

**THREE ESSAYS ON
SHARED LEADERSHIP AND CREATIVITY
IN TEAMS**

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I, Wen-Xin Xie, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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Abstract

My thesis examines two critical aspects of teamwork in modern organizations: shared leadership and creativity.

In Chapter 2, we¹ investigate the conditions under which people believe shared leadership is advantageous and how these beliefs affect stakeholders' decision making. Through a series of experiments, we find that stakeholders generally hold hierarchical beliefs about team leadership (i.e., beliefs that leadership should be consolidated into a single person), leading them to make decisions in favor of teams with hierarchical leadership. However, complex tasks evoke more communal leadership beliefs, leading stakeholders to select teams that share leadership to work on complex tasks over those with single leaders.

Beyond that, we investigate the actual leadership dynamics in teams. In Chapter 3, we hypothesize that when members perceive the environment to be more uncertain, they tend to believe that sharing leadership is desirable, leading them to broaden their definitions of what constitutes "leadership behavior." This broadening increases the likelihood that they attribute leadership to their teammates. We tested these hypotheses in three studies. Study 1a and Study 1b use multi-wave data from student project teams. Study 2 establishes the causal direction of these relationships in an experimental study.

Teams have a bias against novel ideas because novel ideas are inherently uncertain. In Chapter 4, we identify that preference diversity that promotes creativity raises the chances that members will disagree with one another. This disagreement can make members feel more uncertain about the novel ideas. We predict that members will seek to reduce these feelings of uncertainty by choosing more familiar ideas over

¹ I am the lead author of these three research papers, and throughout the thesis I will use first-person-plural pronouns (e.g., we) to refer to me and my co-authors. My Chapter 2 and 3 coauthor is Colin Fisher. My Chapter 4 coauthors are Sarah Harvey, Haoyue Zhang, Poornika AnnanthaRamakrishnan, and William Bottom.

more novel ones. We found support for this argument by using one face-to-face lab experiment and one online experiment and proposed ways to mitigate the negative effects of preference diversity.

Impact Statement

For scholars, this thesis develops and extends existing leadership and creativity theory. For practitioners, this thesis provides insights into team management, decision making, and team creativity.

First, sharing leadership is a research-proven way for teams to enhance their effectiveness. Using experiments and longitudinal team leadership network data, this thesis develops a theory of the social perceptions of shared leadership and refines the theory about the emergence of shared leadership. The first study examines the conditions under which external stakeholders believe that shared leadership is most advantageous. The second study takes the follower's point of view and examines the influence of environmental uncertainty on the emergence of shared leadership.

Both have important implications for external stakeholders and internal team members. External stakeholders, such as managers and investors, need to compose teams, allocate resources, and assign tasks. When making these decisions, they should be wary of their own associations between leadership and hierarchy. To overcome the bias against shared leadership, stakeholders need to carefully consider both the task and situation when they think about teams. Team members, likewise, need to be careful about how they communicate their leadership structures to external stakeholders. For example, when they signal to stakeholders that they are sharing leadership, they should also emphasize the complexity of their tasks.

These two studies open avenues for future research. Future research should continue exploring the social perceptions of shared leadership and consequences, if there are, misperceptions. Moreover, leadership is a union of leaders, followers and situations. Future research should not just emphasize leaders' actions, perceptions and personas: it should also examine and measure followers' perceptions of a given

behavior changing according to situations.

Second, my thesis explores the novelty bias in teams, which prevents teams from being creative and innovative. I found that teams with high preference diversity were more likely to feel uncertain about novel ideas. To mitigate the negative effects, my research suggests the descriptions of ideas should include more concrete information about how to make the idea function.

This research has practical implications for teams that desire to be better at selecting ideas. Teams are advised to be mindful not to dismiss a novel idea just because they have different preferences. When teams cannot reach a consensus about an idea, instead of directly rejecting it, they should seek more information to aid their assessment. For idea generators who submit ideas, if the ideas are highly novel, they should provide more details about how to realize this idea, rather than just focusing on why the idea is important.

This research adds a new perspective to creative evaluation literature – that group context and certain group interactions may create or amplify the uncertainty of novel ideas. Unlike individual evaluators, the source of uncertainty for group evaluators is broader. We call for future research to pay greater attention to the context in which teams operate and the practices teams use for evaluating ideas.

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But now, here I am. Some years later, I have completed a dissertation that I feel proud of. I have grown a lot in the past few years. I have to say that doing a Ph.D. is a great source of development and learning. But more importantly, I learned that I was not alone in this tough journey. I could not have completed my Ph.D. and my dissertation without the assistance of a group of people who are extremely brilliant and supportive. I cannot list all of them, but I thank you all in my heart and would like to highlight a few people for special acknowledgements.

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Chapter 1 Introduction

This thesis contains two research topics: shared leadership and team creativity. They are two important aspects of team research. Specifically, Chapters 2 and 3 are about shared leadership and Chapter 4 is about team creativity.

Teams² are the building blocks of modern organizations. Today's teams are different from the teams of the past: they are far more diverse and increasingly required to perform in complex and dynamic environments (Zaccaro, Rittman, Marks, Rittman, & Marks, 2001). But while teams face new hurdles, their successes still hinge on effective team leadership and team creativity. Team leadership is a team-level relational process, in which leaders and followers are fluid roles that any member can take on in a given situation (Denis, Langley, & Sergi, 2012). Team leadership helps set up team directions and coordinate individuals' efforts, which contributes significantly to team effectiveness (Hackman & Morris, 1975). Team creativity refers to the extent to which teams generate products, processes, and solutions to organizational problems that are both novel and useful (Amabile, 1988; Hargadon & Bechky, 2006). Team creativity helps organizations to solve problems and gain competitive advantages.

Nowadays, 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 they informally share leadership among multiple members (D'Innocenzo, Mathieu, & Kukenberger, 2016; Manz & Sims, 1987). This emerging, non-hierarchical, distributed view of leadership is commonly referred to as *shared leadership*. Recent literature reviews have called for more empirical testing and theory refinement of *shared leadership* (Carter, Dechurch,

² This thesis uses the term "teams" and "groups" interchangeably.

Braun, & Contractor, 2015; Denis et al., 2012; Paunova, 2015). Although research has shown that shared leadership generally 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, and proverbs such 'too many cooks spoil the broth' suggest that it is easier for people to think of leadership as the province of a single individual rather than a collective endeavor. These inconsistent beliefs can be problematic, since evaluators may be biased against teams with shared leadership when making important decisions. Thus, it is important to understand under which conditions decision-makers (i.e., stakeholders outside the team) will believe that shared leadership is more effective than the traditional hierarchical leadership.

To address this question, we investigated people's implicit beliefs about how leadership should be structured in teams. In Chapter 2, through a series of experiments ($n = 1067$)³, we find that people generally hold hierarchical beliefs about team leadership (i.e., beliefs that leadership should be consolidated into a single person), leading them to predict that teams with single leaders would be more effective than those with shared leadership. However, complex tasks evoke more communal leadership beliefs (i.e., beliefs that leadership should be shared), leading stakeholders to select teams that share leadership to work on these tasks over those with single leaders. This research indicates that leadership structure affects how teams are perceived by stakeholders and shows that leadership structure (i.e., hierarchical or shared) is an important component of people's beliefs about leadership.

Building on Chapter 2, we try to understand how shared leadership emerges in teams. Previous research about the emergence of shared leadership has focused on

³ Each chapter has its own set of studies starting with 1. Chapter 2 has Studies 1-4. Chapter 3 has Studies 1 & 2. Chapter 4 has Studies 1 & 2.

social conditions such as shared purposes and external coaching (Carson, Tesluk, & Marrone, 2007) or leaders' personal attributes (DeRue, Nahrgang, & Ashford, 2015) to explain shared leadership emergence. However, without examining the followers' perspectives, the story is not complete. In particular, theory remains sparse about how followers react to the context with regard to leadership, develop a unique pattern of thinking about leadership, and interact with leaders. During the interactions between leaders and followers, leaders need to *claim* leadership (i.e., take actions to assert their leader roles), and followers need to *attribute* leadership (i.e., bestow leader roles on others). We argue that followers' leadership attributions might be a function of their communal leadership beliefs and the situations in which they find themselves.

To examine this argument, in Chapter 3, we hypothesize that when members perceive the environment to be more uncertain, they tend to believe that sharing leadership is desirable (i.e., communal leadership beliefs), leading members to broaden their definitions of what constitutes "leadership behaviors." This broadening increases the likelihood that they attribute leadership to more than one of their teammates. We test these hypotheses in three studies. Study 1a (n = 352 individuals, 46 teams) and Study 1b (n= 101 individuals, 15 teams) use multi-wave data from student project teams to show that when individuals perceive the environment as more uncertain, they adopt more communal leadership beliefs and, thus, are more likely to attribute leadership to multiple teammates. Study 2 (n = 397 individuals) establishes the causal direction of these relationships in an experimental study in which participants were randomly assigned descriptions of either certain or uncertain environments for a team task. Participants reported more communal leadership beliefs and were more likely to attribute leadership to fictitious teammates in uncertain (vs. certain) environments, even though the actual behaviors of these teammates were the same in both conditions.

My thesis also examines another important facet of team success, team creativity. Improving creative idea generation in groups has been the focus of a large body of research over the past few decades (e.g., Gilson & Shalley, 2004; Goncalo & Staw, 2006; Nemeth & Ormiston, 2007; Nijstad & Stroebe, 2006; Paulus, 2000). However, the processes involved in determining which ideas to retain, value, develop, adopt, and resource, have been relatively unexplored. Overlooking the process of determining which ideas to resource is problematic because generating more creative ideas does not necessarily result in the most creative ideas being selected and implemented (Payne, 1982; Timmermans, 1993; Wright, 1975). Past research suggests that selection panels tend to select less novel ideas (Criscuolo, Dahlander, Grohsjean, & Salter, 2017). It is important to understand why groups do not select the most creative ideas and how to mitigate this situation.

In Chapter 4, we hypothesize that groups high in preference diversity will perceive greater uncertainty about novel ideas, because diverse preferences create disagreement about the pros and cons of novel ideas, making people less likely to support them for further implementation. Building on social comparison theory (Festinger, 1954), we argue that when individuals lack concrete information about how to realize a novel idea, they will be more likely to rely on the social cues of their teammates to make decisions. Therefore, when team members have disagreements, people will have greater uncertainty perceptions about novel ideas. We tested these hypotheses using two studies. Study 1 uses a face-to-face group experiment ($n = 186$, 62 teams) to show that groups high in preference diversity perceive greater uncertainty and select the less novel idea. Study 2 uses an online experiment ($n = 397$) and finds that when there is a lack of concrete information about ideas, group members are more subject to the negative influence of preference diversity. Therefore, to mitigate the

negative effects of preference diversity, providing groups with more concrete information about novel ideas can be an effective approach.

The thesis is presented as follows. In the following three chapters (Chapters 2-4), I will report the main arguments and empirical results of my three stand-alone research papers. In the final chapter, I articulate the central findings, their high-level limitations and strengths, and implications for future research.

Chapter 2 When Do People Believe in Teams That Share Leadership? How Expectations of Team Effectiveness Vary with Leadership Structure and Task Complexity

Leading teams in organizations often requires more attention, knowledge, and skill than any single member can provide. Indeed, research increasingly suggests that informally shared leadership is positively related with team performance (D’Innocenzo, Mathieu, & Kukenberger, 2016; Manz & Sims, 1987), and appears to be a more useful predictor of team effectiveness than hierarchical leadership (Pearce & Sims, 2002). Although research has shown that the effects of hierarchical leadership on team effectiveness are highly mixed and even negative (Anderson & Brown, 2010; Greer, de Jong, Schouten, & Dannals, 2018), people still tend to believe hierarchical leadership is more effective. When people think about leadership, they often envision powerful individuals, such as U.S. presidents (Kakkar & Sivanathan, 2017), CEOs (Waldman, Ramírez, House, & Puranam, 2001), 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. Disbelief in the efficacy of shared leadership may reduce its prevalence in organizational teams and thus in the rewards and resources that shared leadership teams receive. 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 their beliefs about individual leaders. Research on individual leadership suggests that 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 perceivers' cognitive representations of how leaders ought to look and behave (Shondrick, Dinh, & Lord, 2010). As scholars have identified the 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 is beliefs about *team* leadership. Beliefs about the characteristics of individual leaders may be of less use for forming expectations about the effectiveness of teams, in which leadership is a dynamic and mutual influence process that can be distributed among members (Carson et al., 2007; Greer et al., 2018). Yet, expectations regarding 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 (Hoch, 2013; Ilgen, 1999; Manz & Sims, 1987; Zaccaro et al., 2001), 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), three important areas require further research. First, there is a lack of empirical research to test whether beliefs about team leadership structure align with the evidence about actual effects of sharing leadership. Previous research has shown that shared leadership enhances team effectiveness, although the strength of this effect depends on task characteristics (Wang, Waldman, & Zhang, 2014). Yet, we do not know whether and when people believe in shared leadership's efficacy. Second, 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 et al., 2015), but has not yet examined their influence on observers or stakeholders' expectations and decision making, which can have critical implications for organizations. Third, 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).

As the first empirical research to investigate how people's beliefs about sharing leadership affect expectations of teams, this research consists of 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 (Appendix 2. 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). Shared leadership is not mutually exclusive to other approaches to studying team leadership, such as transformational and charismatic leadership, (Hoch, 2013): they can be engaged and exercised simultaneously. Transformational and charismatic leadership focuses on leaders' behaviors (i.e., whether leaders use their communications skills, visions, and charm to influence others), and shared leadership focuses on how

leadership is structured in teams (i.e., whether leadership is centralized or distributed). Shared leadership means that multiple team members are seen as fulfilling leadership functions in teams (e.g., Carson et al., 2007). 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.⁴

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 to 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

⁴ In Study B2 (Appendix 2. 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.

influence on team effectiveness (Nicolaidis et al., 2014).

Although past research generally believes shared leadership is beneficial, some suggest that it has potential costs. For example, dynamically rotating leadership roles among team members, which is seen as one way of sharing leadership, might be detrimental. 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 members simultaneously fulfil different leadership functions over time, such as a team having one member as a task-focused leader, but another as a more relationship-focused leader (Gibb, 1954). We refer to 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 themselves. 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 on 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 have ‘prototypes’ of the necessary and desirable leadership attributes and behaviors in their minds (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 have 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 to 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 shared leadership. For instance, in a review, Shondrick et al. (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 et al. (2015) have investigated “beliefs as to how leadership should be structured in groups” (p. 1193).⁵ 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

⁵ 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.

communal prototypes. Hierarchical relationships are more easily processed, identified, understood, learned, and remembered than other forms of social structures such as equality. Therefore, people tend to endorse hierarchical social relationships (Zitek & Tiedens, 2012). For instance, 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 more readily attribute leadership 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 ‘leadership attribution error’ (Hackman & Wageman, 2007; Wageman & Fisher, 2014). This suggests a bias away from attributing performance outcomes to collectives and toward individuals. Finally, we argue that people are motivated to defend and justify hierarchical leadership. According to system justification theory, people are generally motivated to defend and justify the existing social system’s ability to meet their underlying needs to reduce uncertainty, threats, and social disorder (Jost, 2019). Hierarchical leadership is a more common way of organizing leadership in teams than shared leadership. Shared leadership in people’s minds might be uncertain and violate the most common cases. Therefore, people would bolster and justify hierarchical leadership. In summary, our hypothesis is that people generally believe that single leadership is more prototypical than shared leadership and is thus more likely to be effective. In people’s cognitions, when they are presented with a particular leadership structure, they will compare that structure with their default hierarchical leadership beliefs. If the structure is aligned with their beliefs, they will

expect teams with this structure to be more effective than teams with structures that are not aligned with their beliefs. Although this hypothesis is strongly implied by prior research, it has not yet directly tested. We thus consider this a baseline hypothesis.

***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 effectiveness.*

Overview of Studies

In Study 1, we will examine whether people generally hold hierarchical beliefs about team leadership. In Study 2, we will explore the task characteristics under which these hierarchical beliefs were stronger or weaker. Based on our findings, we hypothesize that complex tasks evoke more communal beliefs about team leadership, and thus lead to decisions favoring teams with shared leadership. In Study 3 and Study 4, we will design studies to test this hypothesis.

Study 1⁶

Study 1 tested Hypothesis 1. We presented participants with either a *Single Leadership* team or a *Shared Leadership* team (randomly assigned) and asked them to predict team effectiveness.

⁶ Studies 1, 3, & 4 were all preregistered at the Open Science Framework (van't Veer & Giner-Sorolla, 2016).

Method

Participants and design. We recruited 507 adults (51.5% male; $M_{age} = 36.07$ years, $SD_{age} = 11.99$; 64.4% employed full-time; $M_{work\ experience} = 13.94$ years, $SD_{work\ experience} = 9.25$), from Amazon Mechanical Turk (MTurk). Participants were paid \$0.50. Sixty-four participants were excluded from the analysis because they did not complete the study or failed the attention check (valid $n = 443$)⁷. In a sensitivity power analysis (Faul, Erdfelder, Buchner, & Lang, 2017), we assumed a significance criterion (.05, two tailed) and a standard power criterion (80%) and we found the critical t was 1.97 and minimum effect size is .27.

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. We choose this particular recruitment criterion because the object of the exercise is to understand lay people's beliefs about shared leadership. Thus, we wanted to reach as wide as possible a population rather than limiting it to participants who are mainly extremely experienced Mturkers. There were two attention checks instructing participants to select specific options. The first was in the beginning to prevent inattentive participants from taking part in the study ("Please check the 'attentive' option") and the second ("Please select strongly agree") was in the middle. 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

⁷ We included those participants ($n = 19$) who failed the attention check to conduct the analysis. The results are consistent. A total of 45 participants did not complete the whole survey. We could not analyze the missing data.

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, $n = 216$) or a team with shared leadership (Shared Leadership Condition, $n = 227$). The manipulation and diagrams are depicted in Appendix 2. A, Figure 2.A.1⁸.

Measures

In the following studies, the items were assessed on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree).

