

**When do people prefer teams that share leadership?****The pivotal role of task complexity****Abstract**

Research has shown that shared leadership enhances team effectiveness. However, people's lay beliefs about leadership often do not reflect this: People tend to favor groups with single, stable leaders. In a series of experiments, we investigated the conditions under which people believe that shared leadership (compared to hierarchical leadership) is most advantageous. In Study 1 ( $n = 443$ ), we hypothesized and found that people generally hold hierarchical beliefs about team leadership, which leads them to expect teams with single, stable leaders to be more effective than those with shared leadership. In Study 2 ( $n = 154$ ), we explored the task characteristics under which these hierarchical beliefs were stronger or weaker. Based on our findings, we hypothesized that complex tasks evoke more communal beliefs about leadership and thus lead to decisions favoring teams with shared leadership. On the other hand, simple tasks evoke more hierarchical beliefs about leadership and lead to decisions favoring teams with a single, stable leader. In Study 3 ( $n = 126$ ) and Study 4 ( $n = 342$ ), we found support for this hypothesis. We conclude that, like beliefs about individual leaders, beliefs about team leadership structure influence people's expectations for teams, but the specific beliefs are contingent on the complexity of the task. These insights have implications for theory on shared leadership in teams and beliefs about leadership in organizations.

*Keywords:* shared leadership, expectations, implicit leadership theories, leadership structure schema, task complexity

Leading teams in organizations often requires more attention, knowledge, and skill than any single member can provide. Indeed, research increasingly suggests that teams are most effective when teams informally share leadership among multiple members (D'Innocenzo, Mathieu, & Kukenberger, 2016; Manz & Sims, 1987). Although research has shown that shared leadership promotes team effectiveness (Nicolaidis et al., 2014), people's beliefs about team leadership may not reflect this reality. When people think about leadership, they often envision powerful individuals, such as U.S. presidents (House, Spangler, & Woycke, 1991), CEOs (Hambrick & Mason, 1984), or military generals (Simonton, 1980). Popular preoccupation with individual leaders (e.g., Hackman & Wageman, 2007; Meindl, 1995) and proverbs such "too many cooks spoil the broth" suggest it is easier for people to think of leadership as the province of a single individual, rather than a collective and shared endeavor. We therefore wonder: Under what conditions might people believe that shared leadership is advantageous for teams?

To understand people's beliefs about shared leadership, it is important to understand people's beliefs about individual leaders. Research on individual leadership suggests people's beliefs about leadership shape both the expectations for and the selection of organizational leaders (e.g., Junker & Van Dick, 2014; Lord, Foti, & De Vader, 1984). People with prototypical leadership characteristics, such as masculinity and charisma, are expected to be more effective leaders because they match people's cognitive representations of how leaders ought to look and behave (Shondrick, Dinh, & Lord, 2010). As scholars have identified the processes and individual characteristics that differentiate "leader" and "non-leader" categories in people's lay beliefs, they have discovered that the specific cognitive prototype representing "leader" varies by context (Hanges, Lord, & Dickson, 2000; Lord & Maher, 2002; Lord, Brown, Harvey, & Hall, 2001). For instance, when a task is perceived to be complex, people expect individuals with greater cognitive complexity to be more effective leaders (Lord,

Hannah, & Jennings, 2011). As in this example, beliefs about context-appropriate leadership characteristics lead people to expect those who possess them to be more effective leaders than those who lack them.

Despite the importance of individual leaders' characteristics, one critical, yet understudied factor are beliefs about *team* leadership. Beliefs about the characteristics of individual leaders may be of less use for forecasting the effectiveness of the whole teams, in which leadership functions are either consolidated on a single member or shared among multiple members (Carson, Tesluk, & Marrone, 2007; Greer, de Jong, Schouten, & Dannals, 2018). Yet, expectations about team effectiveness are an increasingly important facet of organizational life (Satterstrom et al., 2019). For instance, managers must predict team effectiveness when assigning teams to tasks (Cabrera, Sauer, & Thomas-Hunt, 2009; Meyer, 1994) or deciding whether in-process teams require help (e.g., Fisher, 2017; Fisher, Pillemer, & Amabile, 2018). Recruiters implicitly use expectations for teams in deciding whether to hire intact teams or specific individuals (Groysberg, Lee, & Nanda, 2008). Investors must project how well entrepreneurial teams will work together when deciding to back a new venture (Franke, Gruber, Harhoff, & Henkel, 2006; Klotz, Hmieleski, Bradley, & Busenitz, 2014; Zarutskie, 2010). Because teams are an essential means of accomplishing work in contemporary organizations (e.g., Ilgen, 1999; Manz & Sims, 1987), expectations for team effectiveness are an important issue for both scholars and practitioners.

Although researchers have begun to explore beliefs about team leadership structure (Carnabuci, Emery, & Brinberg, 2018; DeRue & Ashford, 2010; Wellman, 2017; Wellman, Ashford, DeRue, & Sanchez-Burks, 2014), two important areas require further research. First, existing research has focused on the extent to which team members' beliefs about leadership structure affect their propensity to share leadership with each other (DeRue, Nahrgang, & Ashford, 2015), but has not yet examined their influence on observers or

stakeholders' expectations. Second, prior research does not address the extent to which team leadership structure beliefs may vary by context, either treating these beliefs as a function of stable social schema (e.g., Carnabuci et al., 2018) or as idiosyncratic to particular team experiences (e.g., DeRue et al., 2015).

To better understand people's beliefs about sharing leadership and their impact on expectations of teams, we conducted both hypothesis-testing and exploratory experiments. In Study 1 ( $n = 443$ ), we hypothesized and found that people generally hold hierarchical beliefs about team leadership, which leads them to expect teams with single, stable leaders to be more effective than those with shared leadership. In Study 2 ( $n = 154$ ), we explored the task contingencies under which these hierarchical beliefs were stronger or weaker. Based on our findings, we hypothesized that simple tasks evoke more hierarchical beliefs about leadership (favoring teams with a single, stable leader). On the other hand, complex tasks evoke more communal beliefs about leadership (favoring teams with shared leadership). In Study 3 ( $n = 126$ ) and Study 4 ( $n = 342$ ), we found support for this hypothesis. We also replicated our findings in four additional experiments with slight methodological variations (see Appendix B). These results suggest that, like beliefs about individual leaders, beliefs about team leadership structure influence people's expectations about team effectiveness, but the specific beliefs are contingent on the complexity of the task. These insights have implications for theory on shared leadership in teams and beliefs about leadership in organizations.

## **Theory and Hypotheses**

### **Shared Leadership**

To define and elaborate the concept of "shared leadership", we briefly review research on shared leadership in teams. Shared leadership research draws on a functional view of team leadership (Gibb, 1954; Hackman & Wageman, 2007; McGrath, 1962) in which leadership is

viewed as any behavior in which someone "assumes responsibility for satisfying a team's need" (Morgeson et al., 2010, p. 8). Even when teams have formal leaders, they also rely on emergent and informal ways of organizing leadership (Morgeson et al., 2010), which can complement or even compete with formal hierarchies (Adler, Kwon, & Heckscher, 2008; Coleman, 1988). In this view, informal leadership in teams is attributional and socially constructed—a team member provides leadership when other members recognize them as leaders (DeRue & Ashford, 2010; Morgeson & Hofmann, 1999). Given that shared leadership is defined as "emergent" and not necessarily related to formal organizational roles, we focus only on beliefs about informal shared leadership for the purposes of this research.<sup>1</sup>

Scholars have found that sharing leadership enhances team effectiveness. Importantly, three recent meta-analyses found that shared leadership predicts team performance and member satisfaction, with meta-analytic effect sizes ranging from .21 to .35 (D'Innocenzo et al., 2016; Nicolaidis et al., 2014; Wang, Waldman, & Zhang, 2014). Two lines of reasoning explain this relationship. First, teams simply have more leadership resources when they share leadership – they can draw on the knowledge and skills of multiple members (Morgeson et al., 2010) and deploy the leadership skills most relevant for the task and situation (e.g., Friedrich, Vessey, Schuelke, Ruark, & Mumford, 2009), allowing them to perform more effectively. Second, sharing leadership empowers team members (Manz & Sims, 1987; Wang et al., 2014), making them more confident in the team, which partially mediates shared leadership's influence on team effectiveness (Nicolaidis et al., 2014).

Recently scholars have noted that leadership can be shared in two main ways, which are not necessarily equivalent (e.g., Contractor, DeChurch, Carson, Carter, & Keegan, 2012; Klein, Ziegert, & Knight, 2006). First, teams can share leadership by having multiple

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<sup>1</sup> In Study B2 (Appendix B), we tested whether describing a leadership structure as formal vs. informal moderated the effects we found in Study 1. We found that it did not – beliefs about sharing leadership followed the same patterns for formal and informal leadership structures. We thus did not study the formality of leadership further.

members simultaneously fulfill different leadership functions over time, such as a team having one member as a task-focused leader, but another more relationship-focused leader (Gibb, 1954). We refer multiple members being recognized as leaders at the same time as the *multiplicity* dimension of shared leadership. Second, team leadership can also be shared when members rotate active leadership functions between members. We refer to the extent of change in which specific members provide leadership as the *dynamism* dimension of shared leadership. Dynamism describes times when members share leadership by handing over the leadership role like a baton (Contractor et al., 2012; Pearce, Hoch, Jeppesen, & Wegge, 2010). Thus far, there has been little empirical research on how these different approaches to sharing leadership impact team effectiveness. However, research on unstable status hierarchies suggests that dynamically shared leadership could evoke dysfunctional competition (Hays & Bendersky, 2015), inhibit role clarity and coordination (Anderson & Brown, 2010; Anderson, Willer, Kilduff, & Brown, 2012) or disrupt team learning (Wang, Han, Fisher, & Pan, 2017).

### **Beliefs about Leadership**

**Beliefs about individual leadership.** Theory of beliefs about individual leadership provides a foundation for understanding beliefs about team leadership. Scholars of individual leadership beliefs have long recognized that leadership is "in the eye of the beholder," (Lord, Epitropaki, Foti, & Hansbrough, 2020, p. 50) – the degree to which one perceives another person as a leader depends on a match between the perceiver's beliefs and the target's characteristics (Cronshaw & Lord, 1987; Epitropaki, Sy, Martin, Tram-Quon, & Topakas, 2013; Lord & Maher, 1991; Lord, Foti, & Phillips, 1982). Research on leadership beliefs has found that people hold in their minds "prototypes" for the necessary and desirable leadership attributes and behaviors (e.g., Lord et al., 1982) Like other socio-cognitive processes (e.g.,

Fiske, 1992), people automatically compare new stimuli (i.e., a particular person behaving in a specific situation) with their cognitive leadership prototype to formulate expectations.

Targets who closely match these cognitive prototypes tend to evoke more positive expectations, which influence the selection and evaluation of individual leaders (Epitropaki et al., 2013; Foti & Lord, 1987; Lord & Maher, 1991; Phillips & Lord, 1986; Smith & Foti, 1998).

