and innovations in banking: does the composition of the top team make a difference? *Strategic Management Journal*, 10, 117–124.
- Barsade, S. G., & Gibson, D. E. (1998). Group emotion: a view from top and bottom. In: D. H. Gruenfeld (Ed.), *Research on managing groups and teams* (pp. 81–102). Stamford, CT: JAI Press.
- Bass, B. M. (1985). *Leadership and performance beyond expectations*. New York: Free Press.
- Bass, B. M. (1990). *Bass and Stogdill's handbook of leadership: theory, research, and managerial applications* (3rd ed.). New York: Free Press.
- Berkowitz, L. (1954). Group standards, cohesiveness, and productivity. *Human Relations*, 7, 509–519.
- Berkowitz, L. (1965). Group norms among bomber crews: patterns of perceived crew attitudes, and crew liking related to air crew effectiveness in Far Eastern combat. *Sociometry*, 19, 141–153.
- Blake, R. R., & Mouton, J. S. (1964). *The managerial grid*. Houston: Gulf Publishing.
- Blickensderfer, E., Cannon-Bowers, J. A., & Salas, E. (1998). Cross training and team performance. In: J. A. Cannon-Bowers, & E. Salas (Eds.), *Making decisions under stress: implications for individual and team training* (pp. 299–311). Washington, DC: American Psychological Association.
- Burke, C. S. (1999). *Examination of the cognitive mechanisms through which team leaders promote effective team processes and adaptive performance*. George Mason University: Unpublished dissertation.
- Burke, C. S. & Zaccaro, S. J. (in preparation). *The influence of leader sense-making and sense-giving on team mental models and team adaptation*.
- Burns, J. M. (1978). *Leadership*. New York: Harper & Row.
- Cannon-Bowers, J. A., Salas, E., & Converse, S. A. (1990). Cognitive psychology and team training: shared mental models in complex systems. *Human Factors Society Bulletin*, 33, 1–4.
- Cannon-Bowers, J. A., Salas, E., & Converse, S. (1993). Shared mental models in expert team decision making. In: N. J., Castellan Jr. (Ed.), *Current issues in individual and group decision making* (pp. 221–246). Hillsdale, NJ: Lawrence Erlbaum.
- Carnevale, P. J. D., & Isen, A. M. (1986). The influence of positive effect and visual access on the discovery of integrative solutions in bilateral negotiations. *Organizational Behavior and Human Decision Processes*, 37, 1–13.
- Carron, A. V. (1982). Cohesiveness in sport groups: interpretations and considerations. *Journal of Sport Psychology*, 4, 123–138.
- Carron, A. V., Widmeyer, W. N., & Brawley, L. R. (1985). The development of an instrument to assess cohesion in sport teams: the group environment questionnaire. *Journal of Sport Psychology*, 7, 244–266.
- Cartwright, D. (1968). The nature of group cohesiveness. In: D. Cartwright, & A. Zander (Eds.), *Group dynamics: research and theory* (3rd ed.) (pp. 91–109). New York: Harper & Row.
- Chase, M. A., Lirgg, C. D., & Feltz, D. L. (1997). Do coaches' efficacy expectations for their teams predict team performance. *The Sports Psychologist*, 11, 8–23.
- Cooper, M., Shiflett, S., Korotkin, A. L., & Fleishman, E. A. (1984). *Command and control teams: techniques for assessing team performance*. Washington, DC: ARRO (ARRO Final Report).
- Davidson, J. E., Deuser, R., & Sternberg, R. J. (1994). The role of metacognition in problem solving. In: J. Metcalf, & A. P. Shimamura (Eds.), *Metacognition: knowing about knowing*. Cambridge, MA: MIT Press.
- Duncan, R. (1973). Multiple decision-making structures in adapting to environmental uncertainty: the impact on organizational effectiveness. *Human Relations*, 26, 273–291.