Team effectiveness expectations. We measured team effectiveness expectations 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 expectations 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. Consistent with prior research on lay beliefs (Fishbein & Ajzen, 1975; Icek, 1991), this measure captures the

⁸ In Study 1, we used a five-person team. In the Single Leadership Condition, we highlighted one person as providing leadership. In the Shared Leadership Condition, we highlighted three out of five as providing leadership. This manipulation is aligned with our conceptualization of shared leadership, in that a larger proportion of team members are viewed as sources of leadership. In a pretest, we varied the proportion of members viewed as leaders (i.e., 3/7, 3/5 and 7/7) and found no significant differences in how these teams were viewed based on these proportions. Yet, the contrast between a single leader and multiple leaders is consistently significant. The results indicate that participants might categorize teams with a single stable leader as one type and teams with multiple leaders as another, regardless of the proportion of leaders.

normative and behavioral aspects of beliefs. The normative aspect is the extent to which shared leadership is seen as acceptable and appropriate; the behavioral aspect is that the consequences of shared leadership are positive. The normative items were: “Leadership is often shared among individuals in groups”; “In most groups, there is usually just one leader” (reverse coded). The behavioral items were “Groups work best when leadership is shared among multiple group members”; “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 expected 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 2.1 and Figure 2.1).

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 ($b = .60$, $SE = .26$, 95% CI: .02, .11). Thus, beliefs mediated the positive relationship between single leadership structure and effectiveness expectations.

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 2.1). We discuss the potential meaning of this result below.

Table 2.1 Means by experimental condition for Leadership Structure Schema (LSS) and Team Effectiveness Expectations for Studies 1, 3, & 4

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

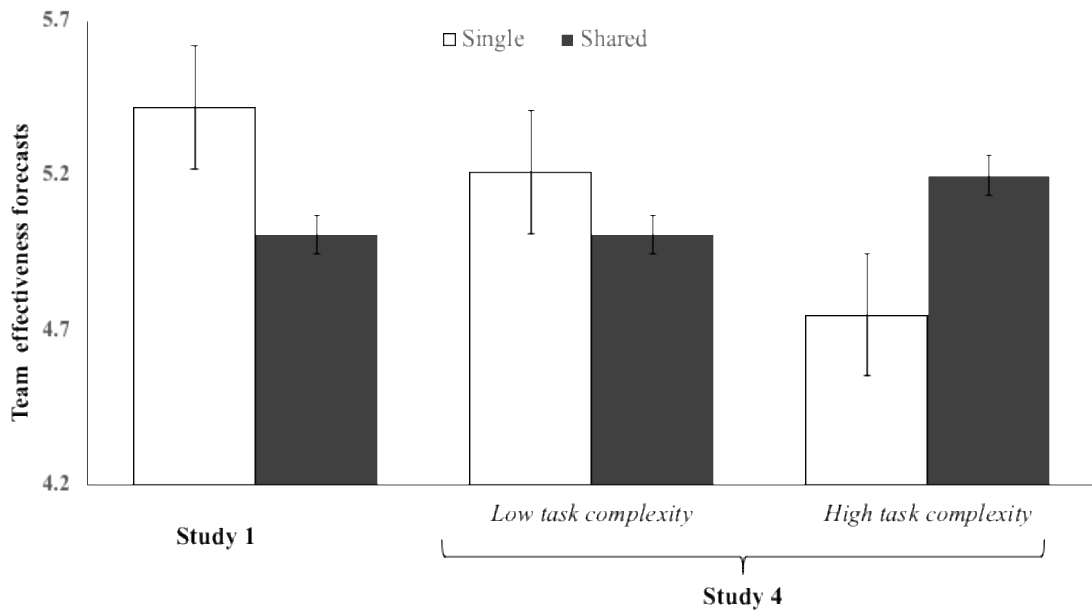
^a In Study 1, task complexity was not manipulated; results are shown in the low complexity columns

^b In Study 3, leadership was not manipulated; results are shown in the 'single' leadership columns.

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

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

Figure 2.1 Team Effectiveness Expectations (Studies 1 & 4) for Single and Shared Leadership in Different Conditions



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 Studies B1 ($n = 229$) and B2 ($n = 458$) (see Appendix 2. B). These results support our contention that expectations regarding team effectiveness are influenced by a team's leadership structure and confirm the preferences 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 or one with 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 preferences 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 by asking participants to form expectations for 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. We recruited 194 adults (54.5% male; $M_{age} = 36.37$, $SD_{age} = 12.04$) from Mturk with a compensation of \$0.50. Forty participants were excluded from the analysis because they failed the attention check or did not complete the study (valid $n = 154$). We assured the data quality using the same methods as Study 1.

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. They then 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 different 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 ($n = 39$).⁹ The diagrams are depicted in Figure 2.A.2, Appendix 2. A. These conditions comprise a 2 x 2 factorial design (Multiplicity x Dynamism).

Measures

Team effectiveness expectations. After participants viewed the team's

⁹ We had one more condition in which all seven team members were viewed as providing leadership in the team. We treated it as a part of the pretest in order to examine if different proportions of member-leaders would make a difference to people's expectations. We found no difference in this condition to the shared leadership conditions in this study (3 out of 7 were leaders). For succinctness' sake, we do not present results from this condition below, but all results remain the same when including this condition.

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 (three descriptors), (2) participation (three descriptors), (3) task variety (four descriptors), (4) task significance (four descriptors), (5) flexibility (three descriptors), (6) task complexity (four descriptors), (7) information processing (four descriptors), (8) problem solving (four descriptors), (9) skill variety (three descriptors), and, (10) work interdependence (three descriptors). The specific examples and source of these descriptions can be found in Table 2.2.

In addition, we created three descriptors of "coordination complexity" based on Klein et al.'s (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 expectations for the statements intended to

describe that task characteristic as the final measures. Cronbach's α and the descriptive statistics for each task characteristic are shown in Table 2.2.

Table 2.2 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>
Task characteristics			
Autonomy ^a	The work allows members to make their own decisions about methods, procedures and schedules as long as the work gets done.	.70	4.86 (1.21)
Participation ^a	The work allows everyone to participate in decision making.	.82	5.03 (1.26)
Task variety ^b	The work requires the performance of a wide range of tasks.	.92	5.25 (1.24)
Task significance ^b	The results of the work are likely to significantly affect the lives of other people.	.89	4.86 (1.21)
Flexibility ^a	The work requires most members know each other's jobs.	.74	5.17 (1.23)
Knowledge characteristics			
Task complexity ^b	The tasks in the work are simple and uncomplicated (Reverse coded).	.73	3.32 (1.48)
Information processing ^b	The work requires members to monitor a great deal of information.	.89	5.08 (1.18)
Problem solving ^b	The work involves solving problems that have no obvious correct answer.	.72	4.97 (1.02)
Skill variety ^b	The work requires team members to utilize a variety of different skills in order to complete the work.	.89	5.37 (1.17)
Social characteristics			
Work interdependence ^a	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)

^a Items are from Campion et al.'s scales (1993)

^b Items are from Morgeson and Humphrey's scales (2006)

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

Results

Manipulation check. 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 shared leadership. As shown in Table 2.3, 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.

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 2.3, 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 (marginally) autonomy. No significant interactions between multiplicity and dynamism were found.

Table 2.3 Effectiveness Expectations for Different Tasks Based on Conditions, and the Multiplicity and Stability of Leadership Structures in Study 2

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

Notes: *n*=154. ⁺ *p*<.10, * *p*<.05, ** *p*<.01

Discussion

In Study 2, we explored how task characteristics might influence the relationship between team leadership structure and expectations of 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 expect that teams with single, stable leaders would be more effective than those with shared 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, one task descriptor 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 from Study 1 to Study 2 for teams that shared leadership. We detail an additional hypothesis based on this theorizing below.

We also explored differences in expectations for teams that shared 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 further 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 2. B). 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* effectively captures 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 involving 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 should 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, shared leadership has a stronger influence on team effectiveness (D’Innocenzo et al., 2016; Wang et al., 2014). We argue that people’ beliefs about shared leadership will be consonant with these results, such that they may associate shared 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 they intuit that complex strategies are more effective in solving 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 engages more actors 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 will expect teams that share leadership (aligned with their communal leadership beliefs) to be more effective than teams that are led by a single person (misaligned with their communal leadership beliefs).

***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. We recruited 131 full-time employees (68% male; $M_{\text{age}} = 33.82$ years, $SD_{\text{age}} = 10.06$) from MTurk to take part in the study in exchange for \$1.80. Participants were randomly assigned to one of two conditions of task complexity: low or high. Five participants were excluded from the analysis because they failed the attention check or did not complete the study.¹⁰ In the sensitivity power analysis (Faul et al., 2017), we found the critical t was 1.98 and minimum effect size (Cohen's d) to achieve 80% power is .50. We assured the data quality using the same methods as above.

¹⁰ The exclusion rate was probably lower in this study because we paid a higher wage. Of the five excluded participants, three did not finish the survey and two failed the attention check. When I included the two inattentive participants and conducted the analysis, the results are the same.

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, that 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 ($n = 64$) or Low-complexity condition ($n = 64$). 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, and 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 (the previous two factors plus allergy risks, environmental and ecological impact, consistency with current brand image, potential retail distributors, smoothness and texture, quality of ingredients, country of production, and potential export sales).¹¹ 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

¹¹ In the pretest, we used four products and four factors as low task complexity manipulations. However, 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.

factors will (not) be very important to the final analysis.” The scenarios are displayed in Appendix 2. C.

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 in 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.¹² 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 ($M = 2.50$, $SD = 1.17$), $t(126) = 7.20$, $p < .001$, 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-complexity condition ($M = 3.78$, $SD = 1.13$, $t(126) = 2.21$, $p = .028$, Cohen’s $d = .39$). The results are shown in Table 2.1 above.

¹² We also sought to use an implicit measure of team leadership beliefs used in prior research (Carnabuci et al., 2018), 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 was 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.

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 2. 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 shared 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 regarding which teams to assign to tasks and their expectations of team effectiveness (Hypothesis 2b), as well as testing the mediating role of hierarchical or communal beliefs about team leadership (Hypothesis 2c).

Method

Participants and design. We recruited 361 participants (54.4 % male; $M_{age} = 37.19$ years, $SD_{age} = 11.72$, 68% employed full-time) from MTurk who took part in the study in exchange for \$1.00. Nineteen participants were excluded from the analysis because they failed the attention check or did not complete the survey (valid $n = 342$).¹³ We used the same procedures as above to assure data quality.

Study 4 uses a 2 (single vs. shared leadership) x 2 (task complexity high vs.

¹³ Among the 19 participants excluded, 17 did not finish the whole survey and two failed the attention check. When I included the inattentive participants to conduct the analysis the results were the same.

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. In the sensitivity power analysis (Faul et al., 2017), we found the critical t was 1.97 and minimum effect size to achieve 80% power is .30. 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 2.A.1, Appendix 2. 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 expectations.

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 expectations. We used Wageman et al.'s (2005) measure of team effectiveness as we did in Study 1 (Cronbach's $\alpha = .81$).

Team choice. 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 2.1).

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 expect 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 expectations 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 shared leadership teams ($M = 5.20, SD = 1.09$) to be more effective than single leadership teams ($M = 4.75, SD = 1.03, t(164) = 3.48, p < .001$, Cohen's $d = .42$). In the Low-complexity condition, participants expected single leadership teams ($M = 5.21, SD = 0.93$) to be more effective than those with shared leadership ($M = 5.01, SD = 1.17, t(160) = 1.69, p = .09$, Cohen's $d = .19$) (as shown in Figure 2.1).

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 single leadership team.

Hypothesis 2c. We predicted that LSS mediated the effects of task complexity on team effectiveness expectations. We found support for this hypothesis with both team choice and effectiveness expectations as dependent variables. Because each participant indicated their expected 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 expectations for both 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 choice. Using Hayes and

Scharkow'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.¹⁴

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 2. B). Study 4 further shows that these task-contingent beliefs about leadership structure influence the assignment of teams to tasks, which suggests the potential practical implications of these task-contingent beliefs discussed below.

Chapter Discussion

Across four experiments, we built and tested hypotheses regarding team leadership structure beliefs and their impact on expectations of team effectiveness. We conclude that, like beliefs about individual leaders, beliefs about team leadership structure influence people's expectations of teams, but those beliefs are contingent on the complexity of the task. Specifically, people expect more effective performance

¹⁴ Here, we report the correlations between variables not otherwise indicated in the results. The correlation between the repeated measure, team effectiveness expectations of teams with single and shared leadership, was significant ($r = -.17$, $p = .001$). The correlation between team effectiveness expectations of teams with single leadership and team choice was significant ($r = -.49$, $p < .001$). The correlation between team effectiveness expectations of teams with shared leadership and team choice was significant ($r = .48$, $p < .001$). For the mediation analysis, the results hold when we include age and gender as covariates.

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 also 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 shared 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, which is consistent with the previous research about the actual performance of teams with shared leadership. This research is the first empirical evidence showing that people's beliefs about when shared leadership is more effective reflects the reality of current evidence. Yet, this research is only a first step in identifying the various kinds of situations that may activate more hierarchical or communal beliefs. There might be situations when people's beliefs are less accurate. 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 belief emerges in teams. For instance, a team working on a complex task would be more likely to converge on strong, communal beliefs than a team working on a simple task.

This research also broadens the scope of beliefs about 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; Vinkenbunrg, 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 of teams, they are likely to affect outcomes of importance in organizations, such as assigning teams to tasks (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; Nicolaidis et al., 2014; Wang et al., 2014), an interesting possibility is that people incorrectly place teams that share leadership at a disadvantage when task requirements are not salient or when team members fail to notice that tasks are gradually becoming more complex. The preference for teams with single, stable leaders is consistent with prior theory on the romance of leadership (Meindl et al., 1985) and 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 beliefs are likely to be maladaptive for teams, leading outsiders such as 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 lead them to make decisions against teams that share leadership. To prevent these

irrational decisions, 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 decide 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 their default 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 any 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). Even if theories suggest so, the actual practices might have some discrepancies. For example, in East Asian cultures, most cases reveal a single leader operating on the top. Shared leadership is very rare, which is opposite to the predictions of the theory. Future research should continue to investigate the cultural differences in people's beliefs about shared leadership.

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 paid by 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 probably a much weaker situation than doing so in an organizational setting. Features of organizations, such as norms, culture, and formal hierarchies, may also influence how hierarchical/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.

Finally, we used diagrams as experimental stimuli and did not use other manipulation methods, such as organizational charts or descriptive text. The diagram manipulations clearly reflect the definitions of hierarchical and shared leadership. People easily associate organizational charts with formal leadership and formal leaders are designated by the authority, which is not aligned with the definitions of shared leadership. We are investigating people's beliefs about informal shared leadership. Therefore, we did not use organizational charts as manipulations. Moreover, we are confident that if we had used descriptive text to manipulate leadership structures, the results would hold as we have already used text to describe the leadership structures in the current manipulation. Future research could vary the manipulation materials to test our arguments.

Conclusion

We investigated how people's beliefs about team leadership affect their expectations of teams and found that teams' leadership structure strongly informs people's expectations. Although people may hold default hierarchical leadership beliefs, they form higher expectations of 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

Chapter 3 All Hands on Deck? The Role of Perceived Uncertainty in Shaping Team Member Leadership Beliefs and Attributions

Shared leadership has long been found to facilitate team effectiveness, because it can empower team members and fully utilize their knowledge, skills, and expertise (D’Innocenzo, Mathieu & Kukenberger, 2016; Nicolaides et al., 2014; Wang, Waldman & Zhang, 2014). Given the benefits of shared leadership, one fundamental question remains to be answered: how shared leadership develops in teams. Previous research on shared leadership emergence has focused on social conditions, such as shared purpose, social support, voice and external coach, all of which may engender shared leadership (Carson et al., 2007). Research also suggests that leaders’ individual characteristics, such as warmth and competence, can explain the emergence of either shared or hierarchical leadership (DeRue, Nahrgang & Ashford, 2015). Previous literature, however, has not effectively captured the dynamics between leaders and followers in particular contexts. Shared leadership, by definition, is a dynamic, interactive process of influence that develops through social interactions within a particular context (Carter, Dechurch, Braun & Contractor, 2015; Pearce, Conger & Locke, 2008). Developing shared leadership is a demanding effort and many attempts fail, even when teams have the right social conditions and individuals (Denis, Langley & Sergi, 2012). Therefore, it is important to understand the micro-processes that occur between leaders and followers which compose the foundations of shared leadership.

Informal leadership emergence literature has proposed a social process model, which can help us to understand the dynamics between leaders and followers. According to this model, informal leadership emergence begins when team members *claim* leadership (i.e., they take action to assert their leadership roles). For example,

they define missions, establish expectations and goals, structures and plans, monitor teams, solve problems and support the social climate (Morgeson, DeRue, & Karam, 2010). In return, other members need to respond to these claims and *attribute* leadership (i.e., they take action to bestow leadership roles on others). For instance, they might publicly refer to someone as the group leader or act in accordance with the direction of another (DeRue & Ashford, 2010). Even though followers are an integral part of the leadership emergence process, research along this line tends to focus only on the claiming leadership behaviors (Zhang, Nahrgang, Ashford, & DeRue, 2020), implicitly assuming that leadership emergence is triggered by such behaviors.

However, leadership attribution is unlikely to be based only on changes in the leaders' behaviors. Leadership attribution, in fact, is determined by followers' leadership structure beliefs (Carnabuci, Emery, & Brinberg, 2018). These beliefs reflect people's expectations and beliefs about how leadership should be structured in groups (Wellman, Ashford, DeRue, & Sanchez-Burks, 2013). Leadership structure beliefs vary from communal (i.e., groups work best when they share leadership) to hierarchical (i.e., groups work best when there is only one leader) (DeRue & Ashford, 2010; DeRue et al., 2015; Wellman et al., 2013). People's leadership structure beliefs serve as cognitive maps through which they adjust their leadership attributions (Smith & Collins, 2009).

Moreover, leadership attributions might be a function of the specific situations in which followers find themselves. The context might change people's definition of leadership, because the context will shape the meaning of organizational behaviors (Johns, 2006). In this particular research, we focus on uncertainty perceptions. Uncertainty is one of the most important attributes of environmental perceptions in teams (Agle, Nagarajan, Sonnenfeld, & Srinivasan, 2006; McMullen & Shepherd, 2006; Milliken, 1987). For example, some team members might not be sure how the

business environment will change; they might not be sure what kind of characteristics and skills they need to cope with changing and challenging circumstances. Teams may have been dealing with challenging situations before, but something on the scale of COVID-19 crisis is, for most of us, of a different magnitude. Perceived uncertainty is defined as group members' inability to understand how the environment will change, the potential impact of those changes and whether the responses to the environment will be successful (Milliken, 1987). When group members experience uncertainty, it is hard to know what behaviors will contribute the most to the group's goals, therefore, group members would find it very challenging to attribute leadership to their peers based on their behaviors.