However, leadership beliefs are context-specific: People hold more than one single prototype for leadership characteristics and behavior – a myriad of task and environmental factors influence which specific leadership prototype is applied (Hanges et al., 2000; Lord et al., 2001). For instance, the cognitive prototype for military leaders is quite different than the prototype for religious leaders (Lord et al., 2020). Research on leadership beliefs has identified six overarching features of leadership prototypes: sensitivity, intelligence, dedication, dynamism, tyranny, and masculinity (Epitropaki & Martin, 2004). However, these and other features are connected to each other, the context, the perceiver, and the target in complex and dynamic ways (i.e., a "connectionist" approach, Lord et al., 2001), making broad generalizations about situational contingencies difficult (Lord et al., 2020).

**Beliefs about team leadership.** Recently, leadership beliefs researchers have called for more attention to beliefs about collective leadership. For instance, in a review, Shondrick and colleagues (2010) argued that theories of leadership beliefs "reflect the assumption that leadership is portrayed by a single individual operating in a stable hierarchical structure; they are not geared to assessing more micro-level leadership events or the collaboration of multiple individuals in leadership processes" (p. 959). To account for the prevalence of shared, informal leadership in teams, scholars have begun to investigate people's beliefs about hierarchy and communal sharing in teams (DeRue & Ashford, 2010; Wellman, Ashford, DeRue, & Sanchez-Burks, 2014; Wellman, 2017). Most prominently, DeRue and

colleagues have investigated "beliefs as to how leadership should be structured in groups"(DeRue et al., 2015, p. 1193).<sup>2</sup> Building on relational models theory (Fiske, 1992; Haslam & Fiske, 1992), these beliefs about team leadership are arrayed on a continuum from hierarchical to communal (DeRue et al., 2015; Wellman et al., 2014; Wellman, 2017). Hierarchical leadership beliefs draw on an "authority ranking" relational model, in which members are implicitly ranked based on valued social dimensions. Communal leadership beliefs draw on a "communal sharing" relational model, in which valued resources such as leadership are distributed among members. These hierarchical and communal beliefs influence how teams share leadership – when team members hold more communal leadership beliefs, they distribute leadership more broadly than when they hold more hierarchical leadership beliefs (DeRue et al., 2015).

We argue that people generally default to hierarchical beliefs about leadership because hierarchical prototypes of leadership are more cognitively accessible than communal prototypes are. At least one study indirectly supports this claim: Carnabuci, Emery and Brindberg (2018) found that people adjusted their attributions of leadership relations to become more hierarchical, such that they forgot or overlooked leadership ties that did not conform to a pyramid-like hierarchy. Research on individual leadership also suggests that people generally hold hierarchical views of leadership, which leads them to attribute leadership more readily to individuals viewed as heroic (Staw & Ross, 1980) or charismatic (Offermann, Kennedy, & Wirtz, 1994). Moreover, individual leaders are disproportionately viewed as the cause of collective outcomes (Brown, Scott, & Lewis, 2004), which has been termed "the romance of leadership" (e.g., Meindl, Ehrlich, & Dukerich, 1985) or the

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<sup>2</sup> Researchers have termed these beliefs about team leadership "leadership structure schema" or LSS (DeRue et al., 2015; Wellman et al., 2014). We do not adopt this term in our hypotheses because our theory is that beliefs about team leadership are fluid and context-specific, whereas the term "schema" implies stable, deeply embedded cognitive structures. However, we use the label LSS to refer to the measures of beliefs about team leadership in some studies.



"leadership attribution error" (Hackman & Wageman, 2007; Wageman & Fisher, 2014). This suggests a bias away from attributing performance outcomes to collectives and toward individuals. In summary, our baseline hypothesis is that people generally believe that single leadership is more prototypical than shared leadership and is thus more likely to be effective.

***Hypothesis 1a.** People expect teams with single leadership structures to be more effective than those with shared leadership structures.*

***Hypothesis 1b.** People's beliefs about team leadership (i.e., hierarchical vs. communal) will mediate the relationship between team leadership structure and expected performance.*

### Study 1<sup>3</sup>

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<sup>3</sup> Studies 1, 3, & 4 were all preregistered at the Open Science Framework (van't Veer & Giner-Sorolla, 2016).

## Method

**Participants and design.** To test Hypothesis 1, we recruited 443 adults (47.6% male;  $M_{age} = 35.94$  years,  $SD_{age} = 11.98$ ; 69.1% employed full-time;  $M_{work\ experience} = 13.87$  years,  $SD_{work\ experience} = 9.26$ ), from Amazon Mechanical Turk (MTurk). Participants were paid \$0.50. Participants were randomly assigned to one of two conditions: Single leadership ( $n = 216$ ) or shared leadership ( $n = 227$ ).

To assure data quality, we used several methods to exclude inattentive participants, following recommendations from Cheung, Burns, Sinclair, and Sliter (2017). Participants were required to have >60% MTurk approval ratings in order to participate. There were two attention checks instructing participants to select specific options. The first was in the beginning to filter out inattentive participants from taking part in the study ("Please check the 'attentive' option"). Halfway through the study, participants completed the second attention check ("Please select strongly agree"). Those who failed were excluded before analyses. An online service (TurkPrime) was used to assure data quality (e.g., prevent repeat IP addresses from completing the study) (Litman, Robinson, & Abberbock, 2017). These same techniques were used in all MTurk studies below.

**Procedure and material.** Participants were instructed to review one of two diagrams depicting either a team with single leadership (Single Leadership Condition) or a team with shared leadership (Shared Leadership Condition). The manipulation and diagrams are depicted in Appendix A, Figure A.1, Online Supplementary Material.

## Measures

**Team effectiveness forecasts.** We measured team effectiveness forecasts by adapting Wageman, Hackman, and Lehman's (2005) nine-item measure of team effectiveness, which has been used to measure manager evaluations of team effectiveness in prior research (e.g., Wageman, 2001). We altered items to the simple future tense to create forecasts rather

than post-hoc evaluations (e.g., "This team will be very productive"). The scale was internally reliable, so we averaged the items into a single variable:  $\alpha = .93$ .

**Beliefs about leadership structure.** Following prior research (DeRue et al., 2015), we used Wellman et al.'s (2014) five-item leadership structure schema (LSS) scale to measure beliefs about sharing leadership in teams. The items were: "In most groups, there is usually just one leader" (reverse coded); "Groups work best when leadership is shared among multiple group members"; "Leadership is often shared among individuals in groups"; "Groups work best when there is a single leader in the group" (reverse coded); and "Leadership in groups is most effective when one person takes charge of the group" (reverse coded). The reliability of the scale was good, so we averaged the items into a single variable:  $\alpha = .83$ . Higher scores on this scale indicate more communal beliefs, while lower scores indicate more hierarchical beliefs.

**Manipulation check items.** We measured perceived sharedness of the leadership structure with the following two items: "In this team, only one individual provided leadership throughout the team's work" (reverse coded) and "In this team, several members provided leadership throughout the team's work" (seven-point agree-disagree scale). We averaged these two items ( $\alpha = .91$ ) into a single measure.

## Results

**Manipulation check.** Indicating that the manipulation was effective, the perceived sharedness of team leadership structure was higher in the shared leadership condition ( $M = 5.95$ ,  $SD = 1.24$ ) than in the single leadership condition ( $M = 2.69$ ,  $SD = 1.41$ ),  $t(441) = -25.86$ ,  $p < .001$ , Cohen's  $d = 2.45$ .

**Hypothesis 1a.** Hypothesis 1a was supported: Participants forecasted teams with single leadership structures ( $M = 5.42$ ,  $SD = .94$ ) to be more effective than teams with shared leadership structures ( $M = 5.01$ ,  $SD = 1.18$ ,  $t(441) = 4.06$ ,  $p < .001$ , Cohen's  $d = .38$ ) (as

shown in Table 1 and Figure 1).

[Insert Table 1 and Figure 1 here]

**Hypothesis 1b.** Hypothesis 1b was also supported. We conducted the mediation analysis using Hayes and Scharkow's (2013) PROCESS macro (Model 4). We specified 5,000 bootstrapped resamples and bias-corrected 95% confidence intervals. The indirect effect of leadership structure (i.e., experimental condition) via LSS was positive and the confidence interval excluded 0 ( $b = 1.09$ ,  $SE = .33$ , 95%  $CI$ : .48, 1.75). Thus, beliefs mediated the positive relationship between single leadership structure and effectiveness forecasts.

We also found that participants held more communal leadership beliefs after reviewing a team with shared leadership structure ( $M = 3.85$ ,  $SD = 1.16$ ) than a team with single, stable leadership structure ( $M = 3.52$ ,  $SD = 1.18$ ;  $t(441) = 2.95$ ,  $p = .003$ , Cohen's  $d = .28$ ) (as shown in Table 1). We discuss the potential meaning of this result below.

## Discussion

As predicted, participants expected teams with single, stable leaders to be more effective than those that shared leadership because of their hierarchical beliefs about leadership. We further replicated these results using alternative manipulations in Study B1 ( $n = 229$ ) and B2 ( $n = 458$ ) (see Appendix B). These results support our contention that the expectations about team effectiveness are influenced by a team's leadership structure and confirm the bias toward single, stable leaders strongly implied by prior research (e.g., Shondrick et al., 2010).

As noted above, we also found that mere exposure to a diagram depicting either a team with a single leader versus shared leadership produced significant changes in reported beliefs about team leadership (i.e., LSS). This suggests that beliefs about team leadership depend a great deal on the situation and do not always function as stable "schemas" as is

implied by prior research (Carnabuci et al., 2018; DeRue et al., 2015). Given that individual leadership beliefs depend strongly on context (Lord et al., 2001; Lord et al., 2020), we thus sought to build a situation-contingent view of leadership beliefs about teams in our subsequent studies.

### **How do Task Characteristics Affect Beliefs about Team Leadership?**

Under what conditions are people's biases toward single stable leadership (i.e., hierarchical beliefs) stronger or weaker? Are there conditions under which communal beliefs are stronger than hierarchical beliefs? We argue that task characteristics are a particularly promising set of contextual variables that may affect the strength of hierarchical and communal beliefs about team leadership. Task characteristics, such as autonomy and task variety, are a critical part of team work design (Hackman, 2002; Hackman & Oldham, 1975) and have been found to be among the most predictive factors of team effectiveness (Morgeson & Humphrey, 2006; Wageman et al., 2005). However, prior theory offers little guidance on which task characteristics are most likely to affect leadership beliefs and effectiveness expectations. Thus, we conducted an exploratory study using task characteristics from two major taxonomies (Campion, Medsker, & Higgs, 1993; Morgeson & Humphrey, 2006). A secondary purpose of our exploratory study was to examine whether beliefs vary for different forms of sharing leadership (i.e., whether dynamic approaches to sharing leadership evoked different expectations than multiple approaches to sharing leadership).

### **Study 2**

In this study, we explored how task characteristics affect beliefs about team leadership and expectations for team effectiveness by asking participants to forecast the effectiveness of a team (a) with a given leadership structure (between-subject design, randomly assigned); and (b) performing tasks with various characteristics (within-subject

design).

