

COLLECTIVE MIND: AN INTEGRATION OF TEAM PERFORMANCE, SHARED
MENTAL MODELS AND WITHIN-GROUP AGREEMENT

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Abstract

The current paper addresses the concept of the collective mind and heedful interrelating as addressed by Weick and Roberts (1993). Heedful interrelating refers to the possibility of team members acting on the basis of team-level cognitive schema that are used to frame and orient action. The concepts of collective mind and heedful interrelating are theoretically disentangled and related to the literature on individual and team performance, shared mental models, and within-group agreement. Following this, a series of propositions are provided in order to guide future research on the concept of collective mind and heedful interrelating as discussed by Weick and Roberts (1993), providing guidelines for integrating these constructs within the groups and teams literature. A general summary is then provided.

Introduction

Scientific literature on groups and teams in the workplace is becoming increasingly prevalent, developing in parallel with group and team applications within managerial settings, in which teams and groups have been used with increasing regularity (Goodman, Ravlin, & Schminke, 1987; Taggart, 2002). Within this literature, and somewhat contradicting the trend within organizational science of focusing on group and team input and output models (Ilgen, 1999), group and team processes have emerged as major foci (Levine & Moreland, 1990; Marks, Mathieu, Zaccaro, 2001). Furthermore, descriptive, rather than normative or selection/training research on groups and teams has been shown to be useful, with researchers covering a broad range of topics from group development (Gersick, 1988) to group-think (Aldag & Fuller, 1993) at all levels of organizations (Cohen & Bailey, 1997; Hambrick, 1994; Kramer, 1998; Peterson, Owens, Tetlock, Fan & Martorana, 1998).

As an important emergent property of effective teams, the idea of the collective mind has been advanced as a component vital to teams performing in situations requiring high-reliability (Weick and Roberts, 1993). As stated by Weick and Roberts, the collective mind is “a pattern of heedful interrelations of actions in a social system” (1993; p. 357). These “heedful interrelations of actions” purportedly allow near error-free performance within a given environment. Although originally studied within the context of high risk team contexts such as aircraft carriers, the factors influencing and coalescing to precede and define high team performance within this context are relevant to all teams.

While fascinating, the rather amorphous constructs of collective mind and heedful interrelating, within groups and teams, have made empirical investigation of the ideas presented by Weick and Roberts (1993) somewhat problematic (A. P. Brief, personal communication, September, 2003). The current paper attempts to redress problems with the conceptualization of the ideas contained in Weick and Roberts (1993) for integration into a more mainstream, empirical framework. Specifically, we attempt to integrate discussions of collective mind and heedful interrelating with organizational research on team performance, shared mental models, and within-group agreement. First, a short overview of the concept of the collective mind will be given. Then, each of the three mainstream topics listed above will be discussed, and pertinent aspects of collective mind

and heedful interrelating will be accordingly integrated and/or contrasted against prevailing literature within each area. Following a thorough comparison and integration of research on the collective mind with the three topic areas just mentioned, a propositional structure will be erected, relating them to collective mind and heedful interrelating. We do this to advance conceptual understandings of ideas contained in Weick and Roberts (1993), and in an attempt to advance the study of concepts which heretofore have been considered outside the domain of more mainstream organizational science (A. P. Brief, personal communication, September, 2003).

The Collective Mind

Recently, situations requiring highly reliable performance have been thrust into the limelight of organizational behavior research (e.g., Waller & Roberts, 2003). In examining a context in which the reliability of performance was critical, Weick and Roberts (1993) proposed the concept of the collective mind as necessary in these contexts and provided evidence of its validity with qualitative data. In their model, the collective mind is a state where individuals act and process information with great heed while interrelating collectively by cognitively contributing, representing, and subordinating their actions as a function of four defining properties of team performance. Heedfully performed actions may be conceptualized as those carried out "...carefully, critically, consistently, purposefully, attentively, studiously, vigilantly, conscientiously, and pertinaciously" (Ryle, 1949, p. 151). Thus, heedful performance is not necessarily a function of the goal towards which a given behavior may be directed, but instead is a function of the degree of mindfulness with which a behavior is performed. Important to note is that with the description of heeded behaviors, a distinction is made between those engaged in automatically and those which are carried out as a function of repetition (i.e., habitualized action automated through routinization) and those which occupy the full consciousness of the performer, with heedful actions coinciding with the latter type of behaviors.