We argue that uncertainty perceptions will activate followers' communal leadership beliefs, and therefore cause them to attribute leadership to many of their team members. We will test these hypotheses in two studies. Study 1a (n = 352 individuals, 46 teams) and Study 1b (n = 105 individuals, 15 teams) use multi-wave data from student project teams to manifest the hypotheses. In Study 2 (n = 397 individuals), we will establish the causal direction of the hypotheses in an experiment that varies descriptions of the certainty of the environment and then measures the changes in communal leadership beliefs and the attributions of leadership to fictitious team members.

Theory and Hypotheses

Leadership Attributions

Leadership attribution is defined as the actions people take to bestow leadership on another person (Chrobot-Mason & Gerbasi, 2016). These actions include endorsing, noticing, publicly referring to someone as a leader, or simply acting in accordance with

the direction of leaders (DeRue & Ashford, 2010). Leadership attribution is an integral part of the leadership emergence process. Leadership emergence is a socially constructed process in which members are involved in an ongoing process of ‘attributing’ leadership and ‘claiming’ leadership (Morgeson & Hofmann, 1999).

Past research has primarily delivered one key message, which is that observers attribute leadership based on actors’ behaviors, personal characteristics and social identity. According to implicit leadership theory, people are more likely to associate leadership with people who possess certain dispositional characteristics, such as their personality and gender (Eagly & Karau, 2002; Kulich, Ryan, & Haslam, 2007; Lord, Brown, Harvey, & Hall, 2001; Lord & Maher, 1991; Scott & Brown, 2006). Along these lines, status characteristics theory suggests that leadership influence derives from people’s shared expectations of a particular group member: who they think will contribute the most to the group’s goals (Berger, Berger, Fisek, & Norman, 1977; Bunderson, 2003; Magee & Galinsky, 2008). People’s expectations are informed by various personal characteristics, such as tenure and expertise. Moreover, based on the social identity theory of leadership, people attribute leadership to those who are more representative of the group identity than others (van Knippenberg, Lossie, & Wilke, 1994).

Perceived Environmental Uncertainty

Knight (1921) defined environmental uncertainty as when, in an uncertain environment, the outcomes of any chosen action cannot be fully predicted because of unknown changes to the environment (Packard, Clark, & Klein, 2017). There are three facets of perceived uncertainty. First, individuals do not understand what components of the environment might be changing. For example, a team cannot predict the behaviors of a key competitor. Second, individuals lack the ability to predict the impact

of those changes. For example, the key competitor changes its strategy, and the team cannot predict how the strategy will impact the team's work. Third, individuals do not understand what response options will be available and whether a certain response will be successful. For example, the team thinks of a strategy to respond to a competitor, but the team members do not know whether their chosen responding strategy will be successful (Milliken, 1987).

Perceived environmental uncertainty is different from perceived risk, which refers to a decision-making setting in which people do not know what the outcome of a decision will be but do know the possible outcomes associated with it, as well as the probability of those outcomes occurring (Knight, 1921). Perceived environmental uncertainty exists when people know neither the possible outcomes nor the possibility of them happening. Another related concept is ambiguity which is often used to describe the unknown aspect of decisions. Therefore, it is also often conflated with uncertainty (Camerer & Weber, 1992). In the current research, we treat perceived environmental uncertainty as a broader concept that encompasses perceived ambiguity.

When their environment is perceived to be uncertain, individuals experience a sense of losing control. Losing control is a deeply undesirable state, and people are often motivated to find ways to compensate for it (Kay, Whitson, Gaucher, & Galinsky, 2009; Landau, Kay, & Whitson, 2015). Therefore, in uncertain situations, individuals prefer charismatic and dominant leaders, because they can relieve the followers' concerns and generate confidence, thus leading to more influence over their organizations and a greater ability to achieve success (Agle et al., 2006; Kakkar & Sivanathan, 2017). Moreover, increasing uncertainty can be associated with the decentralisation of a group's communication structure, as a decentralized structure is more efficient and leads to fewer errors. That is because centralized structures are

unable to process the overload of information in uncertain environments (Faucheux & Mackenzie, 1966; White, Currie, & Lockett, 2016).

Leadership Structure Beliefs

Leadership structure beliefs range from communal leadership beliefs to hierarchical leadership beliefs (DeRue et al., 2015). A communal leadership belief is defined as a mental model that dictates that leadership should be shared among different members of the team (DeRue & Ashford, 2010; Wellman et al., 2013). The communal leadership belief reflects the communal sharing relational model (Fiske, 1992). In contrast, a hierarchical leadership belief is defined as a mental model in which leadership should be consolidated in one member of the team, (Carnabuci et al., 2018). The hierarchical leadership belief reflects the authority ranking relational model (Fiske, 1992).

People use these leadership structure beliefs to make sense of the leadership relations in their groups (Carnabuci et al., 2018; Wellman, 2017). When the communal leadership belief is used to guide leadership activities, this entails a system of widespread involvement, where many or all members of the group frequently engage in leadership behaviors. The group seeks consensus, unity and shared identity (Fiske, 1992). Group members do not care about tracking individual contributions or benefits or assigning specific responsibilities beforehand. However, when a hierarchical leadership belief is used to guide leadership activities, the group focuses on ranking group members based on their differences in valued social dimensions. Higher-status members will enact the leadership role in their interactions with lower-status members, and lower-status members will conform to their superiors' orders, suggestions and directives.

Perceived Environmental Uncertainty and Communal Leadership Beliefs

My core argument is that perceived environmental uncertainty promotes team members' informal leadership attributions by activating more communal leadership beliefs. There are three reasons that support this argument. First, in uncertain situations, people feel a lack of personal control (Averill, 1973; Tomaka, Blascovich, Kelsey, & Leitten, 1993; White, 1959), and this lack of personal control is an unpleasant experience. People are, therefore, motivated to engage in behaviors and cognitions that compensate for this (Landau et al., 2015; Whitson & Galinsky, 2008). When people are not sure who has the most relevant skills to provide leadership, they may believe that a single person cannot possess all of the knowledge, skills, and abilities necessary to provide leadership in uncertain situations (van Knippenberg, van Knippenberg, & van Dijk, 2000). Thus, in uncertain times, they believe that relying on multiple members for leadership is more reassuring than relying on a single member. According to social identity theory (Hogg, 2007; Hogg & Adelman, 2013), individuals look to their in-group members for help and support in the face of uncertainty. Therefore, they will think that multiple team members providing leadership might be the most effective approach.

Second, environmental uncertainty is a key factor that triggers the psychology of social sharing in people (Kameda et al., 2003; Kameda, Takezawa, Tindale, & Smith, 2002). According to the perspective of evolutionary psychology, human beings treat sharing as a device that can be used to reduce uncertainty. This tendency dates back to pre-historic societies (Kaplan & Hill, 1985). Early human beings' acquisition of fruit and vegetables was stable, but their acquisition of meat was highly variable and uncertain (Kaplan & Hill, 2017). By increasing the number of people in the risk-pooling group, the risk in the meat supply decreases significantly. Communal sharing is

thus thought to have emerged as a collective-risk-reduction device. This psychological process is reinforced through evolved psychological adaptations to recurring problems in the ancestral environment. Kameda and his colleagues (2002) found that uncertainty is a key factor in triggering people's psychology of social sharing, regardless of how much effort they are making and how much they would benefit from the sharing. I argue, therefore, that perceived environmental uncertainty triggers people's communal sharing approach to leadership, as sharing leadership can be a way to reduce and manage uncertainty.

Another reason why people activate communal leadership beliefs when they perceive the environment to be uncertain is that the power of an individual's agency is reduced in an uncertain environment. When people have incomplete knowledge about a situation, they no longer believe in any one individual's ability to shape events (Bandura, 2000). In uncertain situations especially, people feel that they have lost personal control over events (Shamir & Howell, 1999) and they are also less likely to believe another person has control over the event (Kulich, Ryan, & Haslam, 2007; Meindl, Ehrlich, & Dukerich, 1985; Zemba, Young, & Morris, 2006). When the two paths (i.e., rely on oneself/rely on someone else) are blocked, people turn to a collective effort to shape the event (Bandura, 2000, 2001). People seek desired outcomes in (personally) uncontrollable situations through working together to secure what they cannot accomplish on their own, and therefore, they are more likely to conceptualize leadership as a collective phenomenon. Therefore, I propose that:

Hypothesis 1: *When people perceive the environment as uncertain, they adopt more communal leadership beliefs.*

Communal Leadership Beliefs and Leadership Attributions

Individuals who adopt communal leadership beliefs are likely to view leadership as a shared group responsibility, and they will therefore attribute leadership to many team members. People tend to perceive social structures through the lens of their own beliefs (Smith & Collins, 2009). If followers hold communal leadership beliefs, they believe that leadership should entail a system of widespread involvement, in which many or all group members frequently engage in leadership behaviors (Wellman, 2017). They will first look around and try to make sense of the existing leadership structures. When the observed leadership pattern is inconsistent with their communal leadership beliefs, they feel a sense of inconsistency. Unconsciously, people will reduce cognitive inconsistency because inconsistency is an undesirable feeling (Festinger & Hutte, 1954; Hebl & Kleck, 2000). To reduce the inconsistency, they will see more of the group members as sources of leadership. In doing so, the leadership structure is more consistent with the observers' communal leadership beliefs.

In contrast, if followers adopt hierarchical leadership beliefs, they will conceive of leadership as zero-sum and believe that only one individual should be the leader (DeRue et al., 2015; Wellman et al., 2013). They will observe the existing leadership structures and compare them with their hierarchical leadership beliefs. If these beliefs are consistent with each other, they will not change their current leadership attributions. However, when they find that there is inconsistency, they will adjust their leadership attributions (Carnabuci et al., 2018). Specifically, they will see only one individual as a source of leadership and publicly refer to him or her as the only leader.

The communal and hierarchical leadership beliefs have different behavioral manifestations. People who hold communal leadership beliefs attribute leadership in an undifferentiated way. According to the communal sharing relational model, group

members will focus on commonality and equality, while downplaying members' unique individual qualities (Fiske, 1992); they will also undergo a psychological process that depersonalizes themselves and other group members, so that they no longer view each another as distinctive individuals but as equivalent and interchangeable group members (Brewer & Gardner, 1996; Hogg, 2001). Therefore, shared leadership beliefs drive people to grant leadership to multiple group members, regardless of their personal characteristics, the prototypicality of their leadership behaviors and their social rank. Take, for example, the following scenario: Group Member A volunteered to write a report to clarify the company's situation, while Group Member B possesses the most leadership capabilities. Group members who adopt communal leadership beliefs would view both A and B as sources of leadership, downplaying their personal leadership capabilities. However, those who hold hierarchical leadership beliefs would be resistant to viewing A as a source of leadership because A is not the top-ranked person in the group process ('A should follow the lead of B').

When hierarchical leadership beliefs are used to govern behaviors, followers evaluate other members based on valued social dimensions until they find the top-ranked person (Bunderson, 2003; Lord & Maher, 1991; Magee & Galinsky, 2008). They will only attribute leadership to the top-ranked person and ignore lower-rank members. For example, group members might believe that the most competent person should be the single leader. Hence, they will only view the most competent person as a source of leadership. If other, less competent members engage in leadership behaviors, they will not be recognised as such (DeRue et al., 2015). In conclusion, I propose that:

Hypothesis 2: Individuals who adopt communal leadership beliefs are more likely to attribute leadership to other group members.

In sum, when group members perceive a situation as highly uncertain, they will develop a communal leadership belief, and, thus, attribute leadership to several members. When group members perceive that they are not sure how the environment will change and what impacts their responses will have, it is hard to know who will contribute the most to the group's goals and who should be relied on to make decisions. As stated before, an uncertain environment will trigger communal leadership beliefs. Guided by communal leadership beliefs, people will adjust their leadership attribution to be belief-consistent. As a result, people will attribute leadership to more group members, and thus, I propose:

***Hypothesis 3:** Perceived environmental uncertainty will lead to more leadership attributions through increasing people's communal leadership beliefs. In other words, communal leadership beliefs mediate the relationship between perceived environmental uncertainty and leadership attributions.*

Overview of Studies

Study 1a

Method

Research setting and procedure

The sample was made up of 46 student teams composed of a total of 352 third-year undergraduate students in a large university in central China. The participants were voluntarily attending a four-week entrepreneurship program, which is held once a year at the university's summer school. The program required students to attend for at least eight hours a day, and to interact and collaborate with one another frequently. One of its requirements was that participants should devise and market a new business. For

example, one student team made an interesting new beverage and sold it to college students, while another promoted Korean skincare products. In the first two weeks, the students formed teams to start their own virtual corporations while simultaneously completing coursework. During this time, teams independently conducted market research and planning, selected operating sites and assigned roles to their members. The teams had to decide on their product or service and develop business strategies by the end of the first two weeks. On the first day of the third week, the program director organized a location auction, and each team was allowed to use their allocated budget to 'bid' on an operating site in the university business incubator. Afterwards, the teams began running their businesses, with their targeted customers mainly being other college students. The participating teams took responsibility for their own profits and losses.

These student participants were studying different subjects in the business school, such as marketing and business administration. The average age was 20.67 years ($SD = 0.87$ years). Before participating in this course, the students had an average of 6.6 months of part-time work experience ($SD = 10.5$ months), and 55.7% of the participants were male ($M = 0.46$, $SD = 0.58$).

We used a multi-wave survey approach to collect data, which is consistent with prior work on modelling leadership emergence (Bendersky & Hays, 2012; DeRue et al., 2015). This longitudinal design was able to provide better evidence of causality. Data were collected from team members through surveys administered at three points in time: a week after the program started, which was when they had formed their own teams and began to work as a team to plan their businesses (time 1); three days after teams bought their operating sites and started to run their businesses (time 2); and two days before the program was completed (time 3). At time 1, we measured the baseline

of the leadership structure. At time 2, team members had just begun to encounter the business environment and had therefore developed a fresh understanding of it, and so we measured the perceived environmental uncertainty at this point. At time 3, the entire project was coming to an end, by which point members might have developed a more stable leadership pattern and structure (Gersick & Davis-Sacks, 1990; Kozlowski, Gully, Nason, & Smith, 1999), and we therefore measured the leadership structure. The time points and measurement are summarized in Table 3.1. The response rates for each survey were above 99%.

Table 3.1 The Multi-Wave Design of Study 1a

	Time 1	Time 2	Time 3
Time	7 th day of the program	17 th day of the program	26 th day of program
Activities	Teams work together to conduct marketing research to prepare for their entrepreneurial projects	Teams begin running their businesses in the university's incubation centre	Teams finish their entrepreneurial projects
Design	Measure control variables	Measure independent and mediator variables	Measure dependent variables
Measurements	Demographics Familiarity Leadership attributions (Baseline)	Perceived environmental uncertainty Communal leadership beliefs	Leadership attributions

Measures

Surveys were conducted with paper and pencil questionnaires. Students were required to complete and return the surveys within 30 minutes and finish the survey

independently to assure the quality of surveys. We followed back translation procedures to make sure that the translation was accurate and that there were no comprehension issues (Douglas & Craig, 2007). The network items (i.e., leadership attributions) were assessed on a 5-point Likert scale (1= strongly disagree to 5 = strongly agree). The rest of the items were assessed on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree).

Perceived environmental uncertainty was measured at time 2 using Waldman et al.'s (2001) four-item measurement with slight adaptations to the simulation. The items were assessed on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). The items were: "The market I am facing is very rapidly expanding through the expansion of old markets and the emergence of new ones", "The environment my team is facing is dynamic [and] changing rapidly in many dimensions", "The environment my team is facing is very stressful", and "My team is performing in an environment that is very risky; one false step can mean the firm's undoing". The scale showed sufficient internal consistency, Cronbach's $\alpha = 0.85$.

Communal leadership beliefs were measured at time 2 using Wellman et al.'s (2013) five-item measure. The items were assessed on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). A sample item was, for example, "Groups perform best when multiple members of the group take responsibility for leading the group". The Cronbach's alpha of the scale was 0.85.

Leadership attributions were measured at time 3. We used network out-degree centrality – the degree to which group members would like to view others as a source of leadership – to measure leadership attributions. We asked each group member to rate all group members (excluding self-reports) in answer to the question "To what degree does your team rely on this person for leadership?" (Carson, Tesluk,

& Marrone, 2007). The item was assessed on a 5-point Likert scale (1= strongly disagree to 5 = strongly agree). We used out-degree centrality, which is the number of ties that a group member has to others divided by the total possible sum of outgoing ties among all group members (Freeman, Roeder, & Mulholland, 1979). Leadership network ratings were dichotomised: values of 4 (to a large degree) or 5 (to a very large degree) were assigned a value of 1, and 0 was assigned to values of 3 or less (Carson, Tesluk, & Marrone, 2007; Wang et al., 2017). We then used UCINET and R ('igraph' package) to calculate each individual's out-degree centrality in his or her group. This variable ranged from 0 to 1. The average mean of leadership attributions was 0.38 and the standard deviation was 0.36.

Control variables. We controlled for variables that might influence leadership beliefs and leadership attributions. At the individual level, we controlled for gender and group member familiarity (to what extent the group members were familiar with each other) (time 1), which were found to be related to leadership emergence (DeRue et al., 2015). At the group level, I controlled for team size.

To model the leadership attributions influenced by perceived environmental uncertainty and communal leadership beliefs, we used a two-wave change model by controlling for time 1's leadership structure measures to predict time 3's leadership structure measures (Cohen, Cohen, West, & Aiken, 2003). Missing data was replaced by the group mean (Kossinets, 2003). The percentage of missing data for each team was below 10%. The results remain robust when the data was replaced with the grand mean.

Analysis

To ensure my variables were empirically distinctive, we conducted a confirmatory factor analysis. We compared a five-factor model for perceived

environmental uncertainty (time 2), communal leadership beliefs (time 2), leadership attributions (time 3) and two control variables (i.e., familiarity and out-degree centrality of leadership ties at time 1) with other parsimonious models. The results showed that a five-factor model was the best fit ($\chi^2[47] = 99.123$; CFI = 0.960; TLI = 0.943; RMSEA = 0.059). I conducted a χ^2 difference test and found that a five-factor model is a better fit for the data than a four-factor model ($\chi^2[2] = 8.45$, $p = .015$).¹⁵

Our data contained a hierarchical structure in which responses of individual variables were nested within teams. Therefore, I tested my individual level hypotheses (Hypotheses 1 and 2) via multilevel modelling (the ‘nlme’ package in R). At level 1, I entered the individual level controls (gender, familiarity and leadership attributions at time 1) and study variables (perceived environmental uncertainty, communal leadership beliefs and leadership attributions). At level 2, I entered the group level controls (team size). This approach was used for two reasons: a) it solves the problem of estimation errors not being independent in the single-level regression model; and, b) it solves the problem of individual level effects not being constant across level-2 units (Rockwood & Hayes, 2017). In this case, a single level analysis assumes that group context is consistent among all the groups, which might not be true.