### **Method**

**Participants.** One-hundred and fifty-four adults (54.5% male;  $M_{age} = 36.37$ ,  $SD_{age} = 12.04$ ) were recruited and compensated for \$0.50.

**Procedure.** As in Study 1, participants were instructed to review one diagram depicting a team's leadership structure as the experimental manipulation. Participants then were asked to predict this team's effectiveness in 35 different task situations. Then they completed manipulation checks, and provided demographic data.

**Manipulation.** Participants were randomly assigned to view one of four diagrams depicting a team's leadership structure over three time periods: (a) a single, stable leader ( $n = 39$ ), (b) a single member serving as leader at any one time, but the particular member rotates (single-dynamic;  $n = 39$ ), (c) multiple, stable leaders ( $n = 37$ ), or (d) multiple, dynamic leaders ( $n = 39$ ). The diagrams are depicted in Figure A.2, Appendix A, Online Supplementary Material. These conditions comprise a 2 x 2 factorial design (Multiplicity x Dynamism).

### **Measures**

**Team effectiveness forecasts.** After participants viewed the team's leadership structure, we asked them to predict this team's effectiveness with the prompt: "How well do you think this team would perform work with the following characteristics?" (1 = extremely poorly; 7 = extremely well, each scale interval was labelled). Participants were then presented with 35 descriptions of task characteristics (e.g., "The work requires a variety of skills," "The work requires members to analyze a lot of information"). The sequence of these descriptions was randomized. Participants provided an effectiveness rating for each of the 35 task characteristic descriptions.

These descriptions of work characteristics were drawn from two established survey

scales of work design (Campion et al., 1993; Morgeson & Humphrey, 2006). These 35 task descriptions represented 10 different task characteristics: (1) autonomy (3 descriptors), (2) participation (3 descriptors), (3) task variety (4 descriptors), (4) task significance (4 descriptors), (5) flexibility (3 descriptors), (6) task complexity (4 descriptors), (7) information processing (4 descriptors), (8) problem solving (4 descriptors), (9) skill variety (3 descriptors), (10) work interdependence (3 descriptors). The specific examples and source of these descriptions can be found in Table 2.

[Insert Table 2 here]

In addition, we created three descriptors of "coordination complexity" based on Klein and colleagues' (2006) definition of the concept. The three descriptors are: "The work requires the team to face pressure for quick execution and need to avoid negative consequences", "The work requires the team members to take actions simultaneously", and "The work requires the team to have real-time and reciprocal coordination of action".

Each of the sets of descriptors was sufficiently internally reliable (Cronbach's  $\alpha > .70$ ), so we averaged the effectiveness forecasts for the statements intended to describe that task characteristic as the final measures. Cronbach's  $\alpha$  and descriptive statistics for each task characteristic are shown in Table 2.

**Manipulation checks.** To check the multiplicity manipulation, we asked participants about the extent to which they agreed with these statements: "In this team, only one individual provided leadership at a time" (reverse coded), "At any single point in time, several individuals simultaneously provided leadership in this team" (1 = strongly disagree, 7 = strongly agree, all scale points labelled; Cronbach's  $\alpha = .82$ ). To check the dynamism manipulation, the items were: "The same individual(s) provided leadership throughout the team's work", "The individual(s) who provided leadership remained consistent over time" (Cronbach's  $\alpha = .92$ ). We averaged the two items within each scale as our measures.

## Results

**Manipulation checks.** The experimental manipulations were effective. The perceived multiplicity of leadership structure was higher in the multiple leadership conditions ( $M = 5.77$ ,  $SD = 1.49$ ) than in the single leadership conditions ( $M = 2.67$ ,  $SD = 1.49$ ),  $t(151) = 13.30$ ,  $p < .001$ , Cohen's  $d = 2.19$ ). In addition, the perceived dynamism of leadership structure was lower in the stable leadership conditions ( $M = 6.01$ ,  $SD = 1.15$ ) than in the dynamic leadership conditions ( $M = 2.49$ ,  $SD = 1.51$ ),  $t(152) = 16.21$ ,  $p < .001$ , Cohen's  $d = 2.62$ ).

**Single vs. shared leadership structures.** To examine the influence of team leadership beliefs for a particular task characteristic, we used planned comparisons (i.e., t-tests) to compare expectations for single, stable leaders to the mean of the other three conditions, which all represent some form of sharing leadership. As shown in Table 3, teams with single-stable leaders were rated significantly lower than the shared leadership conditions for four of the 11 task characteristics: participation, flexibility, interdependence, and (marginally) information processing.

[Insert Table 3 here]

**Multiple and dynamic approaches to sharing leadership.** To explore the effects of multiplicity and dynamism, we used 2-way factorial ANOVAs. As shown in the "Multiplicity" column of Table 3, seven of the 11 task characteristics engendered at least marginal differences between conditions: Teams with multiple leaders were expected to perform better than teams with single leaders for tasks involving a great deal of variety, flexibility, information processing, problem solving, interdependence, and, marginally, skill variety and coordination complexity.

Teams with dynamic leadership structures were expected to outperform those with stable leadership structures for four of the 11 task characteristics. Tasks requiring a great deal



of participation, flexibility, complexity, and autonomy (marginally). No significant interactions between multiplicity and dynamism were found.

### **Discussion**

In Study 2, we explored how task characteristics might influence the relationship between team leadership structure and expectations for team effectiveness. Surprisingly, the most consistent finding was that people expected worse performance from teams with single stable leaders than from teams that share leadership when considering the task descriptors we presented. In contrast to Study 1, no information about task characteristics led people to predict that teams with single, stable leaders would be more effective than those that share leadership. The main difference between these studies is the presence of task descriptors – Study 1 contained no contextual information about the teams' or their work. Moreover, all the task descriptors in Study 2 suggested that tasks were relatively demanding and complex. For instance, a descriptor of task variety stated: "The work requires the performance of a wide range of tasks." We thus sought a higher-order construct that would capture the complex task demands implied by all the descriptors and explain the reversal of expectations for teams that share leadership from Study 1 to Study 2. We detail an additional hypothesis based on this theorizing below.

We also explored differences in expectations for teams that share leadership via multiplicity and dynamism. There were differences in which task characteristics were predicted by only multiplicity (i.e., variety, information processing, problem solving, interdependence, skill variety, coordination complexity) and dynamism (participation, flexibility, complexity, autonomy). We found these differences promising and, in further studies, investigated whether there were different beliefs about the conditions under which multiplicity and dynamism would lead to team effectiveness. In those studies, we did not find consistent differences in team leadership structure beliefs or expectations based on

multiplicity versus dynamism (The specific results are described in Appendix B, Online Supplementary Material). Instead, these studies reinforced our conclusion that the most consistent differentiator in team leadership beliefs and expectations is single versus shared leadership. Thus, although multiplicity and dynamism are promising directions for future research (Contractor et al., 2012), we do not address them in the studies below.

### **Task Complexity and Beliefs about Sharing Leadership**

Although Hypothesis 1 predicts that people generally hold hierarchical beliefs about team leadership, leadership beliefs often depend on the task involved (Junker & Van Dick, 2014; Lord et al., 2001). We argue that *task complexity* theorizes well the differences in predictions for teams with single, stable leaders and shared leadership that we found in Study 2. Task complexity is a broad characteristic of work that encompasses the interdependence, stability, and variety of components and/or people involved in the work (Campbell, 1988; Hærem, Pentland, & Miller, 2015; Wood, 1986). Following Liu and Li (2012), we define task complexity as an aggregation of any intrinsic task characteristics that imposes specific resource requirements (e.g., cognitive and physical demands, required knowledge and skills) on task performers. For instance, a team task requiring the analysis and integration of inputs from a design department, manufacturing department, and marketing department, would be more complex than one from design only. These requirements, in turn, change the leadership dynamics in teams (Aime, Humphrey, DeRue, & Paul, 2013).

We argue that complex tasks should evoke more communal beliefs about leadership, while simple tasks evoke more hierarchical beliefs. A hierarchical leadership belief may be readily evoked when tasks are simple, as it is plausible that a single individual may have sufficient cognitive and technical skills to provide leadership. However, when tasks are complex, such a belief might be constrained: A single leader may not have all the resources,

competencies, knowledge, skills, and ability required to lead a team through complex tasks (Kerr & Jermier, 1978; Pearce, 2004). Recent meta-analyses have found that task complexity is a critical moderator of the effect of shared leadership on team performance: When tasks are complex, the benefits of shared leadership become more apparent (D'Innocenzo et al., 2016; Wang et al., 2014). Assuming that these results are consonant with people's experiences, they may associate sharing leadership with more complex tasks.

Even if people do not think consciously about the benefits of sharing leadership in complex tasks, research has shown that people intuitively believe that complex strategies are more effective to solve complex tasks (Suedfeld, 1996). Shared leadership is often viewed as relatively complex (Cullen-Lester & Yammarino, 2016; Paunova, 2015). Moreover, communal sharing is likely to be viewed as a more complex strategy than hierarchical ranking because communal sharing involves more people and is less consistent with the most cognitively accessible prototype of team leadership. Therefore, people will automatically associate task complexity with the more complex leadership structure: shared leadership. Because complex tasks will activate more communal leadership beliefs, people would predict teams that share leadership will be more effective than teams that are led by a single person.

***Hypothesis 2a.** Complex tasks will evoke more communal beliefs about leadership, while simple tasks will evoke more hierarchical beliefs about leadership.*

***Hypothesis 2b.** When tasks are complex, people expect teams with shared leadership structures to be more effective than those with single leadership structures. However, when tasks are not complex, people expect teams with single leadership structures to be more effective than those with shared leadership structures.*

***Hypothesis 2c.** People's beliefs about team leadership (i.e., hierarchical vs. communal) will mediate the relationship between team leadership structure and expected effectiveness.*

### Study 3

Study 3 tested Hypothesis 2a, that people hold hierarchical beliefs about leadership only for tasks low in complexity, but activate more communal beliefs for those high in complexity.

#### Method

**Participants and design.** One hundred twenty-six full-time employees (68% male;  $M_{\text{age}} = 33.82$  years,  $SD_{\text{age}} = 10.06$ ) were recruited from MTurk and took part in the study in exchange for \$1.80. Participants were randomly assigned to one of two conditions of task complexity: low or high. We assured the data quality using the same methods as above.

**Procedures and material.** Participants were asked to imagine they were senior partners in a large consultancy company, overseeing several self-managing teams. The teams were charged with solving business problems for client organizations. Participants were told that Team J was going to perform a consultancy project for a client company: Choice Chocolate. Participants were told that Choice Chocolate had seen its sales decline for the past two years and engaged this team to help it decide on a new product line to launch to increase sales.