The portion of the equation noted as collective interrelating is now defined. As described by Weick and Roberts (1993), team actions/performance are cognitively constructed (contributing) while imagining an interrelated system of team actions (representing), which allows integrating the constructed action into the system of team actions (subordinating). This set of activities represents a cyclical process whereby appropriate behaviors are conjured in the mind of a team member in light of the member's place in a team, based on the overall team process, and then the imagined behavior is seamlessly integrated into the overall system which the team member creates through this three-step process. This mental integration allows for an evaluation of each action's appropriateness by each member of a team, before acting. Thus, for collective interrelating to occur, each team member must have an accurate representation of the joint situation as that situation is created (Asch, 1952). Only with sets of shared cognitions may a team be said to operate with a collective mind.

Along with the three antecedents of interrelated action listed above, Weick and Roberts also explicate four defining properties of group performance (1993). The first property is that the social forces of team life which motivate action are created only when individuals act as if the social forces exist. In other words, any influences of the team only exist if individuals believe that those forces exist. Thus, a team is an emergent, socially constructed phenomenon brought about only through the actions and cognitions

of team members (see also Berger & Luckmann for a similar view, 1967). The second property of group performance identified is that as individual team members act as if the team exists, team members are motivated to engage in interrelated action by contributing, representing, and subordinating action. Third, only through the three antecedents of interrelated action may a situation where interrelation among group activities be made possible. Lastly, the outcomes of patterns of interrelated performance behaviors necessarily vary according to the degree of heedfulness with which they are performed and the strength or interdependency by which they are tied together.

Another important aspect of the collective mind is that it is an emergent property existing in all teams, yet most evident in situations which allow no mistakes or lapses in mindful cognition and performance. However, the focus in examining the collective mind is "...at once on individuals and the collective, since only individuals can contribute to a collective mind, but a collective mind is distinct from an individual..." (p. 360). Thus, in understanding the collective mind's place within organizational science, it is important to understand modern approaches to conceptualizing antecedents and dimensions of performance at both the individual and team level of analysis.

Team Performance

Research within organizational science has attempted to disentangle the cluttered web of individual-level behaviors and cognitions that make up team performance from those which are more closely aligned with individual-level task performance (Fleishman & Zaccaro, 1992). Individuals in any position engage in what may be defined as taskwork, or performance behaviors which directly relate to the completion of organizationally-relevant tasks at the individual level (Hunt, 1996). Research examining individual-level performance has come a long way as of late and eight general dimensions of individual performance have been hypothesized as encompassing the majority of the individual-level job performance domain (one of which is facilitating peer/team performance), with an emphasis on the fact that performance is behavior or cognition with *observable* behavioral indicators (Campbell, McCloy, Oppler, & Sager, 1993; Harvey, 1990). Before moving on to team performance, it is important to note that performance is distinguished from performance antecedents, such as cognitive ability, knowledge, or motivation, and outcomes of performance, such as units produced, self-efficacy, or profit earned.

Team performance exists as a function of multiple performers within a team, working together interdependently towards a common, organizationally-relevant goal (Neuman & Wright, 1999). Although not existing at the team-level, when defining the team performance domain it is necessary to consider individual-level behaviors, as they relate to team-level performance. In keeping with the idea that performance is behavior (Campbell, et al., 1993), the prospect of attempting to conceptualize, much less validly measure team-level performance is nigh impossible, as individuals make up teams and their behavior is always at the individual level. Due to the difficulty of conceptualizing team-level behavior, and with behavioral performance measurement occurring at the individual level, many researchers look towards team processes as relevant constructs and indicators of team-performance (Bowers, Braun, & Morgan, 1997; Smith, Smith, Olian, Sims, O'Bannon, & Scully, 1994; for a dissenting view of process' place in research, please see Pfeffer, 1983, p. 348).

Team processes (i.e., team performance) are team “members’ interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioral activities directed toward organizing taskwork to achieve collective goals” (Marks, Mathieu, & Zaccaro, 2001; p. 357). These processes are the methods by which team members use information and materials shared by members of the team to produce team-relevant outcomes. These processes are distinct from taskwork due to the fact that they necessarily involve an interplay between team members for process completion and are directly relevant to completing team goals.