When testing Hypothesis 3, we ran a multilevel mediation model using an MLmed macro to test the multilevel mediation hypothesis (Hayes & Rockwood, 2017, 2020) because the indirect effects may be conflated at the individual and team levels. We followed the recommended practices on how to model unconflicted multilevel

¹⁵ To ensure the common method variance was not a significant influence in this study, we conducted a confirmatory factor analysis for main variables that were measured at the same time period. We compared a five-factor model ($\chi^2[47] = 99.123$; CFI = 0.960; TLI = 0.943; root mean square error of approximation (RMSEA) = 0.059) with a one-factor model ($\chi^2[54] = 592.221$; CFI = 0.582; TLI = 0.490; the root mean square error of approximation (RMSEA) = 0.177). The χ^2 difference test showed that the five-factor model was better than the one-factor model ($\chi^2[7] = 493.1$, $p < .001$, reducing the concern of common method variance).

mediation and separate the individual and group level indirect effects (Preacher, Zhang, & Zyphu, 2011; Preacher, Zyphur, & Zhang, 2010). We group centred the individual level variables and used Monte Carlo simulation to estimate the parameters.

Results

Table 3.2 shows the descriptive statistics and correlations among all the study variables.

Hypothesis 1 predicts that perceptions of environmental uncertainty lead to communal leadership beliefs. This hypothesis was supported. As shown in

Table 3.3, Model 1, an individual's perception of environmental uncertainty (time 2) was positively related to his or her communal leadership beliefs (time 2) ($b = 0.26, p < .001$).

Hypothesis 2 predicts that an individual's communal leadership beliefs lead them to attribute leadership to more of their teammates. As shown in

Table 3.3, Model 3, the coefficient between communal leadership beliefs (time 2) and leadership attributions (time 3) was marginally significant ($b = 0.03, p = .07$). Given the small sample size of this study, we believe that Hypothesis 2 was partially supported.

Hypothesis 3 predicts that individuals' perceptions of environmental uncertainty positively influence leadership attributions, and that communal leadership beliefs mediate this relationship. A formal test of the indirect effect revealed a non-significant within-indirect effect (i.e., an individual level) of perceived environmental uncertainty on leadership attributions through the communal leadership belief (Indirect Effect = 0.01, $SE = 0.01$, 95 % Monte Carlo CI = -.002 to .016).

There was a marginally significant between-indirect effect (i.e., group level) of perceived environmental uncertainty on leadership attributions through communal leadership beliefs (Indirect Effect = 0.07, $SE = 0.04$, 95 % Monte Carlo CI = .007 to .150). The test of differences in the indirect effects within (i.e., individual level) and between groups (i.e., group level) was significant (Difference = 0.06, 95 % Monte Carlo CI = .000 to .140). The results indicated that the indirect effects exist at the group level. In other words, groups' perceptions of environmental uncertainty would have an indirect positive relationship on leadership attributions based on each group's communal leadership beliefs.

Table 3.2 Descriptive Statistics and Correlations in Study 1a

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. Team size (level 2)	7.81	1.05						
2. Gender	0.46	0.67	-.02					
3. Familiarity	4.14	0.74	-.16**	.10				
4. Leadership attributions (time 1)	0.42	0.36	-.28**	-.01	.22*			
5. Perceived environmental	4.05	1.30	-.02	-.06	.10 ⁺	.09		

uncertainty (time 2)								
6. Communal leadership beliefs (time 2)	4.28	1.25	-.09	-.10	.11*	.09	.32**	
7. Leadership attributions (time 3)	0.38	0.36	.09	.03	.13*	.13*	.07	.17**

Note. $N = 352$. For gender, 1 is male and 0 is female.

* $p < .05$; ** $p < .01$

Table 3.3 Results of Multilevel Models in Study 1a: Predicting Leadership Attributions

Variable	Communal leadership beliefs (time 2)	Leadership attributions (time 3)	
	Model 1	Model 2	Model 3
Intercept	3.26***	-0.37	-0.46 ⁺
Gender	-0.27*	-0.00	0.01
Familiarity	0.11	0.05*	0.05*
Leadership attributions (time 1)	0.24	0.14**	0.13*
Team size (level 2)	-0.06	0.05 ⁺	0.05 ⁺
Perceived environmental uncertainty (time 2)	0.26***	0.01	0.01
Communal leadership beliefs (time 2)			0.03 ⁺
-2 Log Likelihood	1014.38	189.27	185.86
AIC	1030.38	205.27	203.86

Notes. Models are testing Hypotheses 1, 2 and 3. N= 352 at level 1; N= 46 at level 2. These models illustrate the results of the fixed models, which indicates that all of the paths do not vary by Level 2 unit. We used a Maximum Likelihood estimation to compare the fixed effects of these models (Kreft & de Leeuw, 1998). The ICC (1) of Models 1, 2, 3 is 0.14, 0.26, 0.27, respectively.

⁺ $p < .10$, * $p < .05$; ** $p < .01$; *** $p < .001$

Robustness Checks

First, we checked the results after removing all the controls. The results hold for Hypotheses 1 and 2. The results for the indirect effects were slightly different. The original group level effects became weaker after removing all the controls. The indirect effects were marginally significant at the individual level (Indirect Effect = 0.01, $SE = 0.01$, 95% CI = -.001 to .018) and significant at the group level (Indirect Effect = 0.06, $SE = 0.03$, 95 % Monte Carlo CI = .006 to .13). There was no significant difference between the indirect effects of the two levels (Difference = 0.05, 95% Monte Carlo CI = -.002 to .129).

Second, we used outdegree (i.e., the number of ties a member attributes to other members) as an alternative measure of leadership attributions (instead of outdegree

centrality). The results held when outdegree was used as the dependent variable. The indirect effects were not significant at individual level (Indirect Effect = 0.05, $SE = 0.03$, 95% Monte Carlo CI = -.009 to .111) and marginally significant at the group level (Indirect Effect = 0.47, $SE = 0.26$, 95% Monte Carlo CI = .060 to 1.052). The indirect effects within and between groups significantly differed from one another (Difference = 0.43, 95% Monte Carlo CI = .008 to 1.012).

Third, we averaged the group data and ran the mediation analysis using PROCESS to test the group level mediation model (Hayes, 2012). The indirect effect of each group's uncertainty perceptions on group average leadership attributions through group communal leadership beliefs was not significant (Effect = 0.06, $SE = 0.03$, 95% Bootstrap CI = -.002 to .122). It should be noted that the sample size is smaller than recommended, so we could not find significant results here.

Discussion

Study 1a examines how uncertainty perceptions affect communal leadership beliefs and individuals' leadership attributions in groups. As predicted, we found that individuals' environmental uncertainty perceptions were positively related to communal leadership beliefs. However, the relationship between communal leadership beliefs and leadership attributions was weaker. According to the theory, communal leadership beliefs should guide individuals to attribute more leadership to their members (DeRue et al., 2015). This study has a relatively small sample size ($n = 46$) for a complex, multilevel model. Previous research has found that when the sample size is smaller than a nominal level ($n = 50$), the estimation of CI for mediation will produce a Type I error (Bauer, Preacher, & Gil, 2006). Therefore, for the following studies, we planned to increase the number of teams in our observation and improve the measurement and data collection procedure. We thus conducted Study 1b to address

these issues.

Study 1b

Study 1b improves upon Study 1a in the following ways. First, we improved the measurements and controls. Specifically, in Study 1a, some items of perceived environmental uncertainty may reflect perceived risks. Uncertainty and risk are distinct theoretical concepts, and they probably have different effects on people's decision making (Fox & Tversky, 1995). Therefore, we differentiated between perceived uncertainty and risks in Study 1b. Second, it is possible that some members show more leadership behaviors than others and therefore receive more leadership attributions. Therefore, we added one item to ask about group members' tendency to engage in leadership behaviors. This item was included as a control.

Method

Research setting and procedure. The sample was 15 student teams composed of 105 third-year undergraduate students at a large university in central China. The average age was 20.82 ($SD = 1.21$ years). Before participating in this course, they had an average of 6.17 months of part-time work experience ($SD = 5.84$ months), and 49% of the participants were male ($M = 0.51$, $SD = 0.50$). The students attended the same training program and the procedure was the same as with Study 1a. Data were collected from 15 teams in 2019 and we registered this study before collecting the data¹⁶. Because the program is voluntary, it is difficult to control the number of teams we can collect each year: for example, we were unable to collect data in 2018 because not enough students had registered and the program was cancelled and in 2020 because of COVID-19.

¹⁶ https://osf.io/jwutg/?view_only=90862b114ce04f10b73026adaa34a044

Measures

Perceived environmental uncertainty (time 2). To distinguish between the effects of perceived uncertainty and perceived risks, we accumulated items from extant literature about both concepts, including Waldman et al.'s (2001) perceived environmental uncertainty (four items), Jasen et al.'s (2006) perceived environmental dynamism (four items) and the environmental hostility scale (three items). We generated five items based on the definition of environmental uncertainty. We then selected four items from these scales that suited the context of the students' team project¹⁷. In Appendix 3. A, the table presents the scale items and factor loadings in the pre-test sample. We eventually selected three items as a distinctive measure of perceive uncertainty: "The potential impact of environmental changes is unpredictable", "The environment that my team faces is very uncertain" and "The environment that my team faces is very dynamic, changing rapidly in many dimensions". As in Study 1, we followed the back translation procedure (Douglas & Craig, 2007). The scale showed sufficient internal consistency, Cronbach's $\alpha = 0.88$.

Communal leadership beliefs (time 2). We used the same measurement as Study 1a. The Cronbach's alpha of the scale was 0.82.

Leadership attributions (time 3). We used the same measurement as Study 1a.

Control variables. Building on Study 1a, we added two more controls in this study. First, we controlled for individuals' tendency to engage in leadership behaviors (i.e., *leadership claiming*). Perceived risks will prevent individuals from engaging in leadership behaviors and claiming informal leadership roles (Zhang et al., 2020). If A

¹⁷ Perceived risk items were "My team is performing in an environment that is very risky, one false step can mean the firm's undoing", "In the external environment in which my team operates, failure is nearly guaranteed", "In the external environment in which my team operates, the probability of failure is very high", Cronbach's $\alpha = 0.89$

engages in leadership behaviors, B will be more likely to attribute leadership to A. This process is not automatic, but it is necessary to control group members' leader-like behaviors, and we therefore asked each team member "To what extent do you engage in leadership behaviors towards this person?" (Wellman, 2013). We calculated out-degree centrality of leadership claiming. Here, the out-degree centrality indicates the extent to which one is willing to engage in leadership behaviors towards other team members. Second, we controlled for individuals' leadership structure beliefs before they started running their virtual businesses as people may hold prototypical beliefs about how leadership is best structured in teams.

Results

Table 3.4 shows the descriptive statistics and correlations among all of the study variables.

Table 3.4 Descriptive Statistics and Correlations in Study 1b

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Team size (level 2)	7.15	0.76										
2. Gender	.51	0.50	-.11									
3. Familiarity	4.14	0.92	-.05	.04								
4. Communal leadership beliefs (time 1)	3.98	1.21	.06	-.26**	.03							
5. Leadership attributions (time 1)	0.41	0.36	-.06	-.03	-.07	.29**						
6. Leadership claiming (time 1)	0.34	0.36	-.22*	-.20*	-.15	.18 ⁺	.58**					
7. Perceived uncertainty (time 2)	4.56	1.17	-.07	.01	.02	.29**	.28**	.20*				
8. Perceived risk (time 2)	3.84	1.53	-.10	-.16	-.10	.26**	.26**	.27*	.49**			
9. Communal leadership beliefs (time 2)	4.21	1.17	-.08	-.25*	.07	.48**	.15	.15*	.48**	.60**		
10. Leadership attributions (time 3)	0.45	0.36	-.26**	-.01	-.09	.18 ⁺	.35**	.35**	.26**	.28**	.24**	
11. Leadership claiming (time 3)	0.42	0.36	-.20**	-.04	-.03	.30*	.43**	.43**	.22*	.30*	.43**	.48**

Note. $N = 108$. For gender, 1 is male and 0 is female.

⁺ $p < .10$, * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3.5 Results of Multilevel Models in Study 1b: Predicting Leadership Attributions

Variable	Communal leadership beliefs (time 2)	Leadership attributions (time 3)	
	Model 1	Model 2	Model 3
Intercept	1.31	1.00	.97
Gender	-0.39*	-.11*	-.09
Familiarity	0.52	-0.02	-0.02
Communal leadership beliefs (time 1)	0.33***	0.01	0.01
Leadership attributions (time 1)	-0.36	0.17	0.18
Leadership claiming (time 1)	0.28	0.11	0.11
Team size (level 2)	-0.05	-0.11	-0.11 ⁺
Perceived environmental uncertainty (time 2)	0.42***	0.04	0.03
Communal leadership beliefs (time 2)			0.03
-2 Log Likelihood	250.20	55.52	54.84
AIC	268.20	75.52	76.84

Notes. Models are testing Hypotheses 1, 2 and 3. N= 101 at level 1; N= 15 at level 2. These models illustrate the results of the fixed models, which indicates all the paths do not vary by Level 2 unit. We used Maximum Likelihood estimation to compare the fixed effects of these models (Kreft & de Leeuw, 1998). The ICC (1) of Models 1, 2, 3 is 0.17, 0.13, 0.11, respectively.

⁺ $p < .01$; * $p < .05$; ** $p < .01$; *** $p < .001$

Perceived uncertainty and perceived risks have very high correlations ($r = 0.49$, $p < .001$). Therefore, we did not include perceived risks as a control in the following regression model, in order to get rid of the noise of multicollinearity.

Hypothesis 1 was supported. We used multilevel modelling to test a model in which perceived uncertainty predicted the communal leadership beliefs. Hypothesis 1 was supported, and the results are shown in Table 3.5. An individual's perception of uncertainty (time 2) was positively related to his or her communal leadership belief (time 2) ($b = 0.26$, $SE = 0.05$, $p < .001$; Model 1).

In Hypothesis 2, we predicted that an individual's communal leadership beliefs were positively related to an individual's leadership attributions. As shown in Table 3.5, communal leadership beliefs (time 2) were not significantly related to leadership attributions ($b = 0.03$, $SE = 0.04$, $p = .19$; Model 3). Hypothesis 2 was not supported.

Although Hypothesis 2 was not supported, we still tested Hypothesis 3. We did not find a significant indirect effect at either the individual level (Indirect Effect = 0.03, $SE = 0.01$, 95% Monte Carlo CI = -.002 to .016), or at the group level (Indirect Effect = 0.58, $SE = 0.51$, 95% Monte Carlo CI = -.208 to 1.809). Hypothesis 3 was not supported.

Robustness Check

First, we removed the controls and found similar results. We found that individuals' perceptions of uncertainty (time 2) are positively related to their communal leadership beliefs (time 2) ($b = 0.45$, $SE = 0.09$, $p < .001$). Communal leadership beliefs (time 2) were not significantly related to leadership attributions ($b = 0.03$, $SE = 0.03$, $p = .29$). Similarly, we did not find an indirect relationship between uncertainty perceptions and leadership attributions through communal leadership beliefs.

Second, we used outdegree to measure leadership attributions. The results were consistent. The relationship between communal leadership beliefs and outdegree was not significant ($b = 0.18, SE = 0.23, p = .43$). There were no indirect effects at the individual level (Indirect Effect = 0.58, $SE = 0.51$, 95 % Monte Carlo CI = -.208 to 1.809) or at the group level (Indirect Effect = 0.58, $SE = 0.51$, 95 % Monte Carlo CI = -.208 to 1.809).

Supplementary Analysis

The sample sizes in Studies 1a and 1b were smaller than is recommended for multilevel models (Bauer et al., 2006). Therefore, we tested the hypotheses by aggregating the two studies. In the aggregated dataset, 352 individuals attended the program in 2017 and 105 individuals attended in 2019. In total, the sample consisted of 61 student teams and 457 individuals. The average age of participants was 20.70 ($SD = 0.96$ years) and 53.8% of the participants were male ($M = 0.45, SD = 0.50$). Before participating in this course, they had an average of 6.5 months of part-time work experience ($SD = 9.42$ months). The average team size was 7.69 students (ranging from 5 to 10, $SD = 1.03$).

As shown in Table 3.6, Hypotheses 1 and 2 were supported. Individuals' perceptions of uncertainty (time 2) were positively related to their communal leadership beliefs (time 2) ($b = 0.29, SE = 0.04, p < .001$; Model 1). Communal leadership beliefs (time 2) were significantly related to leadership attributions ($b = 0.03, SE = 0.01, p = .05$; Model 3). Hypothesis 3 received support at the group level. A formal test of the indirect effect revealed a non-significant within-indirect effect and a significant between-indirect effect of perceived environmental uncertainty on leadership attributions based on communal leadership belief (Within-Indirect Effect = 0.06, $SE = 0.01$, 95 % Monte Carlo CI = -.002 to .016; Between- Indirect Effect =

0.05, $SE = 0.03$, 95 % Monte Carlo CI = .009 to .112). Test of differences in the indirect effects within and between groups was significant (Difference = 0.05, 95 % Monte Carlo CI = .001 to .106).

Table 3.6 Results of Multilevel Models combining Studies 1a and 1b: Predicting Leadership Attributions

Variable	Communal leadership beliefs (time 2)	Leadership attributions (time 3)	
	Model 1	Model 2	Model 3
Intercept	2.88***	-0.07	-0.13
Gender	-0.34**	-0.03	-0.02
Familiarity	0.09	0.05	0.02
Leadership attributions (time 1)	0.25	0.16***	0.16*
Team size (level 2)	-0.03	0.03	0.03
Perceived environmental uncertainty (time 2)	0.29***	0.02 ⁺	0.02
Communal leadership beliefs (time 2)			0.03*
-2 Log Likelihood	1293.12	260.39	256.58
AIC	1309.12	276.39	274.58

Notes. Models are testing Hypotheses 1, 2 and 3. N= 457 at level 1; N= 61 at level 2. These models illustrate the results of the fixed models, which indicate that all of the paths do not vary by Level 2 unit. We used a Maximum Likelihood estimation to compare the fixed effects of these models (Kreft & de Leeuw, 1998). The ICC (1) of Models 1, 2, 3 is 0.03, 0.26, 0.25, respectively.