- Festinger, L. (1950). Informal social communication. *Psychological Review*, 57, 271–282.

- Festinger, L., Schachter, S., & Back, K. (1950). *Social pressures in informal groups*. Stanford, CA: Stanford University Press.
- Fiedler, F. E. (1964). A contingency model of leadership effectiveness. In: L. Berkowitz (Ed.), *Advances in experimental social psychology* (vol. 1, pp. 149–190). New York: Academic Press.
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: a new area of cognitive–developmental inquiry. *American Psychologist*, 34, 906–911.
- Fleishman, E. A. (1953). The description of supervisory behavior. *Personnel Psychology*, 37, 1–6.
- Fleishman, E. A., Mumford, M. D., Zaccaro, S. J., Levin, K. Y., Korotkin, A. L., & Hein, M. B. (1991). Taxonomic efforts in the description of leader behavior: a synthesis and functional interpretation. *Leadership Quarterly*, 2 (4), 245–287.
- Fleishman, E. A., & Zaccaro, S. J. (1992). Toward a taxonomy of team performance functions. In: R. W. Swezey, & E. Salas (Eds.), *Teams: their training and performance* (pp. 31–56). Norwood, NJ: ABLEX.
- Forsyth, D. R. (1990). *Group dynamics* (2nd. ed.). Pacific Grove, CA: Brooks/Cole Publishing.
- Frye, R., & Stritch, T. (1964). Effect of timed vs. non-timed discussion upon measures of influence and change in small groups. *Journal of Social Psychology*, 63, 139–143.
- George, J. M. (1990a). Personality, affect, and behavior in groups. *Journal of Applied Psychology*, 75, 107–116.
- George, J. M. (1990b). Leader positive mood and group performance. *Journal of Applied Social Psychology*, 25, 778–794.
- George, J. M. (1996). Group effective tone. In: M. A. West (Ed.), *Handbook of work group psychology* (pp. 77–93). Chichester, UK: John Wiley.
- Gersick, C. J. G. (1988a). Time and transition in work teams: toward a new model of group development. *Academy of Management Journal*, 31, 9–41.
- Gersick, C. J. G. (1988b). Marking time: predictable transitions in task groups. *Academy of Management Journal*, 32, 274–309.
- Gladstein, D. (1984). Groups in context: a model of task group effectiveness. *Administrative Science Quarterly*, 29, 499–517.
- Gladstein, D., & Reilly, N. (1985). Group decision making under threat: the tycoon game. *Academy of Management Journal*, 28, 613–627.
- Gross, N., & Martin, W. E. (1952). On group cohesiveness. *American Journal of Sociology*, 42, 546–554.
- Gualtieri, J. W., Parker, C. W., & Zaccaro, S. J. (1995). Group decision making: an examination of decision processes and performance. Paper presented at the 10th annual meeting of the Society for Industrial and Organizational Psychology, Orlando, FL.
- Hackman, J. R. (1976). Group influence on individuals. In: M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (pp. 1455–1525). Chicago: Rand-McNally.
- Hackman, J. R. (1987). The design of work teams. In: J. W. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315–342). Englewood Cliffs, NJ: Prentice-Hall.
- Hackman, J. R., & Morris, C. G. (1975). Group tasks, group interaction process, and group performance effectiveness: a review and proposed integration. In: L. Berkowitz (Ed.), *Advances in experimental social psychology* (vol. 8, pp. 45–99). New York: Academic Press.
- Hackman, J. R., & Walton, R. E. (1986). Leading groups in organizations. In: P. S. Goodman, et al. (Eds.), *Designing effective work groups* (pp. 72–119). San Francisco: Jossey-Bass.
- Hinsz, V. B., Tindale, R. S., & Vollrath, D. A. (1997). The emerging conceptualization of groups as information processors. *Psychological Bulletin*, 121, 43–64.