Taxonomies of teamwork indicate ten dimensions of performance nested within three overarching types of team performance (Marks, et al., 2001). The first type of team performance involves team processes related to transitions. Transitional behaviors involve those focused on evaluating or planning team activities which will guide behaviors toward accomplishing team goals. The performance domain of the transitional phase of performance consists of three components: (1) mission analysis formulation and planning, defined as evaluating future tasks, environmental characteristics, and team resources relevant to mission execution (Prince & Salas, 1993), (2) goal specification, defined as prioritizing goals for mission execution (Dickinson & McIntyre, 1997), and (3) strategy formulation, defined as development of multiple courses of action for mission execution (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995). These three types of performance commonly occur before individuals engage in task-relevant behaviors.

The second overarching performance domain consists of action processes, or processes which teams engage in while performing behaviors that lead directly to mission execution. The performance domain within action processes consists of four distinct variables: (1) monitoring goal progress, defined as tracking goal progress, interpreting environmental feedback in the light of what behaviors must come next, and communicating progress to team members (Jentsch, Barnett, Bowers, & Salas, 1999), (2) systems monitoring, understood as keeping tabs on team resources and relevant environmental conditions (Fleishman & Zaccaro, 1992), (3) team monitoring and backup responses, defined as team member feedback or coaching and direct teammate behavioral assistance (Dickinson & McIntyre, 1997), and (4) coordination activities, thought of as orchestrating the timing and the sequences of interdependent actions (Zalesny, Salas, & Prince, 1995).

The last of the three larger team performance domains consists of interpersonal processes which occur throughout both transition and action stages of team performance and may be defined as processes which aid in governing within-team interpersonal relationships. Three dimensions of interpersonal processes are thought to exist and are as follows: (1) conflict management, defined as providing conditions for the prevention and diffusion of interpersonal conflict (Simons & Peterson, 2000), (2) motivation/confidence building, involving producing and maintaining collective confidence, task-based cohesion, and motivation towards mission execution (Fleishman & Zaccaro, 1992), and (3) affect management, conceptualized as regulating team-member emotions during mission execution (Cannon-Bowers, et al., 1995).

As is the case with individual-level performance, there are team-level variables which may influence performance or be influenced by performance, yet are conceptually distinct from performance (Cohen & Bailey, 1997). These variables include antecedents of performance, such as knowledge and trait-level idiosyncrasies associated with a given

team, and the states teams may experience as a result of their environment and traits (Marks, et al., 2001). These situational and dispositional factors which may affect performance, yet are not behavioral in nature, have been referred to as emergent states and are defined as dynamic properties of a team that vary as a function of context, inputs, processes, and outputs. Emergent states are conceived of as not only team inputs, but also proximal outcomes, such as negative moods or a demotivating work climate leading to poor team performance and lower levels of team efficacy (Kelly & Barsade, 2001).

Teamwork and the Collective Mind

Considering the definition of the collective mind by Weick and Roberts (1993) as involving both a type of cognition (e.g., those which are done heedfully) and particular cognitions themselves (e.g., contributing, representing, and subordinating), and the four properties of group performance, one may attempt an integration of the idea of the collective mind and team processes and the relevant antecedents and outcomes of these processes with current literature on team performance. The first, and possibly the most important component of the collective mind model of team functioning involves the fact that all processes are carried out with great heed.

The heedful aspect of team functioning is not a behavior in itself, but rather describes the manner and motivation with which cognitions or behaviors are executed (Cohen, 1994). As such, any given level of heedfulness may be conceptualized as an emergent state within a team (Marks, et al., 2001). This state may occur as a function of a team's context, goals, and trait-level idiosyncrasies (Marks, et al., 2001; Weick & Roberts, 1993). Ergo, in the light of research by Campbell, et al. (1993) and Marks, et al. (2001), heedfulness may be conceptualized as an antecedent of performance and akin to motivation.

Another aspect of the collective mind is the idea that individuals must formulate their contributions (i.e., possible behaviors) using knowledge of each team members' functioning and how their particular team interrelates behaviorally, in order to represent their team and their current situation and subordinate a particular behavior within the team's functioning (Weick & Roberts, 1993). This process is akin to a thought experiment where an individual team member attempts to project a possible action for a situation and examines a hypothesized outcome for its suitability (Folger & Turillo, 1999). An understanding of the team which would allow accurately representing a given situation for a thought experiment requires similarly shared knowledge of the possible activities within each team member's behavioral domain and how each team member may be expected to react to the next possible event (Klimoski & Mohammed, 1994; Marks, Sabella, Burke, & Zaccaro, 2002; Weick & Roberts, 1993). Team-process knowledge is another antecedent of effective cognitions and behaviors associated with the collective mind and is related to the concept of shared mental models, which will be addressed later.