⁺ $p < .10$, * $p < .05$; ** $p < .01$; *** $p < .001$

Discussion

Individuals' perceptions of environmental uncertainty as positively related to their communal leadership beliefs were consistent across the two individual studies. The relationship between communal leadership beliefs and leadership attributions was more ambiguous and we found support only when combining Studies 1a and 1b. Theoretically, communal leadership beliefs should guide individuals to attribute

leadership to more people, but we did not find consistent evidence of this in the correlational studies. We speculate that there are two reasons for this. First, we could not control other factors that might influence leadership attributions, for example, team members' behaviors. Previous research has found that individuals are less willing to engage in leadership behaviors in risky situations (Zhang et al., 2020). In the current studies, it was hard to fully control participants' behavior, and thus we could not exclude the possibility that they changed their behaviors over time, and their leadership attributions were therefore affected. It would have been better if we had designed a study that controls potential leaders' behaviors. Second, in the above studies, we used the 5-item version of leadership structure schema scale and revised the reversed items to make the survey easier for participants. This might explain why we could not find the relationship between communal leadership beliefs and leadership attributions.

So far, we have not tested the effects separately at the individual and group levels. The mixed mediation model shows that the indirect effects exist at the group level but not at the individual level. This means that a large part of the variance was attributed to the group membership. It is necessary to test the relationship at the individual level so that we can understand the underlying mechanism better. Furthermore, we could directly build a causal effect in the current studies. Therefore, in the following study, we sought to control the group members' behaviors, improve the measurement of communal leadership beliefs, test the hypotheses at the individual level and build a stronger causal relationship.

Study 2

The preceding field study provided reasonable evidence of a relationship between perceived uncertainty and communal leadership beliefs (Hypothesis 1).

Furthermore, communal leadership beliefs lead people to attribute leadership to others (Hypothesis 2). To test the causality at the individual level more precisely, we conducted an experimental study to test whether perceived uncertainty would directly increase an individual's communal leadership beliefs. We also sought to determine if, under controlled experimental conditions, leadership attribution would occur because environmental uncertainty changes people's leadership beliefs. Furthermore, we aimed to show that individuals with communal leadership beliefs would attribute leadership to their team members, regardless of their behaviors or their official titles. Specifically, we decided to manipulate take-focused leadership behaviors, relational leadership behaviors and low relevance leadership behaviors (Yukl, Gordon, & Taber, 2002).

Method

Participants and design. A total of 397 adults were recruited from Amazon's MTurk (Buhrmester, Kwang, & Gosling, 2011; Paolacci, Chandler, & Ipeirotis, 2010) to take part in the study in exchange for \$0.70. Of these participants, 49.4% were female. The average mean age was 33.01 years and the standard deviation was 4.82 years. The participants represented a diverse population, of which 77.6% of participants were non-Hispanic White; 9.6% were Black or African-American; and 6.0% were Asian or Asian American. Their education levels were as follows: 44.6% of them had a bachelor's degree; 18.1% had an associate's degree. In terms of employment, 69.5% had a full-time job and 2.5% were currently enrolled in studies. Most of them (84.9%) claimed that they had taken leadership roles in organizations.

Procedure and materials. First, participants were asked to complete a survey of their general communal leadership beliefs (Wellman et al., 2013), their personality (Melrose, Perroy, & Careas, 2015) and their state affect (Watson, Clark, & Tellegen, 1988), which will be described in detail below. Participants were then asked to imagine

that they were members of the top management team at Gemini Corporation, a large global, multinational corporation. They were randomly assigned to either an uncertain environment or a certain environment, using the manipulations below:

Uncertain condition: *'Right now, your industry is characterised by an UNCERTAIN environment. Things are changing quickly and unpredictably. It is difficult to anticipate the potential impact of those changes on your company and whether particular actions will be successful'.*

Certain condition: *'Right now, your industry is characterised by a CERTAIN environment. Things are changing slowly and predictably. It is easy to anticipate the potential impact of those changes on your company and whether particular actions will be successful'.*

They answered questions about the features of the environment as a manipulation check. After that, participants answered the questions about their communal leadership beliefs again.

In the second phase of the study, participants read a scenario in which they were asked to attribute leadership to their group members. Participants in both conditions read the same scenario introducing the top management team members and their functional background (CEO Brian Johnson; Senior VP Sales Roger Thomas; Senior VP Human Resources Guy Tremblay; Senior VP Finance Cheryl Stewart; Senior VP Operations Richard Wright; and the participant as Senior VP of Marketing). All participants read:

In a recent top management team meeting, some of your team members spoke about their concerns about the future of the company. One member, Richard Wright, was able to put himself in the shoes of the other members. He made the team members feel comfortable enough to express what they were thinking and feeling. Another team

*member, Guy Tremblay, volunteered to write a report to clarify the situation. He took his best shot at compiling a list of things the team does not know as a way to encourage other team members to contribute and plan. Roger Thomas listened carefully while others were talking. He took careful notes during the meeting.*¹⁸

Later, participants answered two questions regarding leadership attribution. The first asked to what extent the behaviors represented acts of leadership (from 1: not at all to 7: to a very great extent). In the second question, participants were asked “To what extent does your team rely on this person for leadership?” and recorded their answers on a 7-point Likert scale (excluding self-reports).

Finally, participants answered some questions about their demographic information. We provided the definition of leadership (Yukl & Michel, 2006) and leader (informal leader) (Pearce, Yoo, & Alavi, 2004) at the beginning of the study and reminded them of the characteristics of the uncertain/certain environment throughout the study.

Measures

Manipulation check items: *Perceived Environmental Uncertainty.* We asked participants to report their perceptions of the environment using Waldman et al.’s (2001) four-item measurement on a 7-point Likert scale (from 1: strongly disagree to 7: strongly agree). We adapted the items to fit the situation. The sample items included “My team is performing in an environment that is changing rapidly”. The Cronbach’s alpha of the scale was 0.94.

Communal leadership beliefs. We used the original 8-item scale of leadership

¹⁸ In a pre-test, we found “putting himself in other members’ shoes” is related to relational leadership behaviors; “write a report to clarify the situation” is task related leadership behaviors, and “taking notes in the meeting” has low relevance to leadership behaviors.

structure schema (Wellman, 2013). We asked participants to what extent they agreed with the following statements on a 7-point Likert scale (from 1: strongly disagree to 7: strongly agree). The additional three items included: “One person cannot lead a group by him or herself” (reverse-coded) and “Groups work best when there is a single leader in the group” (reverse-coded). We measured communal leadership beliefs both before and after the manipulation to capture the degree of change caused by the manipulation. The Cronbach’s alpha of the scale was 0.89 (before manipulation) and 0.92 (after manipulation) respectively.

Leadership attributions. We measured people’s leadership attributions in two ways. First, we asked participants to consider whether the behaviors of three particular members were leadership acts. Richard provided the relational aspect of leadership (i.e., he put himself in others’ shoes). Guy provided the task aspect of leadership (i.e., he volunteered to write a report to clarify the situation) while Roger engaged in some proactive behaviors that were not necessarily related to leadership (i.e., he listened carefully and took notes). We asked participants to rate to what extent those behaviors were acts of leadership” based on a 7-point Likert scale (from 1: not at all to 7: to a very great extent). The ratings of the three actors (Richard, Guy and Roger) were consistent (Cronbach’s alpha was 0.80). Thus, we aggregated the participants’ ratings of leadership behaviors. Later, we referred to this measurement as recognising leadership acts.

Second, we asked participants to rate the degree of leadership they attributed to their team members. Participants were asked “to what extent does your team rely on this person for leadership?” for all the top management team members on a 7-point Likert scale (excluding self-reports). This method is commonly used in shared leadership literature (Carson et al., 2007) as it captures the extent to which team

members attribute leadership to a particular member. We argued that people who hold a communal leadership belief would increase the overall amount of leadership attributions. Thus, we aggregated the participants' ratings of other team members' leadership. Later, we referred to this measurement as attributing leadership.

Control variables. We had two control measures of individual differences. First, we measured the 'Big 5' personality traits using the 10-Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003) and ranked these personality traits on a 7-point Likert scale (from 1: strongly disagree to 7: strongly agree). Leadership attributions could be related to traits such as conscientiousness and agreeableness (Judge, Bono, Ilies, & Gerhardt, 2002; Taggar, Hackett, & Saha, 1999). We controlled, therefore, for personality traits.

Second, we measured participants' state affect before the manipulation. We used the positive and negative affect schedule (PANAS, Watson et al., 1988) to control for the affective factors on a 5-point scale (from 1: very slightly or not at all to 7: extremely). Previous research has suggested that uncertainty in the environment is related to negative affect (Buhr & Dugas, 2006), therefore, we wanted to make sure it is uncertainty rather than negative affect that increases the communal leadership beliefs.

Results

Manipulation check. The uncertain/certain manipulations were effective. Planned contrasts found that perceived environmental uncertainty was higher in uncertain environmental conditions ($M = 5.50, SD = 1.04$) than in certain environmental conditions ($M = 3.05, SD = 1.28$), $F(1,395) = 310.36, p = .000, \eta_p^2 = .44$).

Personality. Planned contrast found that participants in both conditions have

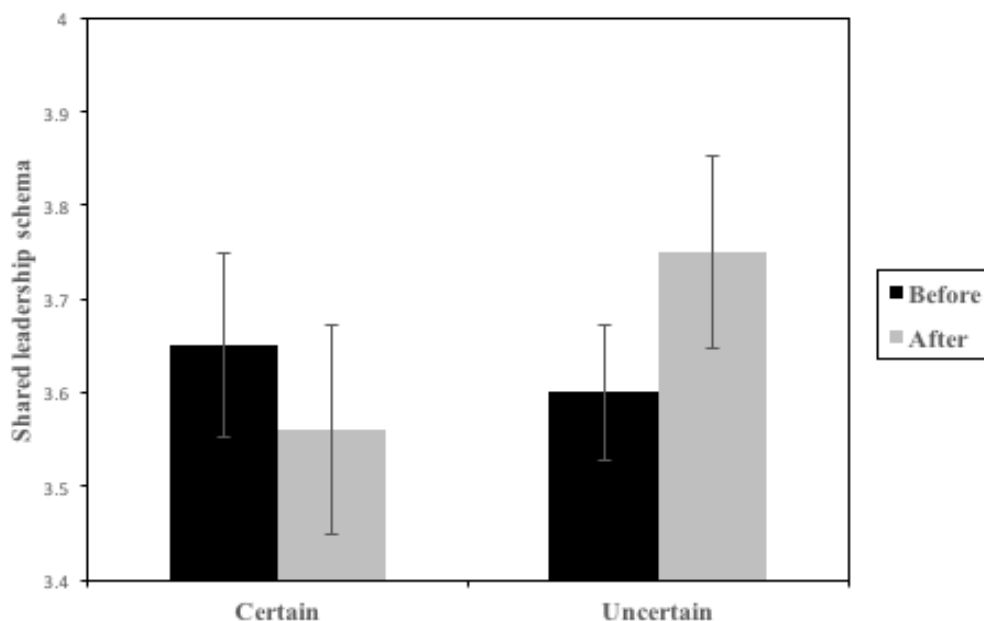
similar personality profiles.

Positive and negative affect. Planned contrast found that participants in both conditions do not differ in their positive affect (Uncertain: $M = 3.18$, $SD = 0.91$; *Certain*: $M = 3.08$, $SD = 0.87$), $F(1,395) = 1.31$, $p = .25$, $\eta_p^2 = .00$) or negative affect (Uncertain: $M = 1.41$, $SD = 0.79$; *Certain*: $M = 1.44$, $SD = 0.77$), $F(1,395) = 0.18$, $p = .67$, $\eta_p^2 = .00$).

Testing Hypothesis 1. As shown in Figure 3.1, after controlling for the communal leadership beliefs before manipulation, people's communal leadership beliefs were higher in uncertain environmental conditions ($M = 3.75$, $SD = 1.38$) than in certain environmental conditions ($M = 3.56$, $SD = 1.24$), $F(1,394) = 5.00$, $p = .03$, $\eta_p^2 = .44$. In addition, we conducted a paired-sample T-test to compare participants' communal leadership beliefs before and after the uncertainty manipulation. In uncertain environmental conditions, participants' communal leadership beliefs after manipulation ($M = 3.75$, $SD = 1.38$) increased from those before manipulation ($M = 3.60$, $SD = 1.17$), $t(198) = 1.96$, $p = .05$. However, in certain environmental conditions, participants' communal leadership beliefs after manipulation ($M = 3.56$, $SD = 1.24$) did not increase from the situation before manipulation ($M = 3.65$, $SD = 1.13$), $t(197) = 1.24$, $p = .22$. Therefore, Hypothesis 1 was supported.

Figure 3.1 Mean Communal Leadership Beliefs by Conditions

Note. Error bars represent standard errors



Testing Hypotheses 2 and 3. To test the relationship between communal leadership beliefs and leadership attributions (Hypothesis 2) and how an uncertain environment affects people's willingness to grant leadership through their communal leadership beliefs (Hypothesis 3), we conducted the mediation analysis using PROCESS (Hayes, 2012). Models 2 and 3 used recognising leadership acts, which are the participants' ratings of the three actors' leadership behaviors, as dependent variables. Models 4 and 5 used participants' ratings of how each of the team members exhibited leadership as dependent variables. Both dependent variables measured leadership attributions. We controlled for communal leadership beliefs before manipulation (baseline), personality, positive and negative affect. The results are displayed in Table 3.7.

Table 3.7 Results for Mediation Effects in Study 2: Predicting Leadership Attributions

Variable	<i>Communal leadership beliefs</i>	<i>Recognising leadership acts</i>		<i>Attributing leadership</i>	
	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	1.00*	3.18	2.97	2.96	2.77
Positive affect	-0.02	0.35**	0.36***	0.40***	0.40***
Negative affect	-0.05	-0.04	-0.03	0.15	0.16 ⁺
Communal leadership beliefs (before)	0.75***	0.12*	-0.04	0.08	-0.06
Conscientiousness	-0.00	0.06	0.06	0.02	0.02
Extraversion	-0.02	-0.02	-0.01	-0.02	-0.02
Emotional stability	-0.02	-0.04	-0.04	-0.06	-0.05*
Openness	0.04	0.04	0.03	-0.02	-0.03
Agreeableness	-0.01	0.02	0.02	0.06 ⁺	0.06
Environmental uncertainty	0.24*	0.24*	-0.03	-0.05*	-0.09
Communal leadership beliefs (after)			0.21**		0.19**
Adjusted R ²	0.45	0.09	0.11	0.14	0.16
F-statistic	$F(9,387) = 35.65$	$F(9, 387) = 24.29$	$F(10, 386) = 4.93$	$F(9,387) = 6.86$	$F(10, 386) = 7.60$
P-value	0.00	0.00	0.00	0.00	0.00

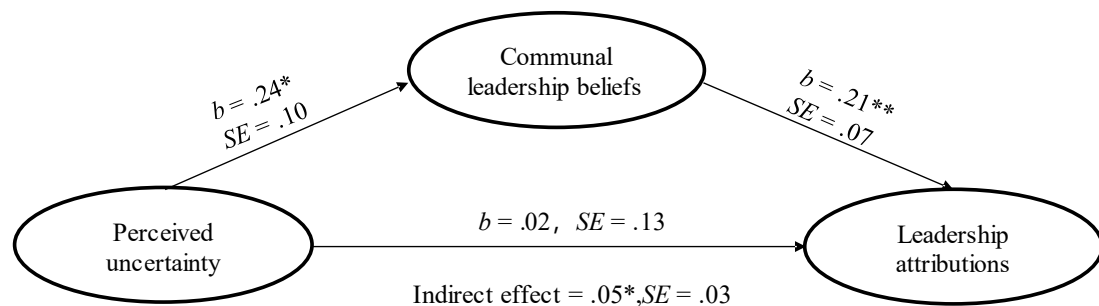
Note. $N = 397$.

* $p < .05$; ** $p < .01$; *** $p < .001$

For the first measurement of leadership attributions, recognising leadership acts, the results indicated that environmental uncertainty was a significant predictor of communal leadership beliefs ($b = 0.24$, $SE = 0.10$, $p = .02$) as a dependent variable and that communal leadership beliefs were a significant predictor of recognising leadership behaviors ($b = 0.21$, $SE = 0.07$, $p = .00$). Therefore, Hypothesis 2 was supported. The indirect effect was tested using a bootstrap estimation approach with 5000 samples (Shrout & Bolger, 2002). These results indicated that the indirect coefficient was significant (Indirect effects = 0.05, $SE = 0.03$, 95% CI = .01, .09). The model is illustrated in Figure 3.2. Therefore, Hypothesis 3 was supported.

For the second measurement of leadership attributions, the results were consistent with recognising leadership acts. They indicated that environmental uncertainty was a significant predictor of communal leadership beliefs ($b = 0.24$, $SE = 0.10$, $p = .02$) and that the communal leadership beliefs were a significant predictor of attributing leadership ($b = 0.19$, $SE = 0.05$, $p = .00$). These results indicated that the indirect coefficient was significant (Indirect effect = 0.04, $SE = 0.02$, 95% CI = .01, .10). Therefore Hypotheses 2 and 3 were supported.

Figure 3.2 The Model of Hypothesized Relationships



Additional Analysis

In the previous analysis, we showed that the overall degree of leadership attributed to team members differs between uncertain and certain conditions. We argued that individuals with a higher communal leadership belief would attribute leadership in an undifferentiated way while individuals with hierarchical leadership beliefs would attribute leadership to the top-ranked member. In order to show this, we examined whether there was a difference between the leadership attributions that Richard, Guy, and Roger received from participants.