Participants were randomly assigned to either a High-complexity or Low-complexity condition. Following prior research (Dóci & Hofmans, 2015; Olshavsky, 1979; Payne, 1976), we manipulated task complexity by varying the number of products to analyze and the number of factors the team needed to consider. In the Low-complexity condition, participants were told this team needed to analyze two potential new products (i.e., Chocolate 1 and 2) and consider two factors in their analysis (i.e., the targeted customer group, health and dietary information). In the High-complexity conditions, participants needed to analyze twelve new products (i.e., Chocolate 1 to 12) and consider twelve factors (previous two factors plus allergy risks, environmental and ecological impact, consistency with current brand image,

potential retail distributors, smoothness and texture, the quality of ingredients, country of production, and potential export sales).<sup>4</sup> Participants in high (low) complexity conditions read a summary of the task description: "Relative to other projects, this project will (not) be very complex. The various products and factors need to be considered simultaneously (one at a time). The interactions between products and factors will (not) be very important to the final analysis." The scenarios were displayed in Appendix C, Online Supplementary Material.

## Measures

**Manipulation check.** We used Morgeson and Humphrey's (2006) four-item task complexity measure as our manipulation check, using a seven-point scale ranging from strongly disagree (1) to strongly agree (7) (e.g., "The tasks on the work were simple and uncomplicated" (reversed coded)). The items were internally consistent ( $\alpha = .94$ ), so we averaged the items into a single variable.

**Beliefs about leadership structure.**<sup>5</sup> As in Study 1, we used Wellman et al.'s (2014) five-item LSS measure as described above ( $\alpha = .79$ ).

## Results

**Manipulation check.** The manipulation was effective: perceived task complexity was higher in the High-complexity conditions ( $M = 4.48$ ,  $SD = 1.85$ ) than in Low-complexity conditions ( $M = 2.50$ ,  $SD = 1.17$ ),  $t(126) = 7.20$ ,  $p < .000$ , Cohen's  $d = 1.28$ .

**Hypothesis 2a.** Hypothesis 2a was supported: In the High-complexity condition, people held more communal views of leadership ( $M = 4.26$ ,  $SD = 1.31$ ) than in the Low-

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<sup>4</sup> In the pretest, we used four products and four factors as low task complexity manipulations. But the effect of that manipulation was small (Cohen's  $d = .28$ ), and the manipulation check in a subsequent pre-test failed. Therefore, we added additional detail to differentiate the High- and Low-complexity conditions. We changed the Low-complexity condition to contain only two options (Chocolate 1 & 2) and two factors.

<sup>5</sup> We also sought to use an implicit measure of team leadership beliefs used in prior research (Carnabuci et al., 2018; De Soto, 1960; Janicik & Larrick, 2005; Walker, 1976), in which participants are asked to memorize a diagram that depicts leadership relations, but subtly deviates from a hierarchical structure. The measure of "linear ordering schema" is the number of trials needed to correctly memorize the diagram. However, the pattern of responses were not normally distributed, with 40% of participants failing to learn the pattern within the time allotted and 37% offering the correct answer in only two trials, which is implausible, given prior research in this paradigm. We did not analyze these data further because of these issues.

complexity condition ( $M = 3.78$ ,  $SD = 1.13$ ,  $t(126) = 2.21$ ,  $p = .028$ , Cohen's  $d = .39$ ). The results are shown in Table 1 above.

## Discussion

Consistent with Hypothesis 2a, Study 3 found that complex tasks evoke more communal beliefs about team leadership, while simple tasks evoke more hierarchical beliefs. We also used different manipulations and replicated the results in Study B3 ( $n = 173$ ) (see Appendix B). This supports our contention that people's beliefs about shared leadership vary by situation. However, Study 3 did not test all of Hypothesis 2, in that participants did not indicate their expectations of team effectiveness or simulate decisions about selecting teams for tasks. In the following study, we test how the task-contingent beliefs about sharing leadership we found in Studies 2 and 3 influence evaluators' decisions about assigning teams to particular tasks.

## Study 4

In Study 4, we examined how task complexity influences evaluators' decisions to assign teams to tasks, in addition to their expectations of team effectiveness (Hypothesis 2b), and tested the mediating role of hierarchical or communal beliefs about team leadership (Hypothesis 2c).

## Method

**Participants and design.** Three hundred forty-two participants (44.2% male;  $M_{age} = 37.5$  years,  $SD_{age} = 11.82$ , 70.2% employed full-time) were recruited from MTurk and took part in the study in exchange for \$1.00. The average completion time was 9.8 minutes.

Study 4 uses a 2 (single vs. shared leadership) x 2 (task complexity high vs. low) mixed design, in which task complexity was manipulated between subjects, but the effects of leadership structure were assessed within subjects. Participants were randomly assigned to either a low task complexity ( $n = 173$ ) or a high task complexity ( $n = 169$ ) condition. All

participants then indicated their expectations of effectiveness for two teams (one with single and one with shared leadership) and chose one team to complete the task.

**Procedure.** Participants were asked to imagine they were the manager in charge of two teams and had to choose one team to work on a new project. Participants reviewed two diagrams depicting (a) single leadership and (b) shared leadership (see Figure A.1, Appendix A). The order in which these two teams were displayed was randomized.

Participants then read the same role and task descriptions from Study 3. They were then instructed to assign one of the teams to work on the project for Choice Chocolate. They were told that these two teams had performed equally well in the past but had different approaches to distributing leadership among their members. Then they answered questions regarding their LSS, manipulation checks, and their team-effectiveness forecasts.

## Measures

**Manipulation check.** The task-complexity manipulation check was identical to those used in Study 3 (Cronbach's  $\alpha = .93$ ).

**Beliefs about leadership structure.** As in Studies 1 and 3, beliefs about leadership structure were measured with Wellman et al.'s (2014) LSS scale. (Cronbach's  $\alpha = .87$ ).

**Team effectiveness forecasts.** In this study, we used two different indications of effectiveness forecasts. First, we used Wageman et al.'s (2005) measure of team effectiveness as we did in Study 1 (Cronbach's  $\alpha = .81$ ).

Second, we asked participants to choose one team to work on the project described. If participants chose the team with shared leadership, we coded it as "1." If they chose the team with single leadership, we coded it as "0."

## Results

**Manipulation check.** The manipulation was effective: Perceived task complexity was higher in the high-complexity condition ( $M = 4.80$ ,  $SD = 1.63$ ) than in the low-complexity

condition ( $M = 2.86$ ,  $SD = 1.18$ ),  $t(340) = 12.64$ ,  $p < .001$ , Cohen's  $d = 1.29$ .

**Hypothesis 2a.** As in Study 3, Hypothesis 2a was supported. Participants in the High-complexity condition reported a more communal LSS ( $M = 4.47$ ,  $SD = 1.34$ ) than those in the Low-complexity condition ( $M = 3.94$ ,  $SD = 1.38$ ,  $t(340) = 3.62$ ,  $p < .001$ , Cohen's  $d = .40$ ) (as shown in Table 1).

**Hypothesis 2b.** We predicted that people would expect teams with single leadership structures to be more effective than teams with shared leadership structures when task complexity is low, but expect teams with shared leadership structures to be more effective than those with single leadership structures when task complexity is high. This hypothesis was supported. To test this hypothesis with Wageman et al.'s (2005) survey measure, we used two-way repeated measures ANOVAs because all participants forecast the performance of both a team with shared leadership and a team with single leadership. Experimental condition (i.e., high vs. low task complexity) was the between-groups factor and the forecasts of the two teams were the repeated measure. These analyses revealed a significant interaction between task complexity and team leadership structure,  $F(1, 340) = 14.10$ ,  $p < .001$ , Partial Eta-Squared = .04. In the High-complexity condition, participants expected teams that share leadership ( $M = 5.20$ ,  $SD = 1.09$ ) to be more effective than teams with single leadership ( $M = 4.75$ ,  $SD = 1.03$ ,  $t(164) = 3.48$ ,  $p < .001$ , Cohen's  $d = .42$ ). In the Low-complexity condition, participants expected teams with single leadership ( $M = 5.21$ ,  $SD = 0.93$ ) to be more effective than those that shared leadership ( $M = 5.01$ ,  $SD = 1.17$ ,  $t(160) = 1.69$ ,  $p < .01$ , Cohen's  $d = .19$ ) (as shown in Figure 1).

The analysis for team choice showed the same pattern of results. We conducted a binary logistic regression in which choice of team was the dependent variable (1 = shared leadership team; 0 = single leadership team). This analysis showed that task complexity significantly predicted choice ( $b = .97$ ,  $OR = .38$ ,  $Wald \chi^2 = 17.57$ ,  $p < .001$ , Nagelkerke  $R^2 =$



.07). As predicted, in the Low-complexity condition, 52% of participants chose the team with single leadership, whereas in the High-complexity condition, only 32% chose the team with single leadership.

**Hypothesis 2c.** We predicted that LSS mediated the effects of task complexity on team effectiveness forecasts. We found support for this hypothesis with both team choice and effectiveness forecasts as dependent variables. Because each participant forecast the effectiveness of two teams with Wageman et al.'s (2005) measure, we analyzed expectations for the single leadership team and the shared leadership team separately. The results showed that LSS mediated the effects of task complexity on team effectiveness forecasts for teams with single leadership ( $b = -.26$ ,  $SE = .09$ , 95%  $CI$ :  $-.35$ ,  $-.10$ ) and shared leadership ( $b = .28$ ,  $SE = .08$ , 95%  $CI$ :  $.14$ ,  $.45$ ).

We found the same pattern of results for team choices. Using Hayes and Scharnow's (2013) approach to test mediation with logistic regression (Model 4), the indirect effect of condition on choice via LSS was significantly greater than 0 ( $b = 1.09$ ,  $SE = .33$ , 95%  $CI$ :  $.48$ ,  $1.75$ ). Therefore, Hypothesis 2c received robust support.

## Discussion

In Study 4, we found strong support for Hypothesis 2 – people expect higher effectiveness from teams with shared leadership in complex tasks because these tasks evoke more communal beliefs about leadership. For simple tasks, on the other hand, people expect teams with single leaders to outperform those with shared leadership because simple tasks do not lead people to override their default hierarchical beliefs about leadership (i.e., Study 1). We replicated these results using different manipulations in Study B4 ( $n = 98$ ) (see Appendix B). Study 4 further shows that these task-contingent beliefs about leadership structure influence assigning teams to tasks, which suggests the potential practical implications of these task-contingent beliefs discussed below.

### **General Discussion**

Across four experiments, we built and tested hypotheses regarding team leadership structure beliefs and their impact on expectations for team effectiveness. We conclude that, like beliefs about individual leaders, beliefs about team leadership structure influence people's expectations for teams, but those beliefs are contingent on the complexity of the task. Specifically, people expect more effective performance from teams with single, stable leaders when they are given minimal information about the team and its task (Study 1) or when tasks are relatively simple (Studies 3 and 4) because hierarchical beliefs about team leadership are most salient in people's minds, leading them to select teams with single, stable leaders (Study 4). However, when considering more complex tasks, these effects are reversed: Complex tasks evoke more communal beliefs about leadership (Studies 3 and 4), leading people to expect teams that share leadership to outperform those with single, stable leaders (Studies 2-4). Below, we detail how this research builds theory on team leadership beliefs, and contributes to research on leadership beliefs more broadly and shared leadership in teams.