Perhaps the only aspect of the collective mind which is purely behavioral in nature is that of engaging in collective interrelating, which, as stated above, may be thought of as a team-oriented thought experiment. The process of engaging in this thought-experiment is one which occurs through contributing, representing, and subordinating (Weick & Roberts, 1993). In a cognition involving these three components, a team member actually imagines the team's current situation, the important variables to consider within that situation (representing), a possible behavior to perform

(contributing) and how that situation would be affected by a given actor's behavior, and how best to integrate any next behaviors into the team (subordinating).

The imagined behavior which a team member could contribute to a given team may fall within any individual or team performance dimensions mentioned above. However, the processes of contributing, representing, and subordinating are themselves team-oriented behaviors which integrate and compare aspects of the environment with team goals, allowing the formulation of appropriate courses of action. These three behaviors may be most easily conceptualized as action processes, involved in system monitoring before overtly behaving (Fleishman & Zaccaro, 1992; Marks et al., 2001).

In summary, it is possible to conceptualize all cognitions and behaviors in which any team member may be expected to engage as occurring, at least in part, as a function of the motivation and knowledge associated with the collective mind (Campbell, et al., 1993; Marks, et al., 2001). However, any individual cognition or behavior which may be related to one of the ten above-mentioned performance domains will likely exist as more accurate and applicable with greater levels of team-related knowledge and higher levels of motivation. Furthermore, according to the four dimensions related to team performance proposed in Weick and Roberts (1993), as individuals begin to think and perform with team-level functioning in mind, the idea of the team will be reified, and knowledge and motivation increased within the team, as the team is actualized through the four defining properties of group performance.

Shared Mental Models

The implications of accurate representations of team-related processes are illustrated above. As team members share more and more accurate mental representations of a given situation and processes involved in interrelated team functioning, accurate prediction of future events and more appropriate behaviors become possible (Klimoski & Mohammed, 1994; Weick & Roberts, 1993). Sharing mental representations of constructs related to team performance has been studied in depth in organizational science under the rubric of shared mental models (Cannon-Bowers & Salas, 2001).

Shared mental models are often defined as socially constructed knowledge structures representing shared information or beliefs about an environment and its expected behavior (Klimoski & Mohammed, 1994). Shared mental models support teams by allowing members of a team to engage in taskwork, avoiding time-costly team meetings to constantly formulate strategy, while still acting with team goals and team processes in mind (Druskat & Pescosolido, 2002; Levesque, Wilson, & Wholey, 2001). Extant in team literature is evidence and theory indicating that shared mental models allow anticipation of others' actions and needs through shared knowledge which improves coordination and directly influences individual behavior (Mathieu, et al., 2000; Mohammed & Dumville, 2001).

Shared mental models may be constructed around any process or thought which emerges as relevant for a team (Stout, Cannon-Bowers, & Salas, 1996). A team may share ideas related to antecedents of performance, such as ideas of the efficacy with which they are able to perform, the motivation which should be manifested due to the situation and tasks, and the knowledge which they will utilize to perform.

Shared Mental Models and the Collective Mind

The last two of the three cases above may be directly applied to an understanding of the heedful interrelating which occurs in the collective mind (Weick & Roberts, 1993).

Shared mental models, representing knowledge of the tasks team members are to interrelate with one another, is likely to improve performance by allowing accurate prediction of future team and situational states (Rentsch & Klimoski, 2001). By allowing accurate prediction of future occurrences, individuals will be better able to contribute, represent, and subordinate (Weick and Roberts, 1993). Weick and Roberts state that the collective mind emerges and the team is created as individuals act over time and heedfully interrelate. One method by which this may occur is the development of mental models.

In order for adequate performance in demanding situations, a necessary requisite may be a shared understanding of the degree to which the situations are demanding and the level of motivation required by a given situation (Druskat & Pesconsolido, 2002). A shared understanding of situational importance would allow similar levels of motivation across team members, making sure that no single member of the team was performing highly above or below other team members. This would reify the team as a cohesive unit, lead to more team affirming cognitions, allow quick adaptation to environmental changes, and reduce process errors within the team (Colquitt, Noe, & Jackson, 2002; Weick & Roberts, 1993).