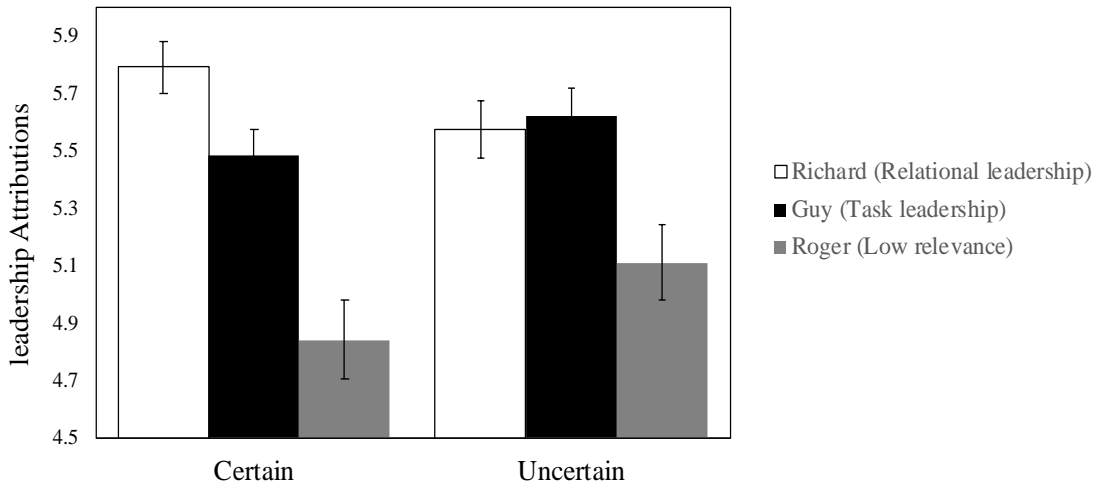
Under conditions of certainty, we predicted that participants would grant the most leadership to one person. As shown in Figure 3.3, we found that participants were more likely to recognise Richard's behavior of putting himself in others' shoes as a leadership behavior ($M = 5.79$, $SD = 1.28$) over Guy's act of volunteering to write a report to clarify the situation ($M = 5.48$, $SD = 1.34$) and Roger's act of listening carefully and taking notes ($M = 4.84$, $SD = 1.94$). The difference between putting oneself in others' shoes and volunteering to write a report was significant $t(197) = 3.36$, $p = .00$. Participants believed that leadership behavior that makes it comfortable to express concerns was the most typical leadership behavior in the specific context.

We also predicted that, in conditions of uncertainty, participants will attribute leadership to several individuals, regardless of these individuals' contributions or behaviors. Under uncertain conditions, participants basically equally recognised the leadership behaviors of Richard ($M = 5.57$, $SD = 1.45$) and Guy ($M = 5.62$, $SD = 1.36$), $t(198) = -.582$, $p = .56$. Interestingly, participants were also marginally more likely to grant Roger leadership in situations of uncertainty ($M = 5.11$, $SD = 1.94$) than in situations of certainty ($M = 4.84$, $SD = 1.94$), $F(1,394) = 2.18$, $p = .14$, $\eta_p^2 =$

.03, even though he only listened to the meeting carefully and took notes.

Figure 3.3 Mean of Leadership Attributions by Conditions and Targets.

Note. Error bars represent standard errors



Discussion

In Study 2, we found support for Hypotheses 1-3. In addition, we found that individuals with communal leadership beliefs had broader definitions of what constitutes leadership behaviors, and thus grant leadership to more of their teammates. Moreover, we controlled for positive affect and negative affect, which ruled out alternative explanations. In this study, positive affect was positively related to leadership attributions. However, after controlling for positive affect, participants still attributed leadership to more teammates in uncertain conditions. By combining all of the evidence, we can conclude that perceived environmental uncertainty does lead individuals to adopt more communal leadership beliefs and, thus, attribute leadership to more group members. It should be noted that this study only examines the mechanism at the individual level. Future research can explore the group level effect; for example, whether group members converge on their communal leadership

beliefs and how that influences individuals' leadership attributions and group leadership structures.

Table 3.8 Summary of Results for Testing Hypotheses from Studies 1a, 1b, & 2

	Study 1a	Study 1b	Studies 1a & 1b combined	Study 2
H1	Supported	Supported	Supported	Supported
H2	Partially supported	Not supported	Supported	Supported
H3	Supported at the group level	Supported at the group level	Supported at the group level	Supported at the individual level

As shown in Table 3.8, we summarized all of the results from Study 1a to Study 2. The results consistently supported Hypothesis 1, which stated that perceptions of environmental uncertainty will lead individuals to adopt communal leadership beliefs. In Studies 1a and 1b, the evidence is correlational, and it may suffer from common method variance. In Study 2, however, we were able to show the causal effect.

We found reasonable evidence to support Hypothesis 2, which stated that communal leadership beliefs will guide individuals to attribute leadership to more team members. Combining Studies 1a and 1b, we concluded that people's communal leadership beliefs predicted the number of leadership ties they grant to their team members at a later time. In Study 2, in uncertain conditions, participants reported higher communal leadership beliefs and then increased their overall leadership attributions.

The results for Hypothesis 3 were mixed but generally supportive. Study 1 generally showed that the indirect effects existed at the group level, but not at the individual level, which suggested a larger part of the variance was attributed to group

membership. The extent to which individuals are deviant from the group average level did not explain a lot of variance. This means that, compared to the whole group, each group member's unique uncertainty perceptions did not influence their unique leadership attributions through their communal leadership beliefs, but the group's average uncertainty perceptions *did* affect their leadership attributions through their average communal leadership beliefs. Study 2 showed that this relationship existed at the individual level. In uncertain (vs. certain) conditions, individuals reported more communal leadership beliefs and were more likely to attribute leadership to their fictitious teammates.

Chapter Discussion

Informal leadership facilitates a team's ability to respond to unforeseen problems and environmental changes. It is important to understand how informal team leadership emerges in uncertain times. Unlike previous research, the present research looked at the issue from the perspective of the followers, rather than the leaders, to understand how and why uncertainty influences leadership attributions. We hypothesised that when members perceive the environment to be uncertain, they tend to believe that sharing leadership is more effective, leading them to increase the likelihood of granting leadership to more of their teammates, and found this to be true. Studies 1a and 1b showed that when team members perceive the task environment to be uncertain, they adopt more communal leadership beliefs and, hence, attribute leadership to multiple team members. Study 2 demonstrates this relationship in an experimental study in which participants were randomly allocated to either certain or uncertain conditions. Participants in uncertain conditions reported higher communal leadership beliefs and were more likely to attribute leadership to

teammates, even though the actual behaviors of these teammates were the same in both conditions.

Theoretical Implications

This research has two main theoretical contributions. First, it contributes to the shared leadership literature by providing new perspectives on the development of shared leadership. Developing and executing shared leadership takes a lot of effort and it is critical to understand the interactions between leaders and followers to successfully implement shared leadership. Past research has suggested that shared leadership may emerge when multiple individuals engage in leadership behaviors and claim leadership roles (DeRue & Ashford, 2010), but the current research suggests rather that it may be that followers in certain circumstances lower their thresholds of leadership attribution, and thus view more individuals as leaders. In the future, to understand how shared leadership develops in teams, we should not only focus on team members' behaviors related to sharing leadership. We must also investigate team members' beliefs about leadership structures and the environment they are operating in. Future research could also explore the paradox in which a leader thinks he or she is the only leader, but the followers think there are several leaders. In other words, the leader may hold a hierarchical leadership belief and his or her followers may hold communal leadership beliefs. Also, the leader might believe that leadership is shared but others see it as consolidated in a single person. Future research could explore when leaders and followers have opposite beliefs regarding leadership and the potential consequences.

Second, this research directly contributes to informal leadership emergence literature. Previous informal leadership emergence literature has seldom focused on followers' perspectives, which is problematic, because what applies to leaders may

not apply to followers. Leaders and followers may have different reactions towards the same situation. For example, according to previous research, people would be reluctant to take on leadership roles in uncertain situations, as doing so might make them accountable for the outcomes (Zhang et al., 2020). From the current research, we know that followers in uncertain situations look to attribute leadership to others. This is because of their communal mindsets and their desire to either have someone else or the entire group be accountable for outcomes. It suggests an interesting result, which is that informal leadership could emerge even when people are not willing to engage in leadership behaviors or claim leadership roles. Followers could fully decide the leadership emergence process because they are the ones who define leadership. When new informal leaders emerge in teams, we should not assume that their behaviors have changed: it is possible that the situation has changed and team members' beliefs about leadership is different.

This research also highlights the role of the context in informal leadership emergence literature. It has been long argued and proven that followers expect different kinds of leadership styles in different contexts (Agle et al., 2006; Shamir & Howell, 1999; Waldman, Ramírez, House, & Puranam, 2001). Previous research has prescribed what kinds of individual characteristics of leaders fit different situational requirements. The current research highlights that people within teams make judgments about who should be leaders not only based on leaders' characteristics, but also based on how many leaders would be most effective in the situation. Only focusing on leaders' individual characteristics can be problematic, since some individuals may be recognised as leaders even though they do not have the prototypical individual characteristics.

The present research adds to prior work (Chapter 2), which asserts that

individuals' beliefs about leadership structures are sensitive to the situation at hand (i.e., task complexity and uncertainty). One of the most enduring messages of leadership research is that the situation dictates what kind of leadership is most effective. No one approach works for all situations (Fiedler, 1978; Vroom & Jago, 2007). This has been successfully applied to individual leadership styles and beliefs about them (Epitropaki, Sy, Martin, Tram-Quon, & Topakas, 2013; Osborn, Hunt, & Jauch, 2002). Our research (Chapters 2 and 3) shows that leadership structure beliefs, like implicit beliefs, are context sensitive. These beliefs may affect different stakeholders. In Chapter 2, we explored people outside of teams. In the current research, we explored internal team members. Future research could explore if there is an overarching situational factor that causes different stakeholders to adopt communal leadership beliefs. Given the evidence so far, it seems as if demanding situations (i.e., those involving complex tasks and uncertain environments) have similar effects on individuals both within teams and outside of teams.

This research has implications for literature on the dynamism of informal leadership. It implies that perceptions of uncertainty may be a catalyst for change in informal leadership structures. As the research moves towards mapping change in leadership structures over time, it will be critical to also theorize and measure their perceptions of the task and environment. Future research could adopt a dynamic or event-based approach to study leadership emergence. As the leadership emergence process does not remain static throughout the group's life span, it is possible that certain events could cause followers to rethink their definitions of leadership behaviors and thus wish to reshape the previous informal leadership. Event-based informal leadership may explain the dynamism of shared leadership. More empirical research should be conducted in order to understand how events change both leaders

and followers, and affect their relationships, in order to enable different leadership structures to meet different situational requirements.

Limitations and Future Directions

These studies have taken the perspectives of followers into account to understand the micro-dynamics of the emergence of shared leadership. They do, however, have several limitations, which suggest directions for future research. First, we did not fully explore the group dynamics that eventually lead individuals to attribute leadership to shared leadership structures. Wellman (2017) suggests that group members need to converge on a common leadership structure belief and then their group will develop a shared leadership structure. Future research could continue to explore how team members converge on their beliefs and develop shared leadership. It would also be interesting to explore the development of shared leadership by examining other leadership network features, such as reciprocity (Carnabuci et al., 2018; Mehra, Dixon, Brass, & Robertson, 2006). The asymmetry of leadership granting and receiving (as seen in actors who attribute more outgoing leadership ties than they receive incoming leadership ties) may create interesting dynamics. Furthermore, we encourage future research to integrate leadership paradigms across different levels (individual, team and context) (Carter et al., 2015; White et al., 2016).

Second, we did not explore other situational factors. In this research, environmental uncertainty is defined as situations in which the environmental components, impacts and responses are unpredictable (Milliken, 1987). We did not distinguish between different types of perceived environmental uncertainty, but rather used a holistic definition. Future research could explore how different types of environmental uncertainty (such as input or output uncertainty) (Packard et al., 2017)

affect leadership emergence. Perceived environmental uncertainty is different from other related contextual factors, such as perceived resource scarcity, and does not necessarily mean that resources are scarce. For example, in a hunter-gatherer society, the acquisition of meat is uncertain and depends on many uncontrollable factors, but this does not necessarily mean that meat resources are scarce. When people are given reminders of resource scarcity, they are more likely to make decisions that advance their own interests (van Lange, De Bruin, Otten, & Joireman, 1997; van Lange, De Cremer, van Dijk, & van Vugt, 2007; van Lange & Kuhlman, 1994). Given that resource scarcity will induce competitive behaviors (Roux, Goldsmith, & Bonezzi, 2015), team members may compete to take on leadership roles as a way to get access to scarce resources. Future research could explore environmental factors, such as organizational culture or norms and membership changes. Moreover, situations with extreme time and performance pressure, such as hospital emergency rooms, also necessitate sharing leadership (Klein, Ziegert, & Knight, 2006). Future research should explore more situational features that may directly influence leadership dynamics in teams.

Third, we examined the theory using different methods (surveys and experiments) and different samples (Chinese and American). Although we collected data from both Western and Eastern cultures, there might be cultural differences in shared leadership beliefs. Future research could explore whether a team consisting of members from different cultures or teams operating in different cultures have conflicting understandings of what team leadership should look like.

Conclusion

Teams rely on informal leadership as a response to uncertain environments. Previous research has focused on leaders' engagement in leadership behaviors to understand the development of shared leadership. This research highlights that uncertain situations also shape followers' definitions of leadership and thus the leadership attributions in teams. For organizations that hope to elicit more shared informal leadership, it is important to manage uncertainty perceptions so as to nurture and encourage people to adopt shared leadership. Future leadership scholars should acknowledge that leadership is socially constructed and that followers also play a fundamental role in leadership phenomena.

Chapter 4 How Preference Diversity Amplifies Uncertainty and Reduces Group Preference for Novelty

Improving creative idea generation in groups has been the focus of a large body of research over the past few decades (e.g., Gilson & Shalley, 2004; Goncalo & Staw, 2006; Nemeth & Ormiston, 2007; Nijstad & Stroebe, 2006; Paulus, 2000). The focus is compelling: groups with more novel ideas are more likely to find fundamentally new solutions to problems previously believed to be difficult or impossible to solve. However, the processes involved in determining which ideas to retain, value, develop, adopt, and resource, have been relatively unexplored. This oversight is problematic for building an understanding of group creativity because generating more and better quality creative ideas does not necessarily result in the best ideas being selected (Payne, 1982; Rietzschel, Nijstad, & Stroebe, 2006; Timmermans, 1993; Wright, 1975). Moreover, many organizations outsource idea generation activities and making selection decisions becomes their most important innovation endeavor (Chesbrough, 2003). A key challenge in assessing potential projects is that people are often biased against novelty (Danneels & Kleinschmidt, 2001; Mueller, Melwani, Loewenstein, & Deal, 2018). Here, the bias against novelty means that people make judgments against ideas that are more novel. In fact, some research suggests that groups in general are no better than chance at identifying their best creative ideas (Putman & Paulus, 2009; Rietzschel et al., 2006) and groups, like individuals, may exhibit a bias against novelty (Mueller, Melwani, & Goncalo, 2012).

At the heart of the bias against novelty is uncertainty. When uncertainty is salient, people tend to prefer ideas that are lower in novelty, even when claiming to

desire creative ideas (Mueller et al., 2012). Instead, they tend to prefer ideas that are relatively familiar and provide the greatest value for the greatest number of people (Blair & Mumford, 2007). Uncertainty has been theorized to come from two sources. First, it may be an inherent part of novelty; because novel ideas diverge from what already exists, their feasibility, resource requirements, and likelihood of success cannot be known (Klein & Knight, 2005; Lampel, Lampel, Shamsie, & Shapira, 2009; Mueller, Wakslak, & Krishnan, 2014). Some scholars argue that the quality of a novel idea is fundamentally unknowable (Huang & Pearce, 2015; Simonton, 1999) and this approach suggests that uncertainty about novel ideas cannot be eliminated. Second, uncertainty can result from environmental unpredictability (Lampel et al., 2009; Milliken, 1987). For example, uncertainty emerges when a group of evaluators cannot know how the market will change and whether a novel product will be successful in the changing market.

In the present research, we suggest an alternative source of uncertainty – group context. The nature of the group context can produce both certainty – acting as a source of biased decision-making (Janis, 1982; Myers & Lamm, 1976) – and doubt – acting as a check on poor decision-making (e.g., Nemeth, 1986). In this research, we suggest that group environments that amplify uncertainty can also create or enhance a bias against novel ideas.

Specifically, in the present research we suggest that preference diversity may produce group bias against novelty. Preference diversity comes from differences in opinions and attitudes held by group members (Nijstad & Kaps, 2008; Schulz-Hardt, Brodbeck, Mojzisch, Kerschreiter, & Frey, 2006; Schulz-Hardt, Frey, Lüthgens, & Moscovici, 2000). It has been long found that preference diversity is beneficial for group decision quality (Schulz-Hardt et al., 2006, 2000) and recent research also

suggests that expertise diversity aids idea evaluation (Criscuolo et al., 2017). That is because preference diversity promotes elaborative discussions – it make groups double-check their ideas, consider multiple perspectives, and identify possible risks (Laughlin, 1988). Yet, the equivocal empirical results of diversity studies on a variety of group outcomes (Harvey, 2013; Nijstad & Kaps, 2008; Srikanth, Harvey, & Peterson, 2017; van Knippenberg & Schippers, 2007) suggest that the relationship between diversity and creativity remains murky. We argue that preference diversity can promote discussion practices that highlight the uncertainty of novel ideas: when group members have disagreements on the pros and cons of a novel idea, they will worry about its potential success and doing so may lead groups away from the most novel ideas.

One way of mitigating the negative effects of preference diversity is to provide concrete details about novel ideas. Ideas can be presented in an abstract way, focusing on *why* they are important or they can be presented in a concrete way, focusing on *how* to make them work (e.g., Berg, 2019). Building on social comparison theory (Festinger, 1954), the absence of concrete information will lead individuals to turn to their fellow group members for social validation to evaluate the idea, but, if group members provide different or conflicting opinions, this will amplify group uncertainty. In contrast, when individuals have concrete information about novel ideas, they are less motivated to rely on fellow group members' opinions and so they are less subject to the influence of preference diversity.

We examine our arguments in two experimental studies. The first involves face-to-face idea decision-making groups (n = 186 individuals, 62 teams) and the second an online experiment (n = 397 individuals). Our findings show that preference diversity causes groups to experience more uncertainty and thus be less

likely to select novel ideas. Further, when presented with concrete descriptions of novel ideas, individuals are less subject to the influence of preference diversity and experience less uncertainty, and thus are more likely to support and resource novel ideas. Our study contributes to a growing body of literature on creative idea recognition, evaluation, and selection (Berg, 2016; Mueller et al., 2018; Mueller et al., 2012), particularly in group contexts (Criscuolo et al., 2017; Goncalo & Staw, 2006; Harvey & Kou, 2013) by revealing the negative impact of preference diversity on idea evaluations and how to mitigate it.