- Hirokawa, R. Y. (1980). A comparative analysis of communication patterns within effective and ineffective decision-making groups. *Communication Monographs*, 47, 312–321.
- Hoffman, R. C., & Hegarty, W. H. (1993). Top management influence on innovations: effects of executive characteristics and social culture. *Journal of Management*, 19, 549–574.
- House, R. J. (1977). A 1976 theory of charismatic leadership. In: J. G. Hunt, & L. L. Larson (Eds.), *Leadership: the cutting edge* (pp. 189–204). Carbondale, IL: Southern Illinois University Press.

- House, R. J., & Mitchell, T. R. (1974). Path-goal theory of leadership: *Journal of Contemporary Business*, 4, 81–97.
- House, R. J., & Shamir, B. (1993). Toward an integration of transformational, charismatic, and visionary theories. In: M. Chemers, & R. Ayman (Eds.), *Leadership theory and research: perspectives and directions* (pp. 81–107). New York: Academic Press.
- Isenberg, D. J. (1981). Some effects of time-pressures on vertical structure and decision-making accuracy in small groups. *Organizational Behavior and Human Performance*, 27, 119–134.
- Jacobs, T. O., & Jaques, E. (1987). Leadership in complex systems. In: J. A. Zeidner (Ed.), *Human productivity enhancement: vol. 2. Organizations, personnel, and decision making* (pp. 7–65). New York: Praeger.
- Kahai, S. S., Sosik, J. J., & Avolio, B. J. (1997). Effects of leadership style and problem structure on work group process and outcomes in an electronic meeting system environment. *Personnel Psychology*, 50, 121–146.
- Kane, T. D., Zaccaro, S. J., Tremble, T., & Masuda, A. D. (in press). An examination of the leader's regulation of groups. *Small Group Research*.
- Kanfer, R., & Ackerman, P. L. (1989). Motivational and cognitive abilities: an integrative/aptitude-treatment interaction approach to skill acquisition. *Journal of Applied Psychology*, 74, 657–690.
- Katz, D., & Kahn, R. L. (1978). *The social psychology of organizations*. New York, NY: Wiley.
- Katz, D., Maccoby, N., Gurin, G., & Floor, L. (1951). *Productivity, supervision, and morale among railroad workers*. Ann Arbor: Institute for Social Research, University of Michigan.
- Katz, R. (1977). The influence of group conflict on leadership effectiveness. *Organizational Behavior and Human Performance*, 20, 265–286.
- Kech, S. L., & Tushman, M. L. (1993). Environmental and organizational context and executive team structure. *Academy of Management Journal*, 36, 1314–1344.
- Kerr, S., & Jermier, J. M. (1978). Substitutes for leadership. *Organizational Behavior and Human Performance*, 22, 375–403.
- Kerr, S., Schriesheim, C. A., Murphy, C. J., & Stogdill, R. M. (1974). Toward a theory of leadership based upon the consideration and initiating structure literature. *Organizational Behavior and Human Performance*, 12, 62–82.
- Kivligan, D. M., Jr. (1997). Leader behavior and therapeutic gain: An application of situational leadership theory. *Group Dynamics: Theory, Research, and Practice*, 1, 32–38.
- Kleinman, D. L., & Serfaty, D. (1989). Team performance assessment in distributed decision making. In: R. Gibson, J. P. Kincaid, & B. Goldiez (Eds.), *Proceedings for interactive networked simulation for training conference* (pp. 22–27). Orlando: Institute for Simulation and Training.
- Klimoski, R., & Mohammed, S. (1994). Team mental model: construct or metaphor? *Journal of Management*, 20, 403–437.
- Kozlowski, S. W. J. (1998). Training and developing adaptive teams: theory, principles, and research. In: J. A. Cannon-Bowers, & E. Salas (Eds.), *Making decisions under stress: implications for individual and team training* (pp. 115–153). Washington, DC: American Psychological Association.