#### **Toward a theory of team leadership beliefs**

These studies extend prior theory on team leadership beliefs (Carnabuci et al., 2018; DeRue & Ashford, 2010; Wellman, 2017). Consistent with prior work, we found that people default to hierarchical beliefs about team leadership (Carnabuci et al., 2018). However, we found that these beliefs are much more flexible than previously assumed and do not always function as deeply held, static schema – hierarchical beliefs are overridden by communal beliefs when exposed to complex tasks.

We believe this reversal occurs because a hierarchical leadership belief is more easily called to mind than a communal leadership belief: Teams with single, stable leaders match people's default mental prototypes of team leadership. We propose that this association is

overcome by motivated, controlled cognitive processing (Foti, Knee, & Backert, 2008). Task complexity may evoke such motivated processing because people need to attend more carefully to complex tasks than to simple ones. When people engage more controlled cognitive processing (e.g., they think not only about the team, but about the task and situation), they recognize the value of sharing leadership and apply more communal beliefs about leadership. However, when they do not consider the task or when it appears easy, they do not engage in the motivated cognitions needed to overcome their more easily-recalled hierarchical prototype.

In this research, task complexity was shown to be an important situational contingency in people's team leadership beliefs. Yet, this research is only a first step in identifying the various kinds of situations that may activate more hierarchical or communal beliefs. Future research should continue to examine other aspects of task situations (e.g., risk, uncertainty, time pressure, demands for creativity) that may also affect the strength of team leadership beliefs.

### **Contributions to shared leadership literature**

This research also contributes to theory on the emergence of shared leadership in teams, which is still relatively poorly understood (DeRue et al., 2015; Paunova, 2015). The few studies examining beliefs about team leadership view them as an antecedent to how team members share leadership among themselves (Wellman, 2017), finding that communal beliefs can lead to more shared leadership structures (DeRue et al., 2015). Although such beliefs may converge in a particular team, our findings suggest that perceptions of the task and situation are systematic influences on how and why a communal and hierarchical beliefs emerge in teams. For instance, a team working on a complex task would likely to converge on strong, communal beliefs than a team working on a simple task.

This research also broadens the scope of beliefs in shared leadership from a within-

team view to a social perception view of teams (Satterstrom et al., 2019). A social perception approach to team leadership beliefs parallels research on individual leadership beliefs, which places less weight on leaders or their actions and instead focuses on how beliefs about leadership affect observers or stakeholders' selection decisions for leadership positions and how observers or stakeholders evaluate leaders once they are in those positions (Carnes, Houghton, & Ellison, 2015; Cronshaw & Lord, 1987; Porr & Fields, 2006; Sy et al., 2010; Vinkenbug, Van Engen, Eagly, & Johannesen-Schmidt, 2011). Our research integrates this central message of implicit leadership theory (Lord & Maher, 1991) into research on shared leadership in teams. Because team leadership beliefs affect expectations for teams, they are likely to affect outcomes of importance in organizations, such as assigning teams to task (Cabrera et al., 2009; Meyer, 1994), providing help and resources to teams (Fisher et al., 2018), or hiring (Groysberg et al., 2008) or funding teams (Franke et al., 2006; Klotz et al., 2014). Thus, future research on shared leadership should further explore how sharing leadership affects how teams are perceived by observers or stakeholders and the extent to which it affects these outcomes.

Coupled with prior findings that shared leadership generally promotes team effectiveness (Carson et al., 2007; D'Innocenzo et al., 2016; Nicolaides et al., 2014; Wang et al., 2014), an interesting possibility is that people are incorrectly biased against teams that share leadership for simple tasks. Based on current knowledge, shared leadership also benefits teams performing tasks of low complexity, though shared leadership might be less crucial in such circumstances. The preference for teams with single, stable leaders is consistent with prior theory on the romance of leadership (Meindl et al., 1985) and the leadership attribution error (Hackman & Wageman, 2007), such that thinking of leadership as the province of heroic individuals may lead managers to mistaken expectations and decisions.

### **Contributions to leadership beliefs research**

More broadly, this research answers calls for research on leadership beliefs to move beyond examining beliefs about individuals (Lord et al., 2020; Shondrick et al., 2010). Theories of leadership beliefs have focused almost exclusively on characteristics of individuals, such as race, gender, and charisma (e.g., Offermann et al., 1994). While this research has revealed important insights about biases in leadership selection and evaluation (see Junker & van Dick, 2014, for a review), such approaches must be expanded to encompass informal, shared leadership in teams.

Consistent with implicit leadership theory (Lord et al., 2020; Lord et al., 1982), people draw on their hierarchical or communal beliefs about team leadership to develop expectations about teams. The current research shows that leadership structure is an important component of people's beliefs about team leadership. People hold predictable and task-contingent views about when shared leadership is most effective. The question "Who should lead?" therefore may be incomplete unless accompanied by the question "How many should lead?" Future research could integrate perceivers' beliefs about "who" and "how many" simultaneously to understand people's implicit leadership theories.

### **Practical Implications**

As mentioned above, hierarchical leadership structure beliefs are likely to be maladaptive for teams, leading outsiders like managers or investors to less accurate expectations when they are activated. Therefore, when formulating expectations for teams, people should be wary of their own associations between leadership and hierarchy, which can bias them against teams that share leadership. To overcome these biases, observers or stakeholders first need to carefully consider both the task and situation as they formulate their expectations for teams, which our results suggest should reduce their reliance on their default hierarchical leadership prototype. Thinking about what may be challenging or complex about

a task should both help external managers set directions for a team (Wageman, Fisher, & Hackman, 2009) and activate more communal beliefs about team leadership. These steps should be especially important when selecting teams for tasks or deciding to help or provide resources to in-process teams.

For teams, these studies suggest that members should take care in how they communicate about their leadership structures. When signaling to observers or stakeholders that they are sharing leadership, teams should be sure to also emphasize the complexity of their tasks, or, at a minimum, to provide information about their situations so that evaluators do not rely heavily on hierarchical leadership beliefs. When teams expect managers or stakeholders to make quick decisions or their work is uncomplicated, they may be well-advised to de-emphasize signs of shared leadership and to instead emphasize single, stable leaders who represent the team well. However, it may also be more effective in the long term for members to inform managers or stakeholders when they are sharing leadership and when it is most effective for them.

### **Limitations and Future Directions**

These studies have several limitations that suggest directions for future research. First, our research focused on task complexity and beliefs about team leadership, rather than investigating other characteristics of teams and their members that may also shape beliefs. Although this approach allowed us to isolate task complexity as an important contingency, there may be team characteristics that are also important (e.g., size, team tenure). Importantly, we did not investigate issues of team composition, such as diversity or gender. For instance, people hold more communal beliefs for larger teams, more diverse teams, or those with a larger proportion of women, who are associated with more communal values (Eagly & Carli, 2003; Rosette & Tost, 2010).

Another factor future research could explore is how well our findings apply to non-

Western cultures with more communal cultural values. In Western cultures, leadership is more likely to be associated with individual agency rather than collective agency. It is possible that in East Asian cultures, leadership is more likely to be associated with a collective (Menon, Morris, Chiu, & Hong, 1999; Nisbett, Peng, Choi, & Norenzayan, 2001). Future research should continue to investigate factors, such as these, that are likely to trigger communal and hierarchical leadership beliefs.

Another limitation of our research comes from our reliance on online panel data derived from MTurk. Although such data sources are increasingly common in management research, there is both warranted and unwarranted skepticism about the degree to which they can be applied to leadership and management (see Porter, Outlaw, Gale, & Cho, 2019, for a review). We used an online panel platform for data collection for several reasons. First, these participants better represent typical working adults than traditional student samples (Crone & Williams, 2017; Goodman & Paolacci, 2017; Peer, Brandimarte, Samat, & Acquisti, 2017; Walter, Seibert, Goering, & O'Boyle, 2019). Second, using online panel data is a good fit for our goal of identifying people's beliefs.

We aimed to minimize the limitations of online panel data by closely examining three major concerns expressed by management researchers (Porter et al., 2019): (1) inadequate data quality, (2) non-naïve participants/professional survey takers, and (3) population representativeness. As detailed in our methods, we hope to have avoided issues with data quality by following best-practice recommendations for using online participant pools. Moreover, poor data quality should result in noisier data, manifesting as validated scales with poor internal consistency or failure to replicate results across studies (Cheung et al., 2017; Walter et al., 2019). Our data do not show these symptoms, giving us confidence that this concern is not well-founded for these studies. Moreover, in a large meta-analysis, Walter et al. (2019) found that the attention and quality responses of online participants was

comparable to that of participants recruited by traditional means (e.g., student samples) for survey and experimental research, suggesting that this issue may not be any more pernicious in online panels than in other populations.

Similarly, concerns about using participants who are extremely experienced with surveys and online experiments are unlikely to apply to our study, and, indeed, have been found to be unproblematic in general (Porter et al., 2019). To guard against such concerns, we used an online tool to prevent the same participants from taking part in more than one of these studies. Although familiarity with an experimental paradigm can cause minor issues (Chandler, Paolacci, Peer, Mueller, & Ratliff, 2015), our experimental paradigm was developed for these studies; thus, we are unaware of any way our participants might be familiar with them.

The third concern—the most serious of the three—requires future research to resolve: our participants were not evaluating work teams in realistic contexts. The most important forecasters of team performance in organizations are likely to be relatively senior managers. Although we tested and did not find that work experience or age attenuated the effects reported here, there may be some threshold of experience at which a more communal belief becomes more habitual (though our data shows no indication of this). Further, formulating expectations for teams from minimal information online is likely a much weaker situation than doing so in an organizational setting. Features of organizations, such as norms, culture, and formal structure, may also influence how hierarchal/communal the leadership structure beliefs that evaluators rely on are. Although some settings where evaluators need to formulate expectations for teams may take place online (e.g., sports betting; crowdfunding), others may use other kinds of information and communication media. These areas present an excellent opportunity for future research on how and when beliefs about leadership structure affect expectations of team effectiveness.



### **Conclusion**

We investigated how people's beliefs about team leadership affect their expectations for teams. We found that teams' leadership structure strongly informs people's expectations for teams. Although people may hold default hierarchical leadership beliefs they also prefer teams that share leadership when considering the kind of complex work common in contemporary organizations. Therefore, when considering how a team will perform, scholars and practitioners must consider how and when people believe in sharing leadership.