Theory and Hypothesis

Group Preferences for Novelty

Individuals and groups have been found to respond negatively to novel ideas, undervaluing them relative to more familiar ideas, especially when selecting ideas for implementation (Mueller et al., 2012; Putman & Paulus, 2009; Rietzschel, Nijstad, & Stroebe, 2010). This preference for lower novelty over higher novelty ideas is problematic when groups desire creative ideas. Creative ideas are higher in novelty, so if groups cannot appreciate and select the most creative ideas, the creative efforts will be lost. Moreover, just because the quality and risks associated with implementing a novel idea cannot be accurately assessed does not mean that the quality of novel ideas is necessarily lower. This argument runs parallel to research on ambiguity aversion, which shows that even when the expected outcome from two alternatives is the same, people prefer the less ambiguous alternative (Fox & Tversky, 1995). Thus, it is not the case that, by preferring low novelty alternatives, groups are ensuring that they pick high quality alternatives. Indeed, some of the highly novel options may also be high in quality, so by undervaluing those ideas,

groups are missing out on a significant opportunity.

The preference for less novel ideas is expected to be particularly strong in groups because groups amplify uncertainty about novel ideas in at least three ways. First, the process of discussion raises issues, concerns, risks, and alternative perspectives (e.g., Hirokawa, 1985; Kaplan & Miller, 1987) that highlight what is unknown about the ideas whereas, for ideas that are low in novelty, issues and concerns can be worked through, addressed, and mitigated based on the implementation and success of similar ideas in the past; for novel ideas, concerns are much more difficult to assuage, because by definition, novel ideas have not yet been tried and tested. Second, the precise uses of highly novel ideas have yet to be determined, so the metrics upon which one should evaluate novel ideas remain unclear (Long Lingo & O'Mahony, 2010). In these cases, group members may disagree on the evaluation criteria, which creates another layer of difficulty in assessing novel ideas. Third, while individuals may have a relatively clear understanding of a novel idea, in groups, they have to communicate that understanding to others before the ideas can be evaluated. For lower novelty ideas, that communication can be effective, but for high novelty ones, it is likely to be challenging, as the idea itself is more ambiguous and, by nature, less familiar.

We propose that preferences for novelty may vary depending on several group level factors. Some group contexts promote discussions that amplify the uncertainty of novel ideas, decreasing preferences for novelty when groups select between novel and less novel ideas. In particular, we propose that preference diversity may actually hurt idea selection because it increases uncertainties.

Preference Diversity and Perceived Uncertainty

We argue that preference diversity amplifies uncertainty and causes groups to

shy away from novel ideas. Preference diversity comes from differences in preference, meaning that group members hold different opinions and attitudes about a particular thing (Jehn, Northcraft, & Neale, 1999; Srikanth et al., 2017; van Knippenberg & Schippers, 2007). An extreme level of preference diversity results in members polarizing into opposing sub-units holding different opinions (Harrison & Klein, 2007).

One reason for the proposed link between preference diversity and uncertainty perceptions is that preference diversity raises disagreement among group members. When teams are selecting creative ideas, different opinions create disagreement about the pros and cons of an idea, making people worry about how well the group understands the idea, its risks, and its chances of success. Indeed, novel ideas are inherently more uncertain and difficult to assess. Therefore, groups may experience more disagreement when discussing novel ideas. The lack of consensus reduces group members' confidence in their judgments and thus increases their sense of uncertainty (Julian, Regula, & Hollander, 1968). Also, supporting this, different literature has found that conflicting opinions elicit uncertain feelings. For example, conflicting reviews make customers feel more uncertain about product quality (Dimoka, Hong, & Pavlou, 2012) and conflicting news coverage of scientific controversies causes readers to feel greater uncertainty about the issue (Jensen & Hurley, 2012). Therefore, we argue that groups that have conflicting opinions and divergent attitudes will experience higher uncertainty. When uncertainty is salient, individuals and groups tend to be less likely to support novel ideas for further implementation (Mueller et al., 2012). Therefore, we argue that:

***Hypothesis 1:** Groups high in preference diversity will experience greater uncertainty about novel ideas than groups low in preference diversity.*

Hypothesis 2: Groups high in preference diversity will have less of a preference for novel ideas than groups low in preference diversity.

Hypothesis 3: Uncertainty perceptions will mediate the relationship between preference diversity and preference for novel ideas.

The Moderating Role of Idea Concreteness

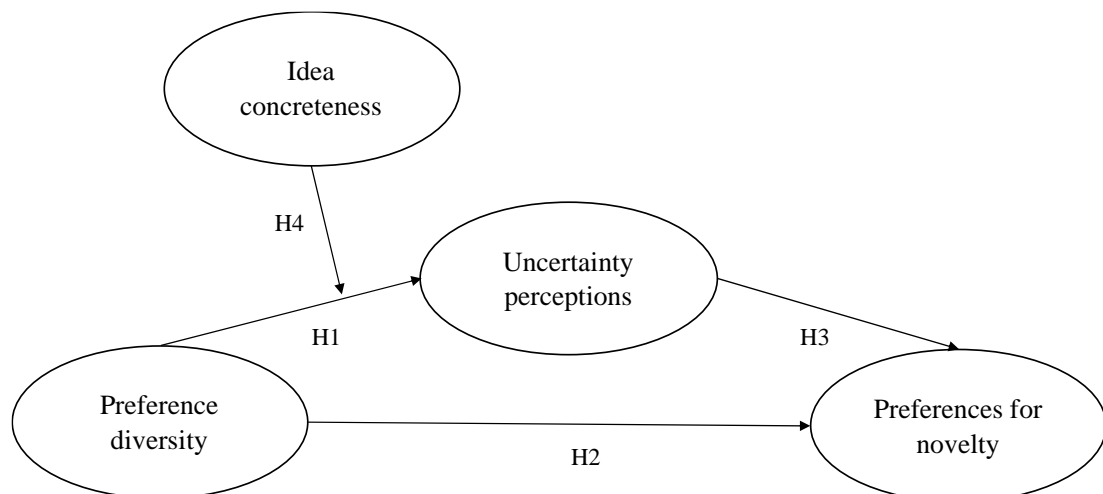
We argue that providing evaluators with more concrete information about novel ideas will mitigate the uncertainty in groups with preference diversity, and thus lead them to select more novel ideas for further implementation. Idea creators often present their ideas in a pitch or a project description. They may focus on *why* the idea is important and present it in a more abstract way or they may focus on *how* to make the idea work and provide details in the presentation. Building on construal level theory (CLT) (Trope & Liberman, 2010), ideas could be presented and communicated at a high and abstract level or at a low and concrete level. The high level representations often convey the value of or why an object is important (e.g., having fun) whereas low level representations often convey more details and how to realize the purpose (e.g., playing ball). Past research has suggested that individuals are biased against ideas that lack concreteness because they indicate uncertainty and people do not like uncertainty (Yates et al., 1978). Evaluators also prefer novel ideas with drawings, prototypes, and concrete instructions to those without (Lu et al., 2019).

We argue that concrete descriptions of ideas are especially important in a group with preference diversity. When lacking concrete information, people are more likely to seek social approval or rely on their team members' opinions. Social influence theory suggests that individuals tend to comply with others (Kelman,

2017). Moreover, social comparison theory suggests that agreement could provide individuals with validation of their choices when the concrete criterion is absent (Festinger, 1954). Therefore, when a concrete criterion for the evaluation is available, people do not evaluate their own opinions or abilities by comparing them with those of others. Moreover, when lacking concrete information to evaluate novel ideas, people turn to their fellow group members and seek consensus so are more subject to the influence of preference diversity. In contrast, when concrete information is plentiful, people make their own judgments and group members' disagreements have less impact on their judgments because they have first-hand information and no longer need to seek validation from the group. Thus, they are less subject to the influence of preference diversity. In summary, we proposed:

Hypothesis 4: *The concreteness level of idea descriptions will moderate the relationship between preference diversity and preference for novelty through uncertainty perceptions (a moderated mediation model).*

Figure 4.1 Summary of the Theoretical Model



Overview of Studies

Study 1

Study 1 examines Hypotheses 1-3: preference diversity leads to less preference for novelty and perceived uncertainty mediates this effect.¹⁹

Method

A total of 186 adults (72% female; $M_{\text{age}} = 23.43$, $SD_{\text{age}} = 7.012$) were recruited from a UK university participation pool for a study on group work and each received £10 for their participation. Participants were randomly assigned to work in one of 62 groups on a creative decision-making task in which they were asked to work together to discuss, evaluate, and then select between two ideas. One idea was high in novelty and the other was low in novelty.

Participants came from various subject backgrounds: 18% arts/humanities, 16% business studies, 18% sciences, 23% social sciences, and the remaining 25% from other disciplines. Participants were also diverse in terms of ethnic backgrounds: 54% Asian, 32% Caucasian, 3% African and 11% mixed race or other.

Procedure

The task was adapted from a creative idea recognition task used in prior

¹⁹ We also explored the effects of role diversity, which occurs when group members take on different roles and have unique ways of thinking about an issue (Harrison & Klein, 2007). These two types of diversity are often grouped together as similar manifestations of deep-level diversity. We want to explore whether, as for preference diversity, role diversity creates uncertainty in a group, making groups less likely to prefer novel ideas. Therefore, we manipulated both preference diversity and role diversity. To manipulate *role diversity*, we developed three different roles and associated evaluation criteria that we asked participants to read and use to guide their group discussions. The roles asked group members to take on either the role of an innovation consultant, focused on the benefits to customers an idea could produce; a financial consultant, focused on the profitability of the ideas; or a project management consultant, focused on the feasibility of the ideas (see Appendix 4.B for the role diversity manipulations).

research (Mueller et al., 2011) and designed to assess individual bias against creative ideas. To extend the task to the team context, participants were asked to take on the role of a team evaluating ideas submitted by entrepreneurs to an innovation accelerator. First, participants were given information sheets about their roles and two ideas. They individually studied the role instructions and information about two ideas for running shoes that were submitted to the accelerator. They took notes of their individual information and roles. After that, they had to hand in their information sheets. Then, participants were informed that they would need to evaluate these two ideas as a group and jointly select one idea on behalf of the accelerator. Participants were asked to answer some questions about the role materials and instructions individually before engaging in a group discussion. Group discussion about the two ideas was about 15 minutes for all groups. After the group discussion we asked them to complete a group questionnaire about their joint decision, and individual questionnaires about their preferences and experiences working in the team.

The two ideas for running shoes presented to the participants were *NanoRun* (high novelty) and *GoShoe* (low novelty). The description for NanoRun was adapted from past research by Mueller et al. (2011). We pre-tested both the ideas using a different sample of 251 participants who were recruited using Amazon Mechanical Turk (MTurk; 49% female, $M_{\text{age}} = 33$). Participants in the pre-test rated NanoRun as significantly more novel ($M = 5.25$, $SD = 1.37$) than GoShoe ($M = 3.99$, $SD = 1.54$), $t(250) = 9.33$, $p = .000$, but in terms of usefulness, the two were rated almost equal: NanoRun ($M = 5.33$, $SD = 1.22$); GoShoe ($M = 5.45$, $SD = 1.11$), $t(250) = 1.12$, $p = .264$.

Manipulation

To manipulate *preference diversity*, we developed different packages of information about the two ideas to be distributed between group members; this was modelled on the hidden profile task (Stasser & Titus, 1985). In groups without preference diversity, each of the three group members were given identical full packages of information, that is, they all had the full range of information available to the diverse groups. In groups with preference diversity, each group member only had a subset of information from the package, distributed in such a way that it created different preferences between group members. In order to develop the full package of information and the specific information sets to be distributed to participants, we conducted several pre-tests²⁰.

In the pre-test, we needed to make sure that each particular subset of information would prime the individual to have a particular preference. For example, when we provided positive information about NanoRun and negative information about GoShoe, we wanted the participants to prefer NanoRun. When we provided neutral information about the two shoes, we wanted the participants to have a more balanced preference. The results support this. When participants received the subset of information that contained positive information about NanoRun and negative information about GoShoe, 73.1% selected NanoRun. When participants received the subset of information that contained negative information about NanoRun and positive information about GoShoe, only 13.8% selected NanoRun. When participants received neutral information, 38.5% selected NanoRun. In addition, of the participants who received all the information about the two shoes, 46.2% selected

²⁰ We recruited 251 participants from Amazon Mechanical Turk (MTurk; 49% female, $M_{\text{age}} = 33$) to participate in this pre-test.

NanoRun. Based the results of the pre-tests, we adjusted the information about NanoRun to make it more positive so that participants in the neutral and full information conditions would have a more balanced preference (see Appendix 4. A for our final preference diversity manipulations).

Measures

Preference for novelty. We measured preference for novelty in two ways. First, we collected a measure of group choice. We asked groups to work together to choose one of the two ideas, either GoShoe (low novelty) or NanoRun (high novelty), to add to the accelerator program for further development following their group discussion.

Second, we calculated a novelty avoidance score by using the novelty score of the group choice and subtracting the highest novelty score of the two ideas. Then, we took the absolute number as the indicator of novelty avoidance. For example, if the group chose the more novel idea, then the novelty avoidance score would be 0. If the group gave NanoRun a score of 5 on a 7-point Likert scale of novelty, but gave GoShoe 3 and chose GoShoe to add to the accelerator program, then their novelty avoidance was 2 (3 - 5, and then take the absolute number).

Uncertainty perceptions. We measured uncertainty by assessing how uncertain a group felt about the high novelty idea, NanoRun, with three items, measured on a 1-7 scale: “How confident does your team feel about NanoRun?” (reverse scored); “How uncertain does your team feel about NanoRun?”; and, “How feasible does your team think NanoRun is?” (reverse scored). The group answered these questions together. The three items had a Cronbach’s alpha of 0.70. We therefore averaged them together into a measure of uncertainty about the novel idea.

Control variables. We controlled for two team process variables that could

influence the teams' choice of novel ideas – task conflict and psychological safety. Task conflicts are defined as task-related disputes (Bendersky & Hays, 2012) and are particularly difficult to reconcile for highly novel ideas. It is easy to ascertain the pros, cons, and potential success of familiar ideas, thus group members will easily reach agreements about less novel ideas. However, task conflicts may force members to choose a less novel idea so that task conflicts will be reconciled: the pressure to reach agreement may sway group members to move away from highly novel ideas. Therefore, we control for task conflicts to exclude this alternative explanation. Psychological safety enhances information sharing and allows people to talk about different opinions freely. Psychological safety is a common belief that the team is safe for interpersonal risk taking (Edmondson, 1999). These newly-formed student teams may have variances in their psychological safety. We argue that if team members feel it is unsafe to share information, they may withhold their different information or perspectives and so the discussion will not highlight the uncertainty of the novel ideas. Therefore, it is necessary to control for psychological safety.

Task Conflict. We asked participants to relate their individual experiences in the group discussion. In the individual questionnaire, we measured task conflict using an existing scale (Bendersky & Hays, 2012). The three items were “My team members experienced conflict of ideas”, “My team members frequently had disagreements about the task we were working on” and “My team members frequently had disagreements about the task we were doing”. The three items had a Cronbach's alpha of 0.83. We therefore averaged them together into a measure of task conflict. Team members agreed on their evaluation of group task conflict. The mean of $rw_{G(j)}$ is 0.70. The median of $rw_{G(j)}$ is 0.79. Therefore, we aggregated individual responses to a group level variable: group task conflicts.

Psychological Safety. We measured psychological safety in the individual questionnaire with seven items, measured on a 1-7 scale. The scale is a commonly used one, developed by Edmondson (1999). Example items were: “If you make a mistake on this team, it is often held against you” (reverse coded), and “It is safe to take a risk on this team”. The seven items had a Cronbach’s alpha of 0.71. We therefore averaged them together into a measure of psychological safety. Team members agreed on their evaluation of group psychological safety. The mean of $r_{WG(j)}$ is 0.84. The median of $r_{WG(j)}$ is 0.92. Therefore, we aggregated individual responses to a group level variable: group psychological safety.

Results

Descriptive statistics are provided in Table 4.1.

Table 4.1 Means, Standard Deviations, and Correlations

	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Preference Diversity	0.53	0.50					
2. Role Diversity	0.48	.893	.002				
3. Novelty Avoidance	0.97	1.86	.32*	-.001			
4. Uncertainty	3.32	1.00	.26*	-.01	.55**		
5. Task Conflict	3.35	1.23	.24 ⁺	.17	-.19	.35**	
6. Psychological Safety	5.46	0.63	.18	.07	.03	-.01	-.42**

Note: ⁺ $p < .10$ * $p < .05$ ** $p < .001$

Manipulation Check

Preference diversity. We created several items to check the effectiveness of the manipulations. For the preference diversity, we asked participants to answer the two statements as a group on a 7-point Likert scale. The statements were “Our team had diverse information distributed between team members” and “Different members of our team were in possession of different pieces of information about the ideas we were evaluating” ($\alpha_{\text{preference diversity}} = .818$). Therefore, we aggregated the two

items as a manipulation check variable: perceived group preference diversity.

In order to check whether individuals in groups with diverse preference held diverse preferences toward NanoRun and GoShoe, we asked participants to write down their preferences before they discussed them with their group members. We calculated the standard deviations of individuals' preferences within a group to check the preference diversity in a group.

Planned contrasts found that the perceived groups' preference diversity was higher in the preference diversity conditions ($M = 6.48$, $SD = 1.90$) than in the preference homogeneity conditions ($M = 3.27$, $SD = 0.70$), $F(1,60) = 81.84$, $p = .000$, $\eta_p^2 = .58$. In addition, the standardized deviations of individuals' preferences toward NanoRun were higher in the preference diversity conditions ($M = 1.39$, $SD = .64$) than in the preference homogeneity conditions ($M = .95$, $SD = .54$), $F(1,57) = 8.23$, $p = .006$, $\eta_p^2 = .13$. The result also held for individuals' preferences toward GoShoe. The standardized deviations of individuals' preferences toward GoShoe were higher in the preference diversity conditions ($M = 1.45$, $SD = .62$) than in the preference homogeneity conditions ($M = 1.06$, $SD = .64$), $F(1,57) = 5.79$, $p = .019$, $\eta_p^2 = .09$. Thus, the manipulations were effective.