In summary, the concept of shared mental models are inseparable from the concept of heedful interrelating and the collective mind (Weick & Roberts, 1993). Furthermore, support for ideas embodied in the collective mind may be found in research covering shared mental models. As individuals share more information regarding the processes of which each team member is capable and the amount of motivation to manifest, each team member will be more likely and more able to engage in behaviors associated with the collective mind. The following section discusses the manner in which variables important to the discussion thus far may be better conceptualized.

Within-Group Agreement

Often, researchers are interested in phenomena at the group level (Hofmann, 1997). However, as is the case with many variables within organizational science, constructs may only be conceptualized at the individual level (e.g., perception of climate, positive affect, and group cohesion). In order to allow meaningful interpretation and analysis of group-level events and processes, some researchers have argued for the specification of multi-level models able to account for both individual and higher-level phenomenon (Klein, Dansereau, & Klein, 1994; Klein, Tosi, & Cannella, 1999; for a particularly strong argument see Rousseau, 1985). Models specifying functional relationships between variables existing at multiple levels of analysis are composition models (Chan, 1998). Often, composition models take into account within-group agreement as a meaningful construct at the group level (Klein, Conn, Smith, & Sorra, 2001)

Within-group agreement (WGA) may be understood as the degree to which members of a group are homogenous, sharing similar levels of a given attribute (not to be confused with reliability, or similar *patterns* of levels; Klein, et al., 2001). Indices of agreement provide a quantitative assessment of the degree of variance or dispersion within a group along a given dimension, around a group mean (Lindell & Brandt, 1999). In a recent discussion by Klein et al. (2001), three common compositional research models were described which all consider WGA an important indicator of group-level phenomenon. Two of the models, called consensus models, discuss computing WGA to

assess the tenability of accurately representing the individuals within a group with a group score, by aggregating individual scores to the group level.

The third model discussed by Klein et al. (2001) is that of a dispersion model. Dispersion models consider important not only scores at one level of analysis, but also indices of those scores' dispersion (necessarily occurring at another level of analysis; e.g., personality, goal, or value heterogeneity). Researchers measuring and testing a hypothesis related to dispersion are interested in the correlates of between-group variability in the dispersion of the construct of interest. Thus, it is clear that dispersion models differ from consensus models in that dispersion models consider within-group homogeneity as an interest in and of itself, instead of existing simply as a necessary requisite for aggregation.

An example of a dispersion model is that of the shared mental model. The degree to which mental models are shared may be indexed by examining mental model dispersion within a group, indexed by WGA (Klein et al., 2001; Levesque, Wilson, and Wholy, 2001). High levels of dispersion existing within a group are likely to provide evidence of lower levels of mental model sharedness and thus, lower levels of collective mind functioning (Druskat & Pescosolido, 2002).

Within-Group Agreement and the Collective Mind

Although researchers espouse the use of WGA as an index of the level of a mental model's sharedness (Klein et al., 2001), Weick and Roberts spoke directly against the use of WGA as a meaningful index of collective mind (1993). Weick and Roberts discuss a situation wherein groups enact a unitary transactive memory structure "with differentiated responsibility for remembering different portions of common experience" (1993; p. 358). They then go on to argue that due to the fact that knowledge is distributed within the team in a non-redundant way, a team may be highly effective and contain within it all the necessary components for the emergence of the collective mind, but measures assessing the degree to which any given piece of information is shared by all group members would cause the erroneous assumption that the team is deficient, due to a lack of information sharedness. More specifically, Weick and Robert state "it is these integrations of disparate inputs that seem to embody the 'magical transformation'... of collective mental processes" (p. 358). Thus, "group mind is not indexed by within-group similarity of attitudes, understanding, or language" (p. 258)

In light of the research and theory indicating the positive effects of redundant information storage on team performance which preceded the publication date of Weick and Roberts' article in 1993 (London, 1975; Stasser, Taylor, Hanna, 1989; Vinokur & Burstein, 1974), it may have been fruitful for Weick and Roberts to explicate that WGA *may* not index the collective mind, instead of discussing the "magical" transformations of which teams are capable. The discrepancy between ideas that a variable's level of sharedness is meaningful or not meaningful for indicating the collective mind is important for both theoretical and methodological reasons. Thus, an important question is *what* the differences between variables that may or may not be valid indicators of the collective mind, when they are assessed using WGA, that is pertinent here.