- Kozlowski, S. W. J., Gully, S. M., Salas, E., & Cannon-Bowers, J. A. (1996). Team leadership and development: theory, principles, and guidelines for training leaders and teams. In: M. M. Beyerlein, D. Johnson, & S. T. Beyerlein (Eds.), *Interdisciplinary studies of work teams: vol. 3. Team leadership* (pp. 251–289). Greenwich, CT: JAI Press.
- Lanzetta, J. T., & Roby, T. B. (1960). The relationship between certain group process variables and group problem-solving efficiency. *Journal of Social Psychology*, 52, 135–148.
- Larson, J. R., Jr., Foster-Fichman, P. G., & Franz, T. M. (1998). Leadership style and the discussion of shared and unshared information in decision-making groups. *Personality and Social Psychology*, 24, 482–495.
- Levine, J. M., & Moreland, R. L. (1989). Cognitive integration in work groups. Paper presented at the Conference on Socially Shared Cognition, Learning Research and Development Center, University of Pittsburgh.
- Levine, J. M., & Moreland, R. L. (1990). Progress in small group research. *American Review of Psychology*, 41, 585–614.
- Likert, R. (1961). *New patterns of management*. New York: McGraw-Hill.

- Likert, R. (1967). *The human organization: its management and value*. New York: McGraw-Hill.
- Lord, R. G. (1977). Functional leadership behavior: measurement and relation to social power and leadership perceptions. *Administrative Science Quarterly*, 22, 114–133.
- Lott, A. J., & Lott, B. E. (1965). Group cohesiveness as interpersonal attraction: a review of relationships with antecedent and consequent variables. *Psychological Bulletin*, 64, 259–309.
- Marks, M., Zaccaro, S. J., & Mathieu, J. (2000). Performance implications of leader briefings and team interaction training for team adaptation to novel environments. *Journal of Applied Psychology*, 85, 971–986.
- Marks, M. A., Mathieu, J., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*, 26, 356–376.
- McGrath, J. (1984). *Groups: interaction and performance*. Englewood Cliffs, NJ: Prentice-Hall.
- McGrath, J. E. (1991). Time, interaction, and performance (TIP): a theory of groups. *Small Group Research*, 22, 147–174.
- McIntyre, R. M., & Salas, E. (1995). Measuring and managing for team performance: lessons from complex environments. In: R. A. Guzzo, & E. Salas (Eds.), *Teams effectiveness and decision making in organizations*. San Francisco: Jossey-Bass.
- Minionis, D. P., Zaccaro, S. J., & Perez, R. (1995). Shared mental models, team coordination, and team performance. Paper presented at the 10th annual meeting of the Society for Industrial and Organizational Psychology, Orlando, FL.
- Mintz, A. (1951). Non-adaptive behavior. *Journal of Abnormal and Social Psychology*, 46, 150–159.
- Moreland, R. L., & Levine, J. M. (1992). Problem identification by groups. In: S. Worchel, W. Wood, & J. A. Simpson (Eds.), *Group process and productivity* (pp. 17–47). Newbury Park, CA: Sage.
- Mumford, M. D. (1986). Leadership in the organizational context: a conceptual approach and its application. *Journal of Applied Social Psychology*, 16, 212–226.
- Mumford, M. D., Zaccaro, S. J., Harding, F. D., Fleishman, E. A., & Reiter-Palmon, R. (1993). *Cognitive and temperament predictors of executive ability: principles for developing leadership capacity*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Nieva, V. F., Fleishman, E. A., & Rieck, A. M. (1978). *Team dimensions: their identity, their measurement, and their relationships*. Washington, DC: ARRO.
- Nygren, R., & Levine, E. L. (1996). Leadership of work teams: factors influencing team outcomes. In: M. M. Beyerlein, D. Johnson, & S. T. Beyerlein (Eds.), *Interdisciplinary studies of work teams: vol. 3. Team leadership* (pp. 67–104). Greenwich, CT: JAI Press.
