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Leadership, information, and risk attitude: A game theoretic approach ☆

John T. Kulas [a,*], Mana Komai [b], Philip J. Grossman [c]

[a] Department of Psychology, Saint Cloud State University, USA
[b] Department of Economics, Saint Cloud State University, USA
[c] Department of Economics, Monash University, Australia

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ABSTRACT

This paper experimentally investigates how risk attitudes mitigate leadership effectiveness in a collective setting with projects that exhibit both free riding and coordination problems. We take two novel approaches: 1) the introduction of economic game theory to psychological studies of leadership, and 2) the application of the leadership ontology of Drath et al. (2008) as a cross-disciplinary integrative framework. Leadership here is focused on the presence or absence of direction, alignment, and commitment as well as antecedent beliefs and practices that are held within a collective (for us, our experimental participants). Our leadership context is stripped down to very minimal conditions: three group members, an investment decision, and the introduction of information regarding group members' attitudes toward risk. We find that the mere mention of risk attitude (whether risky or risk averse) undermines leadership effectiveness in mitigating free riding for our 420 experimental participants. Our study's primary implications lie in the application of game theory methodology to the psychological study of leadership, the introduction of relevant individual difference constructs to economic studies of leadership, and the advocation of the Drath et al. (2008) framework as a helpful integrative mechanism for interdisciplinary leadership research.

1. Introduction

Although leadership is one of the most widely researched topics within the organizational sciences, the psychological and management literatures rarely introduce formal mathematical models descriptive of leader and/or follower behavior. Rather, this literature predominantly revolves around substantive theoretical questions of style, orientation, traits, behaviors, and characteristics of leaders, followers, the context, or their correlates (e.g., authentic leadership, Luthans & Avolio, 2003; contingency theories, Fiedler, 1967, 1971; followership, Bligh, 2011; gender, Carli & Eagly, 2011; transformational leadership, Bass, 1985; Burns, 1978). In addition to a tendency toward these areas of topical focus, self reports via questionnaire administration continue to dominate other methodologies in leadership research (see, for example, Bryman, 2011; Hunter, Bedell-Avers, & Mumford, 2007; Friedrich, Byrne, & Mumford, 2009).

Given these intradisciplinary theoretical perspectives, content areas of focus, and methodological tendencies, our understanding of "leadership" may encounter limits (within a rigid ontology; see, for example, Drath et al., 2008). Economics is a discipline that applies a different ontological lens to leadership and relies heavily on a different set of methodologies (derived from formal mathematical models) to understand human behavior (including leadership behavior). The mathematical models

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* Corresponding author at: WH 303, Department of Psychology, Saint Cloud State University, Saint Cloud, MN, 56303, USA. Tel.: +1 320 308 3234.
E-mail address: jtkulas@stcloudstate.edu (J.T. Kulas).

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reduce leadership to its basic elements, and questions of leadership style and the characteristics of either leaders or followers are generally considered irrelevant. Furthermore, the context is typically either a university laboratory or nonexistent (purely theoretical), and the act of leadership occurs in the form of a multi-person game. Through the economic lens, a leader does not necessarily possess any special characteristic, trait, managerial responsibility, or talent.

In the current study, we demonstrate a merging of approaches (economic and psychological) via application of an information-based, game-theory model of leadership incorporating self-reported risk attitude of leaders and followers. Note here that although a focus on individual differences (such as risk attitude) is generally considered irrelevant in economic investigations of leadership, one exception is Rotemberg and Saloner (1993), who compare the effectiveness of *selfish* and *empathetic* managers in different situations. A second possible exception is work by behavioral economists who look at gender differences in leader effectiveness (e.g., Grossman, Komai, & Jensen, 2013).

The practical questions we are asking in the current investigation (regardless of disciplinary focus) are: 1) does the distribution of risk attitudes within a group have implications for leader effectiveness, and 2) given the above—if you have a group of people with different risk attitudes, how should you assign roles as leaders and followers? For example, does group cooperation increase if more risk averse leaders are followed by less risk averse individuals or vice versa? Here we specifically examine how the distribution of risk within a collective can influence group direction, alignment, and commitment. As one purpose of this study is to illustrate how formal, game-theory based economic models can be applied to questions of interest to leadership researchers, our results are preliminary and are not intended to be taken as definitive conclusions.

