



Collective decision making, leadership, and collective intelligence: Tests with agent-based simulations and a Field study



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ARTICLE INFO

Article history:

Received 1 February 2015

Accepted 4 January 2016

Editor: Kristin Cullen-Lester

Keywords:

collective decision making
collective leadership
collective intelligence
agent-based modeling and simulations

ABSTRACT

This multi-level (individual and collective) study examines collective decision making as it relates to the performance metric of collective decision quality. A collectivistic leadership approach is used, as leaderless collectives engaged in decision making are inherently involved in collective leadership. A multi-level conceptual model for collective decision making is introduced, which incorporates leadership and collective intelligence. Using agent-based simulations and content-coded field study data, results from both methods suggest that there is a positive relationship between individual and collective intelligence, as well as a positive relationship between collective intelligence and collective decision quality. The implications of these and related findings for future collective level research bridging the fields of decision making, leadership, and collective intelligence are discussed.

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Within the field of organizational behavior, the areas of leadership and decision making are among the most highly studied topics, with entire books (Bass, 2008; Guzzo & Salas, 1995; Keeney & Raiffa, 1976; Yukl, 2009) and even journals (e.g., *Leadership Quarterly*, *Organizational Behavior and Human Decision Processes*) dedicated solely to this research. These areas have a long history of being studied together (Vroom & Yetton, 1973), with research often examining a singular leader in conjunction with a group which he or she leads. The inherent nature of researching leader-led groups requires the careful consideration of multiple levels of analysis, as there are individuals nested within groups being led by another individual and the levels of individual, dyad, and group exist simultaneously. Levels of analysis were first introduced into organizational behavior research almost thirty years ago (Dansereau, Alutto, & Yammarino, 1984; Rousseau, 1985) and there have been many pleas for greater attention to levels in organizational behavior in general (Dansereau, Yammarino, & Kohles, 1999; House, Rousseau, & Thomas-Hunt, 1995; Klein, Dansereau, & Hall, 1994) and leadership in particular (e.g. Dansereau & Yammarino, 1998; Dionne et al., 2014; Schriesheim, Castro, Zhou, & Yammarino, 2001; Yammarino & Dansereau, 2009; Yammarino, Dionne, Chun, & Dansereau, 2005; Dionne, Chun, Hao, Serban, Yammarino, & Spangler, 2012) since then. Despite increasing awareness and study of levels of analysis, the discussion of leadership and decision making does not typically extend to the collective level of analysis.

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In spite of a lack of research, many businesses have discovered collective decision making as a valuable tool they can use to solve large, complex problems which would be too time consuming for an individual, or even a group, to attempt. One such organization is Google, whose goal is to rank places to find information on the internet. When an internet user adds a link from their own webpage to another, they are endorsing it as being important. The more people that link to a page, the more important the Google will determine it is (Langville & Meyer, 2003). When a search is performed, webpages determined to be most important are listed first. Thus, Google utilizes the knowledge of internet users to quickly determine the best place to find information, a complex problem. Challenges facing organizations are continually becoming more complex and teams have emerged as a way to counteract that complexity. If this trend continues, increasing complexity will eventually overwhelm the abilities of teams, forcing organizations to rely more on collectives and their decision making capabilities.

In the study of collective decision making there are at least two key distinctions: first, the level of analysis is the collective, and second, the argument can be made that leaderless collectives engaged in decision making are inherently involved in collective leadership. Regarding the first issue, a collective is a sizable, higher-level entity, defined as a clustering of individuals larger than a group, whose members are interdependent based on a set of shared expectations or a hierarchical structure (Dansereau et al., 1984). Collectives can be composed of, for example, groups of groups, departments, functional areas, strategic business units, organizations, alliances of organizations, and even industries (Yammarino & Dansereau, 2009; Yammarino et al., 2005). Although collectives are often confused with groups, there are four main differences between them: size, expertise, level of interaction, and the number of one-to-one connections, wherein the latter two aspects define the nature of interdependence, which is the key difference between groups and collectives. The collective's nature of interdependence is characterized by how its members are organized within it and the type of relationship that exists between them. Within a collective, the relationship, or interdependence, between members is weaker and members act more independently than they would in a group (or dyad).

Regarding the aforementioned second key distinction regarding collective decision making and leadership, Dansereau et al. (1999) describe different ways in which levels of analysis can change over time. When a collective is formed, individuals come together and move up a level to the whole collective level of analysis. This process is not just the accumulation of people until the cluster is large enough to be considered a collective. Rather, the shift involves a change in the entity's level of analysis wherein those in the collective undergo an alteration in their frame of reference. Instead of seeing themselves as individuals with their own wants, needs, and goals, they begin to see themselves as part of a collective and are concerned with accomplishing its goals (Yammarino & Dansereau, 2009).

Although a collective can form without a leadership influence, in the majority of cases this referent shift is largely attributed to the efforts of the leader(s) and his/her/their ability to bring together and unite individuals with a common purpose, task, or set of expectations. Leadership likely helps establish the interdependence and connections among individuals who form the collective. Moreover, it may be unlikely that such a collective would form entirely of its own accord without the influence of leadership,

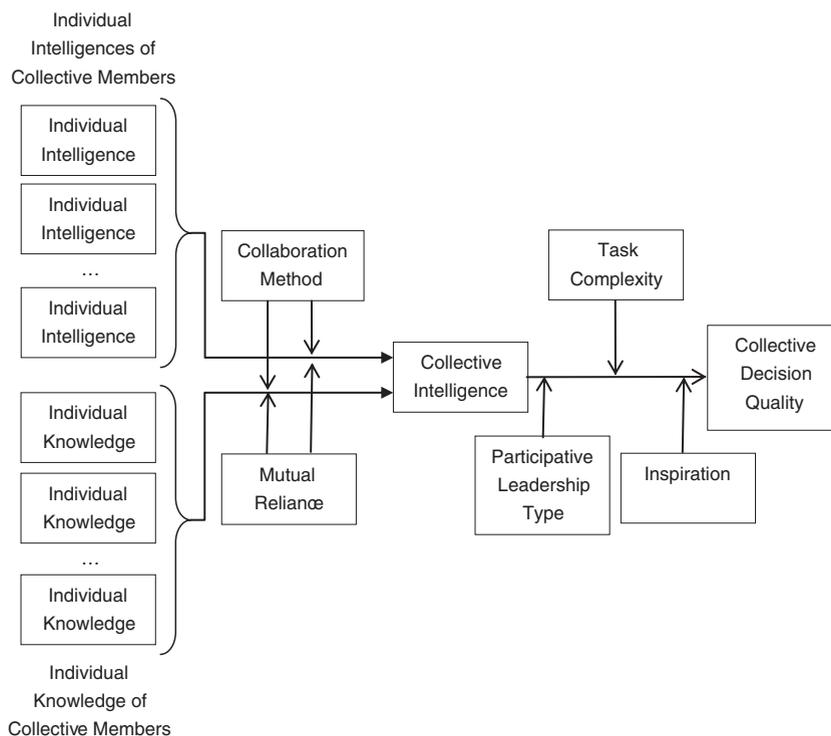


Fig. 1. Model of Collective Decision Making.

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