- Orasanu, J., & Salas, E. (1993). Team decision making in complex environments. In: G. A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsombok (Eds.), *Decision making in action: models and methods* (pp. 327–345). Norwood, NJ: Ablex Publishing.
- Pescosolido, A. T. (2001). Informal leaders and the development of group efficacy. *Small Group Research*, 32, 74–93.
- Priem, R. L. (1990). Top management team group factors, consensus, and firm performance. *Strategic Management Journal*, 11, 469–478.
- Rafaeli, A., & Sutton, R. I. (1989). The expression of emotional expression in organizational life. In: B. M. Staw, & L. L. Cummings (Eds.), *Research in organizational behavior* (vol. 11, pp. 1–42). Greenwich, CT: JAI Press.
- Roby, T. B. (1961). The executive function in small groups. In: L. Petrullo, & B. Bass (Eds.), *Leadership and interpersonal behavior* (pp. 118–136). New York: Holt, Reinhardt, and Winston.
- Rouse, W. B., & Morris, N. M. (1986). On looking into the black box: prospects and limits in the search for mental models. *Psychological Bulletin*, 100, 359–363.
- Salas, E., Dickinson, T. L., Converse, S., & Tannenbaum, S. I. (1992). Toward an understanding of team performance and training. In: R. W. Swezey, & E. Salas (Eds.), *Teams: their training and performance* (pp. 3–29). Norwood, NJ: Ablex Publishing.
- Schachter, S., Ellertson, N., McBride, D., & Gregory, D. (1951). An experimental study of cohesiveness and productivity. *Human Relations*, 4, 229–238.

- Seashore, S. E. (1954). *Group cohesiveness in the industrial work group*. Ann Arbor, MI: Institute for Social Research.
- Shea, G. P., & Guzzo, R. A. (1987). Groups as human resources. In: K. Rowland, & G. Ferris (Eds.), *Research in personnel and human resources management*, vol. 5 (pp. 323–356). Greenwich, CT: JAI Press.
- Shiflett, S. C., Eisner, E. J., Price, S. J., & Schemmer, F. M. (1982). *The definition and measurement of team functions*. Bethesda, MD: ARRO (Final Report).
- Steiner, I. (1972). *Group process and productivity*. New York: Academic Press.
- Sternberg, R. (1985). *Beyond IQ: a triarchic theory of human intelligence*. New York: Cambridge University Press.
- Strauss, A. L. (1944). The literature on panic. *Journal of Abnormal and Social Psychology*, 39, 317–328.
- Sugiman, T., & Misumi, J. (1988). Development of a new evacuation method for emergencies: control of collective behavior by emergent small groups. *Journal of Applied Psychology*, 73, 3–10.
- Sundstrom, E. (1999). The challenges of supporting work team effectiveness. In: E. Sundstrom (Ed.), *The ecology of work group effectiveness: design guidelines for organizations, facilities, and information system for teams* (pp. 3–23). San Francisco, CA: Jossey-Bass.
- Tannenbaum, S. I., Smith-Jentsch, K. A., & Behson, S. J. (1998). Training team leaders to facilitate team learning and performance. In: J. A. Cannon-Bowers, & E. Salas (Eds.), *Making decisions under stress: implications for individual and team training* (pp. 247–270). Washington, DC: American Psychological Association.
- Tesluk, P. E., & Mathieu, J. E. (1999). Overcoming roadblocks to effectiveness: incorporating management of performance barriers into models of work group effectiveness. *Journal of Applied Psychology*, 84, 200–217.
- Thibaut, J. W., & Kelly, H. H. (1959). *The social psychology of groups*. New York: Wiley.
- Tuckman, B. W. (1965). Developmental sequences in small groups. *Psychological Bulletin*, 63, 384–399.
- Tuckman, B. W., & Jenson, M. A. C. (1977). Stages of small group development revisited. *Group and Organization Studies*, 2, 419–427.