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**Table 1.***Means by Experimental Condition for Leadership Structure Schema (LSS) and Team Effectiveness Forecasts for Studies 1, 3, & 4*

|                                | DV: LSS                               |                                       |                                       |                                       | DV: Effectiveness                     |                                       |                                       |                                       |
|--------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
|                                | Low Complexity                        |                                       | High Complexity                       |                                       | Low Complexity                        |                                       | High Complexity                       |                                       |
|                                | Single<br>Leadership<br><i>M (SD)</i> | Shared<br>Leadership<br><i>M (SD)</i> | Single<br>Leadership<br><i>M (SD)</i> | Shared<br>Leadership<br><i>M (SD)</i> | Single<br>Leadership<br><i>M (SD)</i> | Shared<br>Leadership<br><i>M (SD)</i> | Single<br>Leadership<br><i>M (SD)</i> | Shared<br>Leadership<br><i>M (SD)</i> |
| Study 1 <sup>a</sup> (n = 442) | <b>3.85 (1.16)</b>                    | <b>3.52 (1.18)</b>                    |                                       |                                       | <b>5.42 (.94)</b>                     | <b>5.01 (1.18)</b>                    |                                       |                                       |
| Study 3 <sup>b</sup> (n = 126) | <b>3.78 (1.13)</b>                    |                                       | <b>4.26 (1.31)</b>                    |                                       |                                       |                                       |                                       |                                       |
| Study 4 <sup>c</sup> (n = 342) | <b>3.94 (1.38)</b>                    |                                       | <b>4.47 (1.34)</b>                    |                                       | <b>5.21 (.93)</b>                     | <b>5.01 (1.17)</b>                    | <b>4.75 (1.03)</b>                    | <b>5.20 (1.09)</b>                    |

<sup>a</sup> In Study 1, task complexity was not manipulated; results are shown in the low complexity columns

<sup>b</sup> In Study 3, leadership was not manipulated; results are shown in the "single" leadership columns.

<sup>c</sup> In Study 4, only task complexity was experimentally manipulated (between-subjects), but all participants rated teams with both single and shared leadership for effectiveness forecasts (within-subjects).

Bolded cells indicated that shared and single leadership differ for the given DV within that condition,  $p < .05$ .

**Table 2.***The list of measured variables of task characteristics in Study 2.*

| <i>Variables</i>                    | <i>Sample item</i>   | <i>Cronbach's alpha</i> | <i>Mean (SD)</i> |
|-------------------------------------|--|-------------------------|------------------|
| <b>Task characteristics</b>         |  |                         |                  |
| Autonomy <sup>a</sup>               | The work allows members to make their own decisions about methods, procedures and schedules with the work gets done. | .70                     | 4.86 (1.21)      |
| Participation <sup>a</sup>          | The work allows everyone to participate in decision making.  | .82                     | 5.03 (1.26)      |
| Task variety <sup>b</sup>           | The work requires the performance of a wide range of tasks.  | .92                     | 5.25 (1.24)      |
| Task significance <sup>b</sup>      | The results of the work are likely to significantly affect the lives of other people.                                | .89                     | 4.86 (1.21)      |
| Flexibility <sup>a</sup>            | The work requires most members know each other's job.  | .74                     | 5.17 (1.23)      |
| <b>Knowledge characteristics</b>    |  |                         |                  |
| Task complexity <sup>b</sup>        | The tasks on the work are simple and uncomplicated (Reverse coded).  | .73                     | 3.32 (1.48)      |
| Information processing <sup>b</sup> | The work requires members to monitor a great deal of information.  | .89                     | 5.08 (1.18)      |

|                                   |  |     |             |
|-----------------------------------|--|-----|-------------|
| Problem solving <sup>b</sup>      | The work involves solving problems that have no obvious correct answer.                                | .72 | 4.97 (1.02) |
| Skill variety <sup>b</sup>        | The work requires team members to utilize a variety of different skills in order to complete the work. | .89 | 5.37 (1.17) |
| <b>Social characteristics</b>     |  |     |             |
| Work interdependence <sup>a</sup> | Within the team, the work by team members is related to one another.                                   | .77 | 5.16 (1.20) |
| Coordination complexity           | The work requires the team to have real-time and reciprocal coordination of action                     | .73 | 5.20 (1.12) |

<sup>a</sup> Items are from Campion et al.'s scales (1993)

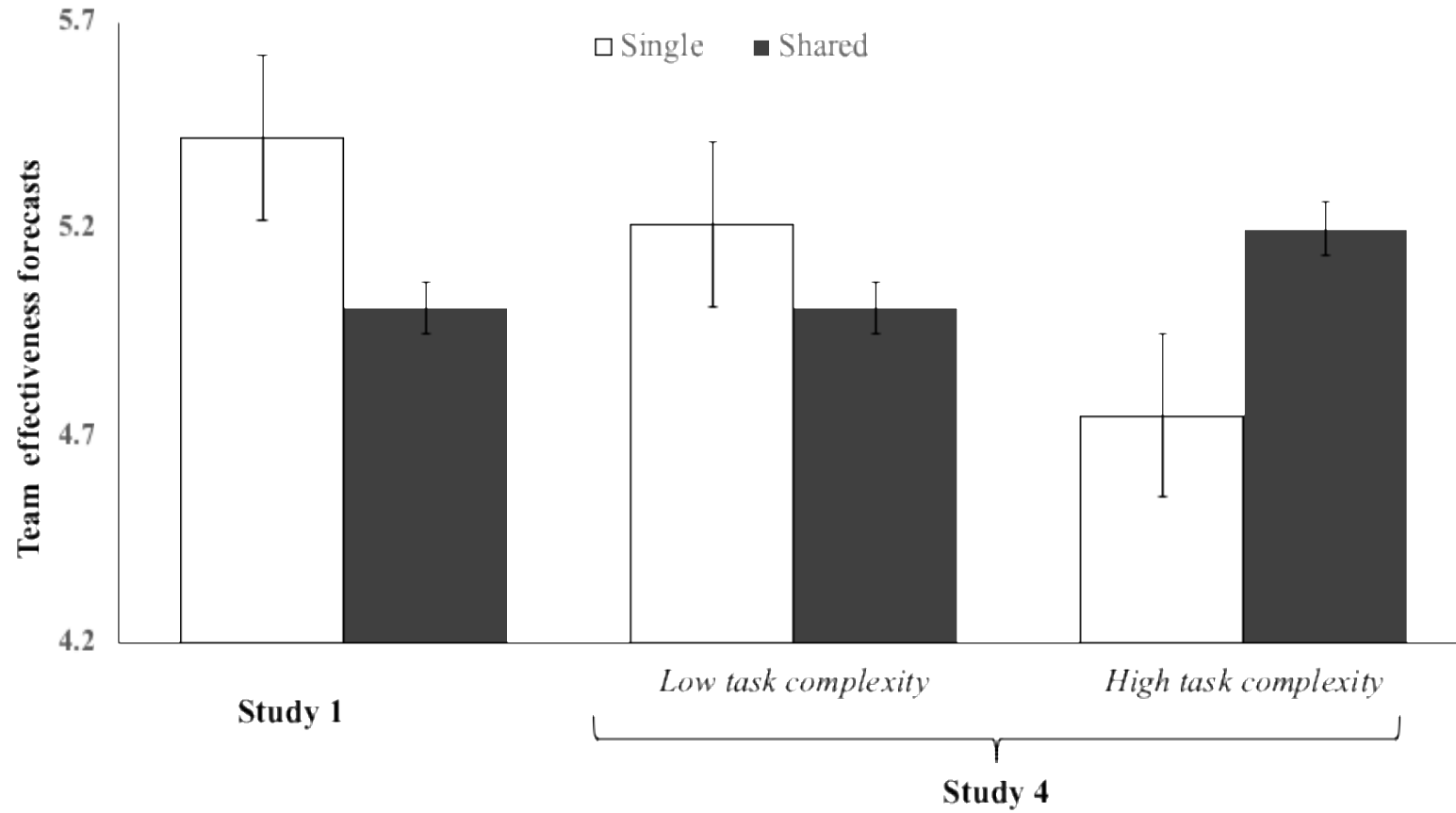
<sup>b</sup> Items are from Morgeson and Humphrey's scales (2006)

**Table 3.**

*The effectiveness expectations on different tasks based on conditions, the multiplicity and stability of leadership structures in Study 2.*

|                            | Condition 1<br>Single-<br>stable<br>(n= 39) | Condition 2<br>Single-<br>dynamic<br>(n=39) | Condition 3<br>Multiple-<br>stable<br>(n = 37) | Condition 4<br>Multiple-<br>dynamic<br>(n = 39) | Single/shared<br>(Condition 1<br>vs., Conditions<br>2, 3 & 4) | Multiplicity<br>(Conditions 1<br>& 2 vs.,<br>Conditions 3<br>& 4) | Dynamism<br>(Conditions 1<br>& 3 vs.,<br>Conditions 2<br>& 4) | Interaction of<br>Multiplicity<br>and<br>Dynamism |
|----------------------------|---|---|--|---|---|---|---|---|
|                            | <i>M (SD)</i>                               | <i>M (SD)</i>                               | <i>M (SD)</i>                                  | <i>M (SD)</i>                                   | <i>t-value</i>  | <i>F-value</i>  | <i>F-value</i>  | <i>F-value</i>                                    |
| Autonomy                   | 4.60(1.32)                                  | 4.88(1.12)                                  | 4.75(1.30)                                     | 5.18(0.96)                                      | -1.51   | 1.32  | 3.40 <sup>+</sup>   | 0.17  |
| Participation              | 4.66(1.29)                                  | 5.15(1.23)                                  | 4.76(1.33)                                     | 5.55(1.03)                                      | <b>-2.17*</b>   | 1.56  | <b>10.65*</b>   | 0.56  |
| Task variety               | 5.00(1.23)                                  | 4.89(1.28)                                  | 5.45(1.32)                                     | 5.69(0.96)                                      | -1.49   | <b>10.43*</b>   | 0.09  | 0.81  |
| Significance               | 4.78(1.22)                                  | 4.64(1.16)                                  | 4.86(1.42)                                     | 5.13(1.01)                                      | -.50  | 2.40  | 0.09  | 0.97  |
| Flexibility                | 4.79(1.21)                                  | 4.98(1.27)                                  | 5.15(1.23)                                     | 5.76(0.99)                                      | <b>-2.26*</b>   | <b>8.89*</b>  | <b>4.36*</b>  | 1.21  |
| Complexity                 | 2.99(1.42)                                  | 3.69(1.38)                                  | 2.82(1.47)                                     | 3.41(1.56)                                      | -1.16   | 0.92  | <b>7.46*</b>  | 0.05  |
| Information<br>processing  | 4.78(1.19)                                  | 4.92(1.18)                                  | 5.18(1.24)                                     | 5.44(1.03)                                      | <b>-1.84<sup>+</sup></b>                                      | <b>5.79*</b>  | 1.19  | 0.09  |
| Problem Solving            | 4.72(1.05)                                  | 4.83(0.99)                                  | 5.11(1.00)                                     | 5.22(1.00)                                      | -1.74   | <b>5.67*</b>  | 0.43  | 0.00  |
| Skill variety              | 5.20(1.16)                                  | 5.20(1.31)                                  | 5.43(1.03)                                     | 5.64(1.14)                                      | -1.04   | 3.23 <sup>+</sup>   | 0.31  | 0.31  |
| Interdependence            | 4.83(1.23)                                  | 5.10(1.27)                                  | 5.32(1.24)                                     | 5.38(1.01)                                      | <b>-2.00*</b>   | <b>4.02*</b>  | 0.84  | 0.33  |
| Coordination<br>complexity | 5.14(1.15)                                  | 4.91(1.10)                                  | 5.43(1.16)                                     | 5.33(1.04)                                      | -.37  | 3.86 <sup>+</sup>   | -.88  | 0.13  |