2. Leadership—traditional and economic perspectives

Consistent across definitions found in the psychological and management literatures, leaders typically have responsibilities encompassing authority (e.g., personnel and/or project management) and *leadership* occurs within contexts that are characterized (at the minimum) by the existence of 1) a leader, 2) follower(s), and 3) a shared goal (see, for example, Bennis, 2007). Ahlquist and Levi (2010) present five necessary conditions for leadership: 1) interpersonal relations (at least one follower must exist), 2) asymmetry (potential nonreciprocity of attention, obedience, etc.), 3) salience (subordinates pay attention), 4) domain specificity (the leadership occurs in some contexts, but not necessarily others [although leaders with high salience may transcend contexts]), and 5) instrumentality (there is a motivating purpose or goal that is communicated by the leader). It is important to note that, although we do not formally adopt this specific framework, our definition of leadership is consistent with these necessary conditions.

Rather than reliance upon the traditional framework, we consider leadership in the context of a collective project and formally define leadership as the ability to produce direction, alignment, and commitment (e.g., we adopt the ontology of Drath et al., 2008, to be explained in greater detail further below). Our definition of leadership does not require formal authority or unique personal or contextual characteristics. It in fact is not dependent on any specific role (leader or follower) being primarily responsible for the production of direction, alignment, and commitment. Although this perspective is a bit different from the traditional organizational sciences' conceptualization of leadership, it is in full concordance with economic investigations of leadership (as well as Ahlquist and Levi's (2010) necessary conditions). Through the economics lens, leaders are simply individuals who can improve group cooperation by making a costly commitment (their own participation), thereby persuading others to participate in a project. Leaders here are average group members—their legitimacy is derived from superior information about the value of the project in hand (Hermalin, 1998; Komai & Stegeman, 2010; Komai, Stegeman, & Hermalin, 2007; Potters, Sefton, & Vesterlund, 2005) or merely by occupying the nominal leadership position (e.g., Meidinger & Villeval, 2002; Moxnes & Van Der Heijden, 2003).

In the economics literature, Hermalin (1998) first suggested that leaders are followed because they are better informed than followers. He maintained that a leader's costly commitment signals his/her followers that a project is worthwhile (we argue similarly that this signal represents a form of alignment among group members). In Hermalin's model, leaders' information is fully communicated to group members (e.g., the leader is fully transparent). In contrast, Komai et al. (2007) argued that in some circumstances an informed leader is better able to direct followers toward a mutually beneficial goal if the leader's information is not fully communicated. With less than complete information about context or project, followers act based only on the behavior of the leader. Here the leader withholds information followers would need to determine if withholding effort (i.e. free riding) is an individually profitable action. Essentially the model posits that, under certain conditions, leader centralization of information is the preferred alternative (to complete disclosure) if the collective outcome of interest is cooperation. Komai and Stegeman (2010) extended this idea to a more complicated setting that exhibited both coordination (direction and alignment) and free riding (commitment) failures—their interest was in determining whether a leader can help a group avoid these potential outcomes.

Coordination failures arise when parties fail to realize mutual gains because they are unable to make mutually consistent decisions. A good example is the decision regarding which side of the road to drive on. If two oncoming cars can both agree that accident avoidance is important (direction) and have an alignment of choice (i.e., both maintain position on the right or left side of road), an accident is avoided; if these outcomes (direction and alignment) are not achieved, an accident occurs. Free riding may arise if there is a conflict of commitment between an individual's self-interest and the group's interest. While all in the group benefit if every member acts in accordance with the group's interest, any one member can gain, at the expense of the other group members, if he acts on his own interest. However, if every group member acts in his or her own interest, all are worse off. Leadership – regardless of disciplinary orientation – is considered to be a potentially powerful moderator of these negative group