- Tziner, A. (1982). Differential effects of group cohesiveness types: a clarifying overview. *Social Behavior and Personality*, 10, 227–239.
- Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage Publications.
- Veldhuyzen, W., & Stassen, H. G. (1977). The internal model concept: an application to modeling human control of large ships. *Human Factors*, 19, 367–380.
- Weldon, E., & Weingart, L. R. (1993). Group goals and group performance. In: D. Moreland, & M. Hogg (Eds.), *British Journal of Social Psychology: special issue on social processes in small groups*, 32 (4), 307–334.
- Wiersema, M. F., & Bantel, K. A. (1992). Top management team demography and corporate strategic change. *Academy of Management Journal*, 35 (1), 91–121.
- Yukl, G. (2002). *Leadership in organizations* (4th ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Yukl, G., & Van Fleet, D. D. (1992). Theory and research on leadership in organizations. In: M. D. Dunnette, & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., vol. 3) (pp. 147–197). Palo Alto, CA: Consulting Psychologists Press.
- Zaccaro, S. J. (1991). Nonequivalent associations between different forms of cohesion and group-related outcomes: evidence for multidimensionality. *Journal of Social Psychology*, 131, 387–399.
- Zaccaro, S. J. (1996). Social contextual considerations of efficacy beliefs: Defining multiple forms of social efficacy. Keynote address presented at the annual meeting of the Association for the Advancement of Applied Sport Psychology.
- Zaccaro, S. J. (2001b). *The nature of executive leadership: a conceptual and empirical analysis of success*. Washington, DC: APA Books.
- Zaccaro, S. J. (2002). Organizational leadership and social intelligence. In: R. Riggio (Ed.), *Multiple intelligences and leadership*. Washington, DC: Lawrence Erlbaum. Mahwah, NJ: LEA Publishers.
- Zaccaro, S. J., Blair, V., Peterson, C., & Zazanis, M. (1995). Collective efficacy. In: J. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment* (pp. 305–328). New York: Plenum.
- Zaccaro, S. J., Gualtieri, J., & Minionis, D. (1995). Task cohesion as a facilitator of group decision-making under temporal urgency. *Journal of Military Psychology*, 7, 77–93.
- Zaccaro, S. J., & Klimoski, R. (2001). The nature of organizational leadership. In: S. J. Zaccaro, & R. Klimoski



- (Eds.), *The nature of organizational leadership: understanding the performance imperatives confronting today's leaders* (pp. 3–41). San Francisco: Jossey-Bass.
- Zaccaro, S. J., & Klimoski, R. (in press). The interface of leadership and team processes. *Group and Organization Management*. Special Issue.
- Zaccaro, S. J., & Lowe, C. A. (1988). Cohesiveness and performance on an additive task: evidence for multidimensionality. *Journal of Social Psychology*, *128*, 547–558.
- Zaccaro, S. J., Marks, M., O'Connor-Boes, J., & Costanza, D. (1995). *The nature of leader mental models*. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Zaccaro, S. J., & McCoy, M. C. (1988). The effects of task and interpersonal cohesiveness on performance of a disjunctive group task. *Journal of Applied Social Psychology*, *18*, 837–851.
- Zaccaro, S. J., Mumford, M. D., Baughman, W., Johnson, J., Marshall-Mies, J., & Fleishman, E. A. (in preparation). The measurement of cognitive and metacognitive skills: Alternative measures for assessing Army leadership potential (ARI Technical Report). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
- Zaccaro, S. J., Parker, C. W., Marks, M. A., Burke, C. S., Higgins, J. M., & Perez, R. S., (1997). Team efficacy, communication and performance: implications for collective regulatory processes. Presented at the annual meeting of the Society for Industrial and Organizational Psychology, St. Louis.
- Zander, A. (1971). *Motives and goals in groups*. New York: Academic Press.