Note: n=154. <sup>+</sup> p<.10 \* p<.05 \*\* p<.000



**Figure 1.** Team effectiveness forecasts (Studies 1 & 4) for Single and Shared Leadership in different conditions

**Online Supplementary Material****Appendix A****Scenarios and figures used in Studies 1 & 4**

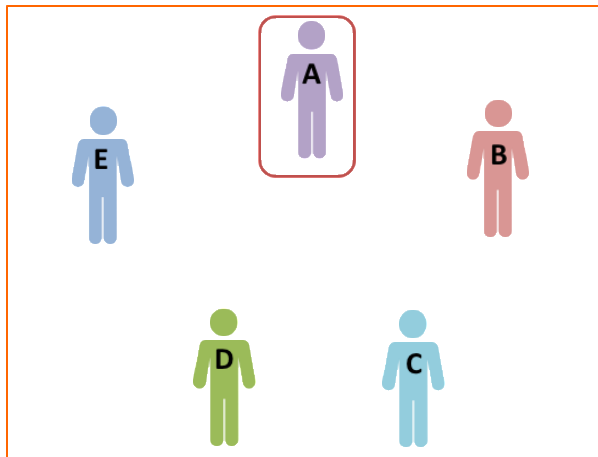
In the diagram below, each member who is enclosed in a rectangular box is an INFORMAL LEADER of the team. An INFORMAL LEADER is an individual who other members agree took responsibility for providing leadership to the team, regardless of official role. Providing leadership means that the member influenced the behavior of other members toward accomplishing team goals.

Please predict some aspects of the team's processes and performance.

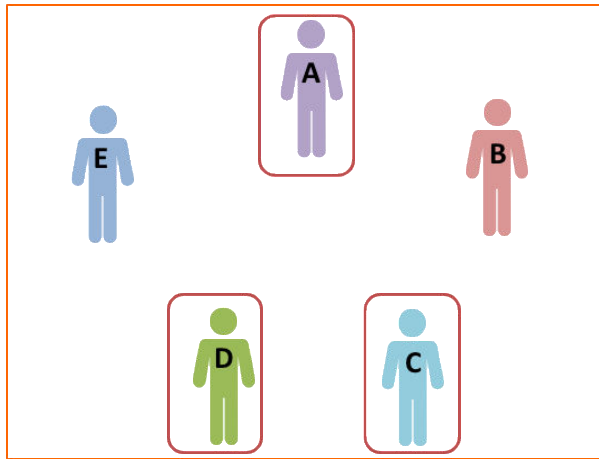
Note: The symbol of an individual could be a female or a male. The same diagram will be displayed throughout the study.

**The team:****Figure A.1:** The diagram in Studies 1 & 4

Single Leadership



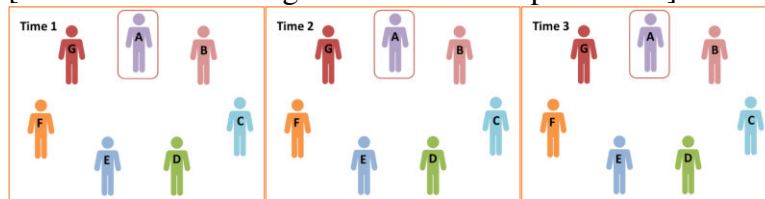
Shared Leadership



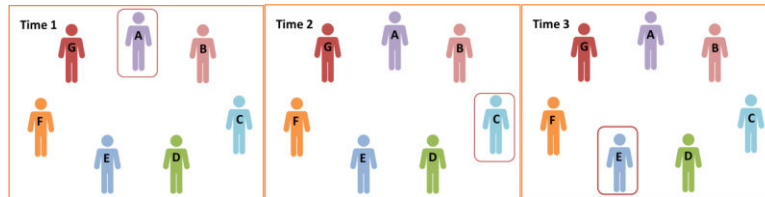


**Figure A.2.** The diagrams in Studies 2, B2, B3, and B4<sup>6</sup>

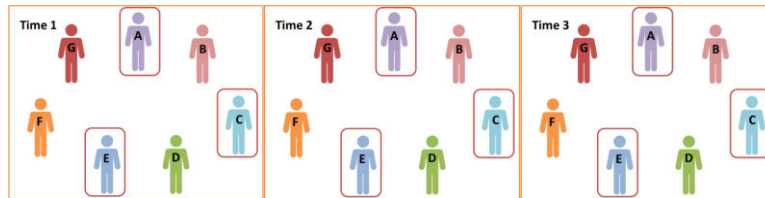
[Condition 1: The single-stable leadership structure]



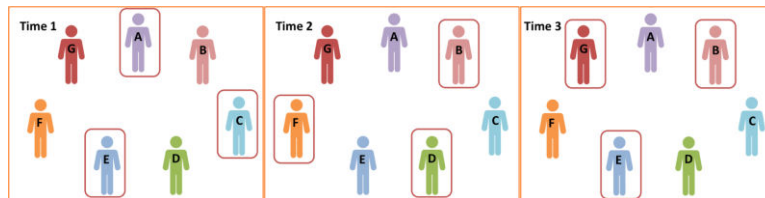
[Condition 2: The single-dynamic leadership structure]



[Condition 3: The multiple-stable leadership structure]



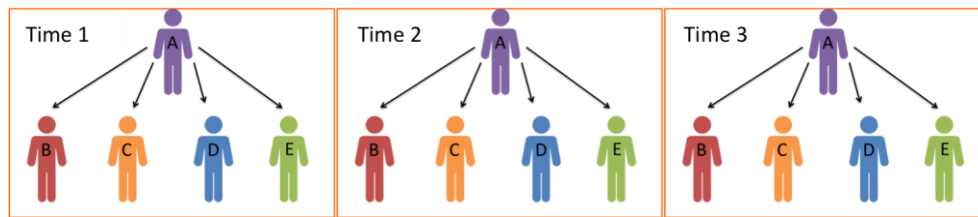
[Condition 4: The multiple-dynamic leadership structure]



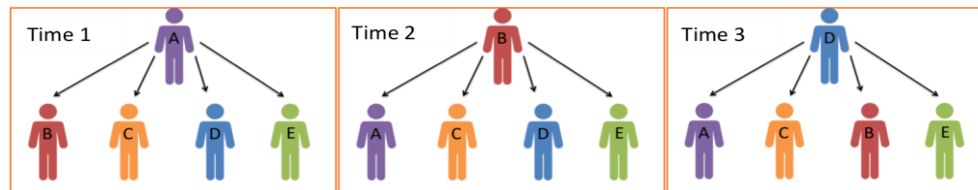
<sup>6</sup> We asked participants to read the following instructions: “In the diagrams, each member who is enclosed in a rectangular box is an INFORMAL LEADER of the team. An INFORMAL LEADER is an individual who other members agree took responsibility for providing leadership to the team, regardless of official role. Providing leadership means that the member influenced the behavior of other members toward accomplishing team goals”.

**Figure A.3.** The diagrams in Study B1<sup>7</sup>

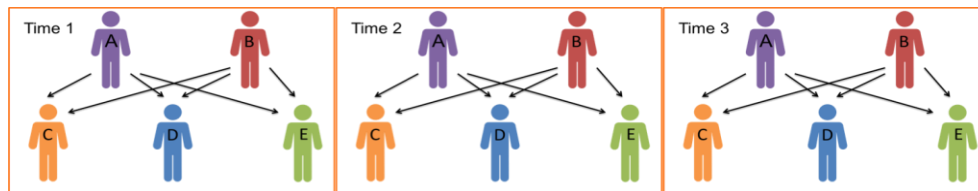
[Condition 1: The single and stable leadership structure]



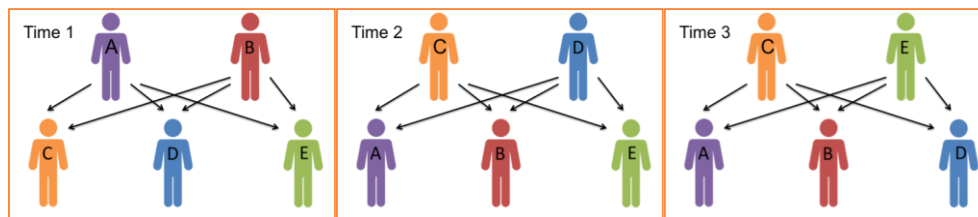
[Condition 2: The single and dynamic leadership structure]



[Condition 3: The multiple and stable leadership structure]



[Condition 4: The multiple and dynamic leadership structure]



<sup>7</sup> We asked participants to read the following instructions: “The individual on the top of the diagram is providing leadership to those below him/her. Time 1-3 represent different time points that researchers observed the same team. The single arrow lines represent one individual has the influence on another individual. Different capital letters (i.e. A, B, C, D, and E) represent different individuals. The symbol of an individual could be a female or a male. The text labelling the conditions was shown to participants.

## Appendix B

Appendix B presents the results of our pilot and replication studies using Mturk, which also explored whether people hold different beliefs depending on how leadership is structured (multiplicity and dynamism). In our experiments, we varied these two ways of sharing leadership and, in Study B2, whether leadership was based on formal roles or informal attributions. Moreover, we manipulated different forms of task complexity (a variety of tasks are organized in a sequential way or a simultaneous way). Tables B.1 and B.2 show the designs of these studies.

We found that how leadership was shared did not reliably predict either evaluators' beliefs or expectations. In Study B3, people's scores of beliefs about dynamism of leadership in the high task complexity (sequential) condition ( $M = 4.28$ ,  $SD = 1.13$ ) were not different from those in high task complexity (simultaneous) condition ( $M = 4.23$ ,  $SD = 1.23$ );  $t(170) = -.26$ , n.s.,  $\eta_p^2 = .00$ . In Study B4, in the high complexity (sequential) condition, 81.8% of participants selected the dynamic structures, which was not different from the proportion of participants in the high complexity (simultaneous) condition (71.4%) ( $Z = 0.96$ , n.s.). In the high complexity (simultaneous) condition, participants were significantly more likely to choose the multiple structures (85.7%) than they were in the high complexity (sequential) condition (51.5%) ( $Z = 2.84$ ,  $p = .004$ ). However, there were clear distinctions between single and shared leadership structures. In the low complexity condition, more participants selected single stable leadership structure (51.4%) than in any of the other three leadership structures. Through these two studies, we found that sharing leadership, in any form, was the main differentiating factor.