When defining a variable to measure within a team context, it is important to consider how that variable is used by, and thus dispersed within, various members of the team (Hofmann, Griffin, & Gavin, 2000; Klein et al., 2001). As an example, extremely task-specific information, particular to a given position in a team, may not be shared by

team members in very different positions (Jones, Johnson, Butler, & Main, 1983; Marks et al., 2002). This is not necessarily a shortcoming of a team. Specializations within teams allow each team member to carry out different and necessary goal-related activities, with each member's knowledge and performance complementing that of other members' (Dryer & Horowitz, 1997; Kristof, 1996). Complementary team variables are those which make the team "whole" through their unshared nature (Muchinsky & Monahan; 1987). Thus, team member knowledge and performance which are complementary in nature do not give insight into the development of the collective mind when measured with WGA metrics.

On the other hand, there are other team-related variables which are more likely to be shared and important for team functioning. As an obvious example, shared knowledge of when performance is to take place (i.e., when to be at work) is very likely to be shared by team members in different positions. Information of this nature is more supplementary in nature. A supplementary team construct is defined as one which "supplements, embellishes, or possesses characteristics similar to other members" (Muchinsky & Mohan, 1987; p. 271). As such, team member knowledge and performance that supplement each other do give insight into the development of the collective mind when measured with WGA indexes.

The above argument appears to discount the usefulness of WGA indexes for all complementary team constructs, which is not the intention. Although WGA may not be meaningfully applied as a metric of the collective mind when measuring agreement along complementary team dimensions, WGA may be fruitfully applied to complementary variables for other reasons. An example of a team where WGA indexes on complementary dimensions may be interpreted meaningfully is that of a team which has little individual-position overlap or redundancy, such as team composed of members who fill positions with very different performance domains. In teams with a small amount of individual-position overlap, turnover is likely to pose a major problem, as losing a team member would cause the loss of important and unshared knowledge and performance abilities (Marks et al., 2002). In this team, greater levels of WGA may indicate the degree to which other team members will be able perform a lost member's duties. Thus, within teams with little individual-position overlap and high levels of complementary processes, WGA may be useful as a measure of the degree to which teams will likely suffer when a team member is lost. However, WGA will not assess the collective mind, irrespective of the level of individual-position overlap, along complementary team dimensions.

The collective mind exists as an emergent property of individual-level heedful interrelating of thoughts and behaviors, inexorably related to shared mental models (Weick & Roberts, 1993). As such, measuring components of the collective mind and heedful interrelating necessitate measurement of both individual and team-level variables (Klein, et al. 2001). The dispersion of shared knowledge and motivation associated with heedful interrelating are important when considering that effective team members must act in concert with one another. To facilitate similar levels of heedfulness, team members must act while having similar ideas about the salience of performance and knowledge about the interrelations of individuals within the team (Weick & Roberts, 1993). Both shared understandings of the environment and the tasks in which others are engaged, or about to engage, are likely to affect the ability of team members to contribute, represent, and subordinate. By measuring the dispersion within a given team along dimensions of

team member knowledge and appraisals of the situational importance, it is possible to assess the degree of shared knowledge and motivation within a team (Levesque, Wilson, & Wholey, 2001; Klein et al., 2001).

Using a WGA metric to measure the degree of knowledge and performance domain sharedness within a team, it may be possible to measure the ability of an individual team member to correctly contribute, represent, and subordinate by taking other team members' concurrent activities into account (Klein et al. 2001). Further, by measuring the sharedness of motivation levels and perceptions of the importance of successful performance within a team (i.e., high-reliability necessary situations), it may be possible to assess the degree to which a team is likely to act with heed and the emergence of the collective mind.

Summary

The collective mind has been presented as an emergent property within teams, as a function of heedful interrelating cognitions and actions within a team (Weick & Roberts, 1993). The heed with which actions are performed and the performance of the actions themselves may be distinguished as differing aspects of the collective mind (Marks, et al., 2001). Heed may be conceptualized as an emergent state within a team, synonymous with motivation, and an antecedent of behavior (Campbell, et al., 1993). Further, contributing, representing, and subordinating may be conceptualized as team-directed performance, akin to a thought-experiment and allowing interrelated actions, and mapping onto the performance dimension of systems monitoring (Marks, et al., 2001).