Therefore, we aggregated all shared leadership conditions when testing Hypotheses 1 and 2. In Study B1, people predicted that teams with single leadership structure ( $M = 4.99$ ,  $SD = 1.22$ ) would be more effective than teams with shared leadership structures (i.e.,

combining single-dynamic, multiple-stable, and multiple-dynamic conditions) ( $M = 4.31$ ,  $SD = 1.12$ ;  $t(178) = 3.68$ ;  $p < .001$ , Cohen's  $d = .58$ ). These results are consistent with Hypothesis 1. In Study B2, a mixed-effects ANOVA found, after controlling for the effects of formality, participants predicted that teams with single stable leadership structures ( $M = 4.88$ ,  $SD = 0.97$ ) were not more effective than shared leadership structures ( $M = 4.87$ ,  $SD = 1.02$ ),  $F(1, 455) = .001$ ,  $p = .975$ ,  $\eta_p^2 = .011$ . When we looked at each dimension of team effectiveness, we found that participants predicted that single stable leadership structure's performance ( $M = 5.31$ ,  $SD = 1.05$ ) would be marginally higher than teams with shared leadership structure ( $M = 5.11$ ,  $SD = 1.04$ ),  $F(1, 455) = 3.48$ ,  $p = .074$ ,  $\eta_p^2 = .012$ . But we did not find same results for team satisfaction and team viability. The formality did not significantly influence people's predictions of team effectiveness,  $F(1, 455) = .53$ ,  $p = .47$ ,  $\eta_p^2 = .012$ . Thus, while support for Hypothesis 1 was weaker in this study (possibly due to the large number of conditions and complexity of the manipulations), it does not appear that people have different leadership structure beliefs about formal or informal leadership structures.

In Study B3, we tested Hypothesis 2a, comparing evaluators' LSS when confronted with high- or low-complexity tasks. In Study B3, participants expressed more hierarchical leadership beliefs ( $M = 2.89$ ,  $SD = 1.20$ ) when considering low-complexity tasks, but more communal leadership beliefs when considering high-complexity tasks ( $M = 4.49$ ,  $SD = 1.21$ ;  $t(171) = 8.33$ ;  $p < .001$ , Cohen's  $d = 1.67$ ). These results support Hypothesis 2a. Study B4 found similar results for LSS ( $t(96) = 2.45$ ,  $p = .01$ ), and further asked participants to choose either a team with single or shared leadership to complete the task (as in Study 4). In the low complexity condition, 76% of participants selected the team with a single leader, whereas only 24% selected the team with a single leader in the high-complexity condition ( $\chi^2(1, n = 98) = 23.19$ ,  $p < .001$ ). LSS mediated the effects of condition on choice of single leadership,  $b = -.66$ ,  $SE = .47$ , 95%  $CI$ :  $-1.80$ ,  $-.08$ . These results supported Hypotheses 2b and 2c. The

specific results of these studies are displayed in Table B.3.

In sum, the results of these studies support our hypotheses and conclusions: observers or stakeholders endorse teams with single leaders over those that share leadership when no contextual information is provided, or for low-complexity tasks, but prefer teams that share leadership for high-complexity tasks.

**Table B.1.***Studies Replicating Study 1*

|                     | <b>Study B1</b>   | <b>Study B2</b>  |
|---------------------|---|--|
| Participants        | 229 adults (48% male; $M_{age} = 36.01$ , $SD_{age} = 11.42$ ), recruited from Amazon Mechanical Turk         | 458 adults (47.6% male; $M_{age} = 35.12$ , $SD_{age} = 11.81$ ), recruited from Amazon Mechanical Turk  |
| Design              | A 2 (multiplicity: single or multiple leadership) by 2 (stable or dynamic leadership) between-subjects design | A 2 (multiplicity: single or multiple leadership) by 2 (stable or dynamic leadership) by 2 (formal or informal leadership) between-subjects design |
| Procedure           | Read one of the diagrams depict four types of leadership structures and then predict the team effectiveness   | Read one of the diagrams depicting four types of formal or informal leadership structures and then predict team effectiveness                      |
| Stimuli             | see Figure A.3  | see Figure A.2   |
| Dependent variables | Wageman et al.'s (2001) measure: team effectiveness ( $\alpha_{effectiveness} = .95$ )                        | Wageman et al.'s (2001) measure: team effectiveness ( $\alpha_{effectiveness} = .93$ )   |
| Age and gender      | Neither age nor gender moderated the effects of conditions on team effectiveness forecasts.                   | Neither age nor gender moderated the effects of conditions on team effectiveness forecasts.  |

**Table B.2.**

*Studies replicating Study 3 and Study 4. This part shows the design and manipulations of two studies (Study B3 replicates Study 3 and Study B4 replicates Study 4). In these two studies, we also found support for Hypothesis 2.*

|                            | <b>Study B3</b>   | <b>Study B4</b>  |
|----------------------------|---|--|
| Participants               | 173 adults (48.6% male; $M_{age} = 39.31$ , $SD_{age} = 13.23$ ) recruited from Amazon Mechanical Turk  | 98 adults (49% male; $M_{age} = 39.26$ , $SD_{age} = 12.29$ ) recruited from Amazon Mechanical Turk  |
| Design                     | A one-factor (low task complexity; sequential complexity; simultaneous complexity) between-subject design.  | A one-factor (low task complexity; sequential complexity; simultaneous complexity) between-subject design.   |
| Procedure                  | Participants read the manipulation and then answered questions about their beliefs.   | Participants read the manipulation of task complexity, rated their beliefs of leadership structure, and then chose one of the four teams depicted in Figure A.2 to work on the task.   |
| Manipulations              | In the <i>Sequential Complexity Condition</i> ( $n = 57$ ), participants read: "In this situation, teams will perform a variety of tasks. Thus, different kinds of expertise may be required sequentially at different points during the team's work." In the <i>Simultaneous Complexity Condition</i> ( $n = 55$ ), participants read: "In this situation, teams will perform a variety of tasks. Thus, different kinds of expertise may be required simultaneously at different points during the team's work." In the <i>Low Complexity Condition</i> ( $n = 61$ ), participants read: "In this situation, teams will not perform a variety of tasks. Thus, one kind of expertise is required consistently throughout the task." | The manipulations of task complexity were identical to Study B3. There were three task characteristic conditions: sequential complexity ( $n = 33$ ), simultaneous complexity ( $n = 28$ ), and low complexity ( $n = 37$ ). |
| Dependent variables        | Beliefs about the multiplicity of leadership structure (identical to LSS, $\alpha_{multiplicity} = .89$ ) and beliefs about the dynamism of leadership structure ( $\alpha_{dynamism} = .86$ )  | Team choices (i.e., the percentage of participants to choose single-stable leadership or shared leadership) was identical to Study 4.  |
| Work experience and gender | Age and gender moderated the effects of conditions on LSS (multiplicity). Older people and women were more likely to report hierarchical leadership beliefs in Low-complexity situations.   | Age and gender did not moderate the effects of conditions on people's choices.   |

**Table B.3.***Means by Experimental Condition for Leadership Structure Schema (LSS) and Team Effectiveness Forecasts for Studies B1-B4*

|                     | DV: LSS        |                              |                                | DV: Effectiveness |                         |                          |                           |
|---------------------|----------------|------------------------------|--------------------------------|-------------------|-------------------------|--------------------------|---------------------------|
|                     | Low complexity | High complexity (sequential) | High complexity (simultaneous) | Single-stable     | Single-dynamic (Shared) | Multiple-stable (Shared) | Multiple-dynamic (Shared) |
|                     | <i>M (SD)</i>  | <i>M (SD)</i>                | <i>M (SD)</i>                  | <i>M (SD)</i>     | <i>M (SD)</i>           | <i>M (SD)</i>            | <i>M (SD)</i>             |
| Study B1            |                |                              |                                | 5.19 (1.28)       | 4.26 (1.18)             | 4.77 (1.08)              | 4.28 (1.04)               |
| Study B2            |                |                              |                                |                   |                         |                          |                           |
| Formal leadership   |                |                              |                                | 5.26 (1.08)       | 5.05 (0.83)             | 4.92 (1.07)              | 5.11 (1.06)               |
| Informal leadership |                |                              |                                | 5.36 (1.04)       | 5.07 (0.76)             | 5.05 (1.25)              | 5.43 (0.97)               |
| Study B3            | 2.89 (1.21)    | 4.54 (1.17)                  | 4.43(1.25)                     |                   |                         |                          |                           |
| Study B4            | 3.57(1.15)     | 3.93 (1.20)                  | 4.60 (1.46)                    |                   |                         |                          |                           |

<sup>a</sup> In Studies B1 & B2, to test Hypothesis 1, we compared Single-stable structure with the three shared leadership conditions (i.e., the aggregation of Single-dynamic, Multiple-stable, and Multiple-dynamic conditions). In Study B2, participants predicted the team performance, which is an indicator of team effectiveness.

<sup>b</sup> In Studies B3 and B4, to test Hypothesis 2, we compare Low complexity with the two High complexity conditions (i.e., the combination of high complexity (sequential) and high complexity (simultaneous) conditions)

<sup>c</sup> In Study B4, only task complexity was experimentally manipulated (between-subjects), but all participants selected from four types of leadership structure, one represents single, stable leadership structure and another three represent shared leadership structures.



## Appendix C

### Task complexity scenarios used in Study 3 and 4

Please imagine you are a senior partner in a large consultancy company. You oversee two self-managing teams, each with seven members. These teams work to solve business problems for client organizations. As part of your job, you need to assign a project to one of the teams. Please read the project description carefully and answer the questions below.

Here is the work description for this project:

#### Low Task Complexity Condition

The consultancy project is requested by a client company: Choice Chocolate. Choice Chocolate has seen its sales decline for the past two years and need help to decide on a new product line to launch to increase the sales. There are two potential production lines.

- Chocolate 1
- Chocolate 2

The client asks the consultancy team to incorporate two main factors in their analysis:

The targeted customer age group,  
Health and dietary information

These factors need to be applied to each of the potential new products.

Relative to other projects, this project will not be very complex. The various products and factors need to be considered one at a time. The interactions between products and factors will not be very important to the final analysis.

#### High Task Complexity Condition

The consultancy project is requested by a client company: Choice Chocolate. Choice Chocolate has seen its sales decline for the past two years and need help to decide on a new product line to launch to increase the sales. There are twelve potential production lines.

- Chocolate 1
- Chocolate 2
- Chocolate 3
- Chocolate 4
- Chocolate 5
- Chocolate 6
- Chocolate 7
- Chocolate 8
- Chocolate 9
- Chocolate 10
- Chocolate 11

- Chocolate 12

The client asks the consultancy team to incorporate twelve main factors in their analysis:

- The targeted customer age group,
- Health and dietary information,
- Differentiation from competitors,
- Manufacturing costs,
- Allergy risks,
- Environmental and ecological impact,
- Consistency with current brand image,
- Potential retail distributors,
- Smoothness and texture,
- The quality of ingredients,
- Country of production, and
- Potential export sales

These factors need to be applied to each of the potential new products.

Relative to other projects, this project will be very complex. The various products and factors needed to be considered simultaneously. The interactions between products and factors will be very important to the final analysis.