Interrelated cognitions and actions are thought to occur as a function of similar predictions of future environment and team member's actions (Weick & Roberts, 1993). More accurate predictions of future environment and team member's actions occur as a function of more highly shared mental models of the environment and individual/ team processes (Marks, et al., 2002; Mathieu, et al. 2000). Thus, the collective mind is allowed to manifest when team members have shared mental models.

One method within organizational science literature used to assess the degree of dispersion of a given construct within a team is that of WGA (Klein, et al., 2001). Within-group agreement is particularly useful in research examining levels of dispersion within a team. Although Weick and Roberts (1993) specifically argued against WGA as a meaningful index, it was noted above that with heedful theorizing on the part of researchers, indexes of WGA may be used as meaningful measures of mental model sharedness (Levesque, et al., 2001).

With the above reviews and integrations of literature on the collective mind and team performance, shared mental models, and WGA, a part of the collective mind's mystery has been unraveled. However, to help direct the study of research on collective mind, the current work intends to make several theoretical proposals to complement the above discussion. In light of the above conceptions of heedful interrelating and collective mind, the following section develops a short series of propositions meant to help fuel research on collective mind and heedful interrelating.

Future Research

Manifestations of the collective mind may be said to occur as a function of heedful interrelating (Weick & Roberts, 1993). Heedful interrelating is defined as the degree to which individuals behave in a group which indicates they are mindfully considering how they should contribute to the group by correctly representing the group

and subordinating their actions to the group (Weick & Roberts, 1993). Although any behavior may be done through a process of heedful interrelating, the processes of contributing, representing, and subordinating required to collectively interrelate within a team is a behavior akin to systems monitoring within the Marks et al. (2001) team-performance framework.

Proposal 1: Scores on a heedful interrelating measure will correlate more strongly with scores on a systems monitoring measure than other team performance dimensions.

Through the process of heedfully interrelating while in the team performance domain, individuals are more likely to subordinate their actions in a way that is consistent with the demands of any given situation (Weick & Roberts, 1993). Thus, heedful interrelating is thought to significantly decrease the number of errors performed by a team (Weick & Roberts, 1993).

Proposal 2: Heedful interrelating within a team will be negatively related to the number of errors performed by a team.

As noted by Weick and Roberts (1993), heedful interrelating is likely to occur more often as a function of the degree to which a team has had a chance to create the team and the collective mind via previous team performance. This notion is directly tied to the amount of a team's experience. As teams reify their own existence through team performance over time, they are more likely to exhibit heedful interrelating.

Proposal 3a: A team's average level of team experience will positively relate to heedful interrelating.

Proposal 3b: A team's length of tenure will positively relate to heedful interrelating.

Shared mental-models, although not explicitly discussed by Weick and Roberts (1993), are thought to be crucial for effective team performance (Cannon-Bowers & Salas, 2001). While each team member, in a team where the collective mind is manifested, may not share all information required by each team member to perform position-specific duties (Cannon-Bowers & Salas, 2001; Weick & Roberts, 1993), for the collective mind to manifest, each team member should have a shared understanding of the importance of behavior for the team (Weick & Roberts, 1993). A shared mental-model of the importance of performance for each team member is akin to a shared level of motivation to perform within a team. Although a team's average level of motivation to perform may relate to heedful interrelating, after controlling for the average level of motivation, heedful interrelating should be positively influenced by the similarity between team members' levels of motivation.

Proposal 4: After controlling for average levels of motivation, heedful interrelating will be positively related to the degree of shared motivation levels within a team.

General Summary

The above arguments extend the level of integration of the idea of the collective mind with other, related bodies of literature. In doing this, the collective mind and heedful interrelating were discussed as they relate to team performance, shared mental models, and within-group agreement. Following this, propositions meant to aid in the future study of collective mind and heedful interrelating were provided. In conjunction with these propositions, the current authors would also like to encourage the integration

of collective mind and heedful interrelating with other topic areas within organizational science, a task we leave to future authors. We believe that future research should also attempt to disentangle the relationship between heedful interrelating and other important team processes through empirical research.

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