Hypothesis Testing

The results of our hypothesis tests are summarized in Table 4.2 and Table 4.3.

Table 4.2 Effects of Preference diversity on Preference for Novel Ideas, Uncertainty, and Group Process

	High Preference Diversity <i>M (SD)</i>	Low Preference Diversity <i>M (SD)</i>	<i>P</i> value
% Choose NanoRun	60.6%	86.2%	0.03
Novelty Avoidance	1.52 (2.16)	0.35 (1.17)	0.01
Uncertainty	3.56 (1.12)	3.05 (0.79)	0.04
Task Conflict	3.63 (1.19)	3.05 (1.23)	0.06
Psychological Safety	5.57 (0.54)	5.34 (0.72)	0.16

Table 4.3 Percentage of Groups Choosing NanoRun (high novelty option) by Condition

Low Preference Diversity	High Preference Diversity
86.20%	60.85%

Preference Diversity

To test Hypothesis 1, that groups with preference diversity would experience greater uncertainty, we conducted an ANOVA to model uncertainty as a function of the preference diversity condition. Groups that were high in preference diversity reported greater uncertainty about the novel idea NanoRun ($M = 3.57$, $SD = 1.12$) than groups without preference diversity ($M = 3.05$, $SD = 0.79$), $F(1,60) = 4.31$, $p = .042$, $\eta_p^2 = .067$. The results supported Hypothesis 1.

To test Hypothesis 2, that preference diversity would lead to a lower preference for novel ideas, we performed two tests. First, a chi-square test was conducted to assess whether groups high in preference diversity were less likely to

choose the more novel idea (NanoRun). The results were found to be significant, $\chi^2(1, n=62) = 5.083, p = .024$. The percentage of selection NanoRun was lower in groups with diverse preference (60.6%) than in groups without diverse preference (86.2%). Second, an ANOVA was conducted to assess whether groups high in preference diversity were more likely to avoid novelty. Planned contrasts found that novelty avoidance was higher in the preference diverse conditions ($M = 1.51, SD = 2.16$) than in the preference homogeneity conditions ($M = .34, SD = 1.17$), $F(1,60) = 21.14, p = .012, \eta_p^2 = .10$. Hypothesis 2 was supported.

Hypothesis 3 proposed that uncertainty would mediate the relationship between preference diversity and preference for novel ideas. We used PROCESS to test the mediation model (Hayes, 2012). When NanoRun was chosen as the dependent variable, results indicated that preference diversity was a significant predictor of uncertainty, $b = -.44, SE = .13, p = .00$, and that uncertainty was a significant predictor of choosing NanoRun, $b = -1.91, SE = .76, p = .01$. The indirect effect was tested using a bootstrap estimation approach with 5000 samples (Shrout & Bolger, 2002). These results indicated the indirect coefficient was not significant ($b = .43, SE = .35, 95\% CI = -.03, 1.24$).

The same results held for novelty avoidance, which is another way to measure people's preference for novelty. In sum, even though we did not find any significant indirect effect, the results generally supported our predictions about the effects of preference diversity on uncertainty and group preference for novel ideas.

Additional Analysis

We also explored whether role diversity would have similar effects on novelty preference as preference diversity had. First, we conducted a chi-square test

to assess whether groups with role diversity were less likely to choose the more novel idea (NanoRun). The results were found to be not significant, $\chi^2(1, n=62) = .485, p = .575$. Surprisingly, however, the direction of the results was opposite to our prediction – groups with role diversity were more likely to choose novel ideas (76.7%) than groups low in preference diversity (68.8%). Next, we conducted an ANOVA to assess whether groups high in role diversity were more likely to avoid novelty. There was no significant difference in novelty avoidance between role diversity conditions ($M = .97, SD = 1.90$) and role homogeneity conditions ($M = .97, SD = 1.84$), $F(1,60) = .00, p = .99, \eta_p^2 = .00$.

Next, in order to test whether role diversity would lead to greater uncertainty about novel ideas, we conducted an ANOVA between role diversity conditions for uncertainty. There was no significant difference between conditions. As for preference for novel ideas, the results were directionally the opposite of our predictions, with groups high in role diversity experiencing less uncertainty ($M = 3.31, SD = 1.03$) than groups without role diversity ($M = 3.33, SD = 1.00$), $F(1,60) = .007, p = .93, \eta_p^2 = .00$.

Since the results did not support our predictions about role diversity, we also did not find a significant effect for preference and role diversity together ($p = 0.455$). Having role diversity appeared to somewhat mitigate the effects of preference diversity, as more groups chose NanoRun when they had both preference and role diversity (68.8%). In addition, we tested a moderated mediation model using PROCESS (Hayes, 2012). When role diversity is low, preference diversity had a significant effect on preference for novel ideas ($b = -2.16, SE = .97, p = .03, 95\% CI = -4.07, -.25$). However, when role diversity is high, this effect disappeared ($b = -1.59, SE = 1.04, p = .13, 95\% CI = -3.65, .46$). No matter whether role diversity was

high or low, the mediation effects of uncertainty did not receive support ($b = .22$, $SE = .44$, 95% CI = $-.23, 1.68$). There is no moderated mediation effect.

Discussion

Our study found that group preference diversity, surprisingly, leads to a preference for less novel ideas. In theory, preference diversity should improve a group's idea evaluation efforts by preventing groups from reaching a premature consensus and encouraging thorough and unbiased discussions (Gruenfeld, 1995; Nijstad & Kaps, 2008). However, we suggested, and found, that preference diversity also increases uncertainty about novel ideas, causing groups to have a lower preference for them and be less likely to support them for further implementation. The uncertainty inherent in novel ideas can be more salient and problematic for groups which hold diverse preferences, leading to a preference for less novel ideas (Mueller et al., 2012).

The results suggest that role diversity does not make groups less likely to select novel ideas. We suggest an alternative reason may be that, because the perspectives given to participants in our study were not irreconcilable and groups selected between two ideas, all members of the group could satisfy their evaluation criteria by choosing a particular idea (or indeed, either idea). As a result, group discussion did not create uncertainty, and may have even created certainty when group members developed consensus around an idea. We argue that groups with overlapping or reconcilable perspectives may have created a stronger preference for novel ideas than groups with conflicting perspectives. In the preference diversity condition, we manipulated distributed conflicting information (i.e., one member with all-positive, one with all-negative, and one with all-neutral information) among group members. In the homogeneous condition, we provided participants with the

complete package of information. Even though the groups had the same amount of information in both conditions, each individual's information was different. Individuals in the diversity condition had two pieces of information, however individuals in the homogeneous condition had six pieces. It is possible that more information created enough certainty to make individuals in the homogeneous condition confident about novel ideas, and thus, during the group discussion, they were more likely to reach consensus around the novel idea. Therefore, in the following study, we will compare groups with conflicting preferences with those with reconcilable preferences. Meanwhile, the amount of information each individual has will remain constant.

We will explore the moderating role of idea concreteness in the next study (Hypothesis 4). One way to mitigate uncertainty perceptions is to provide concrete information about *how* to make the product work rather than provide information about *why* the product should be made. When individuals read more concrete ideas, they are less likely to rely on their group members' opinions to form their own judgments.

Study 2

Study 2 was designed to test how diverse preferences in groups and the concreteness of creative ideas influence individuals' uncertainty perceptions and their preference for novel ideas. Participants were asked to read a pre-prepared 'chat page', supposedly giving the opinions of their team members. Preference diversity was manipulated directly by showing text from a group chat that indicated diverse preferences. In the homogeneous condition, the dialogue indicated homogeneous preferences among three group members. We also added a control condition of no preference from fellow team members. Participants were then asked to rate their

uncertainty perceptions about each idea and give recommendations about investing in them.

Method

A total of 397 participants (53.4% female; $M_{\text{age}} = 34.89$, $SD_{\text{age}} = 13.08$) were recruited from Prolific and paid £1 for a 10-minute survey.²¹ Participants were randomly assigned into one of two conditions, reading either the concrete or the abstract version of the same set of ideas. In each condition, they were asked to evaluate five fitness product ideas: a) child-safe treadmill; b) exercise office chair; c) multifunctional exercise unit; d) bedroom treadmill; e) pull-up bar. For each idea, participants read a pre-prepared team ‘chat page’ with team members’ preferences about each idea. There were five alternative texts on the group’s chat page: all-positive preferences, all-negative preferences, all-neutral preferences, diverse preferences, and no preference. This study was a 2 (between subject: abstract/concrete) x 5 (within-subject: all-positive/all-negative/diverse/all-neutral/no preference) mixed design. We also rotated the order of ideas and the configuration of preference to exclude alternative explanations. The counterbalanced design is shown in Table 4.4.²²

²¹ We tried to use different platforms (e.g., Mturk, Prolific) and participants (US and UK population) to make sure the results are robust.

²² This study was pre-registered on <https://osf.io/v28hw>.

Table 4.4 The Counterbalanced Design for the 5 Within-Subject Conditions in Study 2

Ideas	Condition 1	Condition 2	Condition 3	Condition 4	Condition 5
A	All-positive	All-negative	Diverse	All-neutral	No preference
B	All-negative	Diverse	All-neutral	No preference	All-positive
C	Diverse	All-neutral	No preference	All-positive	All-negative
D	All-neutral	No preference	All-positive	All-negative	Diverse
E	No preference	All-positive	All-negative	Diverse	All-neutral

Procedure

Participants were told that they were independent reviewers recruited to help an innovation accelerator to evaluate some fitness product ideas. They first read the descriptions of the five fitness product ideas and answered some questions about them. These ideas were presented in either an abstract or a concrete way. After that, participants were informed that the rest of their team had previously been on the chat page and discussed the five ideas. They read their teammates' 'chat' about the first idea and answered some questions about the manipulation before answering questions about their feelings of uncertainty toward the idea. This procedure was then repeated for the other four ideas. Finally, they ranked the five ideas and indicated the extent to which they would recommend the innovation accelerator to invest in each.

The five ideas presented to the participants were selected from a fitness product ideas pool, in which fitness product experts and customers had been asked to rate 300 ideas in terms of novelty and usefulness (Berg, 2019). First, 16 ideas which varied in their novelty scores but had the same usefulness level were selected from the pool. We then adapted the content of these 16 ideas to create *abstract* and *concrete* descriptions of roughly the same length. In a pre-test, 82 participants were recruited from Mturk (36.6% female, $M_{\text{age}} = 39.13$, $SD_{\text{age}} = 11.18$) to read either the concrete or abstract version of the 16 ideas, and then rate their concreteness, abstract

level, novelty, usefulness, creativity, development stage and information amount.²³

We selected five ideas that met the following criteria. First, concrete descriptions that were rated more concrete and less abstract than the abstract descriptions.

Second, the correlations of novelty and usefulness ratings between participants and experts were high. Third, the novelty scores were significantly different among the five ideas. Finally, the usefulness scores were not significantly different from each other. The novelty and usefulness ratings from customers and experts are shown in Table 4.5 and the concrete and abstract descriptions of the five ideas in Appendix 4.

C.

Table 4.5 The Novelty, Usefulness, Creativity Scores of Five Ideas Rated by Experts and Customers

Ideas	Novelty Rating	Usefulness Rating	Creativity Rating
A: Child-Safe Treadmill	4.73	3.95	4.98
B: Exercise Office Chair	4.25	3.95	4.07
C: Multifunctional Exercise Unit	3.88	3.95	4.08
D: Bedroom Treadmill	3.85	3.95	3.85
E: Pull-up Bar	2.80	3.95	2.93

Manipulation

The study included two manipulations. To manipulate the concreteness of ideas, we provided either concrete or abstract descriptions of each idea. To manipulate a group's preference diversity, we provided participants with text from a group 'chat' that indicated diverse preferences: specifically, Member A had positive

²³ This helped us exclude the alternative explanations that abstract ideas represent the early stage of a development and concrete ideas the later stage or that the concrete versions provided more information to the customers than the abstract descriptions. We found there were no differences between the two conditions in these dimensions.

preference, Member B had negative preference, and Member C had neutral preference about the idea. This manipulation is the same as in Study 1, in which preference diversity was manipulated as distributed conflicting preferences in groups. Participants read:

Member A: I'm going to say that I think this idea is good. Because a group of expert trainers thought this idea was very promising.

Member B: I strongly disagree. Because a group of potential customers were totally unimpressed by this idea.

Member C: I am on the fence. A group of retailers of fitness products gave this idea a neutral rating.

To manipulate the homogeneous conditions, we provided participants with text from a group 'chat' that indicated homogeneous preferences but also varied its valence: specifically, members A, B, and C all had either positive, negative, or neutral preferences about the same idea. For example, in the all-positive condition, participants read:

Member A: I'm going to put my foot down and say that I think this idea is good. Because a group of expert trainers thought this idea was very promising.

Member B: Yeah, a group of potential customers thought this idea was very promising.

Member C: Likewise, I know that a group of retailers of fitness products thought this idea was very promising.

To exclude alternative explanations, such as the amount of information influencing participants' uncertainty perceptions, we also created a 'no preference' condition in which participants were told that team members had not yet discussed this idea (see Appendix 4. D for all manipulations).

Measures

Preference for novelty. We measured preference for novelty in two ways. First, we asked participants to rank the five ideas based on the extent to which the accelerator should include each and invest in its further development. Second, participants were required to rate the degree to which they would recommend each idea for investment (7-point Likert scale, ranging from 1: extremely low to 7: extremely high). We manipulated the novelty of ideas, therefore preference for novelty is the extent to which they ranked more novel ideas at the top and the extent to which they recommended more novel ideas for investment by the accelerator program.

Uncertainty perceptions. We measured participants' uncertainty perceptions regarding the ideas on a 7-point Likert scale (Colquitt et al., 2012). The items were "I feel a lot of uncertainty about this idea's success", "I cannot predict how successful this idea will be in the future", and "I am not sure if customers will like this idea". The three items had a Cronbach's alpha of 0.73. We therefore averaged them together into a measure of uncertainty perceptions. As a substitute, we also measured perceived ambivalence (Oreg & Sverdlik, 2011). The three items were "I have both good and bad thoughts about this idea", "I find it difficult to decide whether this idea is bad or good", and "In general, I am very ambivalent about evaluating this idea". These three items had a Cronbach's alpha of 0.81. We therefore averaged them together into a measure of perceived ambivalence.

Control variables. We controlled for participants' age, gender, ambiguity tolerance and familiarity with fitness products. The 5-item measurement of ambiguity tolerance was adapted from McLain's scale (1993). The sample item was "I dislike ambiguous situations". The three items had a Cronbach's alpha of 0.88.

Analysis

This data contained a hierarchical structure in which responses regarding uncertainty perceptions of five ideas were nested within individuals. Therefore, we used multilevel modelling (the “lmer” package in R) to test Hypotheses 1-3. We referred to the lower level as the idea level and the higher level as the individual level. Because the independent variables were multi-categorical, we used the PROCESS macro to use the bootstrap method to test the moderated mediation hypothesis (Hayes, 2003)²⁴.

Results

Descriptive statistics are provided in Table 4.6.

Manipulation Check

Concrete vs. Abstract Condition. We created one item to check the effectiveness of this manipulation. We asked participants to answer one statement about the concreteness of ideas on a 7-point Likert scale. The statement was “Please rate the degree to which the idea provides details about how the product functions”. Planned contrast found that perceived concreteness of the five ideas was higher in the concrete conditions (Idea A: $M = 3.27$, $SD = 0.70$) than in the abstract (Idea A: $M = 3.27$, $SD = 0.70$), $F(1,60) = 81.84$, $p = .000$, $\eta_p^2 = .58$. The results are shown in Table 4.7. The manipulations were successful.

²⁴ The actual model used is a “moderated moderated mediation model”. We argue that the effects of a moderated mediation model will be stronger when ideas are more novel. Since we have five ideas which vary in their novelty, we added the expert-rated novelty scores as a further moderator. However, as this is not the focus of this paper, we did not formally hypothesize it.

Table 4.6 Means, Standard Deviations, and Correlations

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	34.89	13.06												
2. Gender	0.55	0.50	-.01											
3. Tolerance of Ambiguity	3.91	1.31	.12**	-.08**										
4. Familiarity with Fitness Products	4.81	1.47	.09**	-.07**	.02									
5. Novelty	3.90	0.64	.00	.00	-.00	-.00								
6. All-positive Condition	0.20	0.40	.00	-.00	.00	-.00	.00							
7. All-neutral Condition	0.20	0.40	.00	-.00	.00	-.00	.00	-.25**						
8. All-negative Condition	0.20	0.40	.00	-.00	.00	-.00	.01	-.25**	-.25**					
9. Diverse Condition	0.20	0.40	-.00	.00	.00	-.00	-.01	-.25**	-.25**	-.25**				
10. Perceived Uncertainty	4.47	1.49	-.03	.00	-.09**	-.04*	.21**	-.30**	.10**	.03	.14**			
11. Perceived Ambiguity	4.16	1.50	-.11**	.03	-.11**	-.03	-.00	-.13**	.10**	-.10**	.12**	.46**		
12. Investment Support	4.11	1.75	-.03	-.02	-.05*	.04*	-.02	.15**	-.04*	-.15**	.02	-.23**	-.02	
13. Rank	3.00	1.41	.00	.00	.00	.00	.06*	-.16**	.04	.17**	-.02	.18**	.04*	-.54**

Note. *M* and *SD* are used to represent mean and standard deviation, respectively.

* indicates $p < .05$. ** indicates $p < .01$

Table 4.7 Manipulation Check Results for Each Idea in Study 2

Conditions	Concrete	Abstract		
Ideas	<i>M (SD)</i>	<i>M (SD)</i>	F value	Eta Square
A: Child-Safe Treadmill	4.70 (1.46)	2.52 (1.82)	171.49***	.30
B: Exercise Office Chair	4.47 (1.49)	2.59 (1.89)	119.79***	.23
C: Multifunctional Exercise Unit	4.42 (1.56)	2.76 (1.77)	97.61***	.20
D: Bedroom Treadmill	4.48 (1.25)	2.94 (1.79)	145.36***	.27
E: Pull-up Bar	5.42 (1.16)	3.39 (1.88)	165.48***	.30

Note: *M* and *SD* are used to represent mean and standard deviation, respectively
 *** indicates $p < .001$

Preference diversity. We created two items to check the effectiveness of this manipulation. We asked participants to answer two statements using a 7-point Likert scale: “My teammates’ discussion indicates different opinions about whether to select this idea to add to the program” and “My teammates’ discussion goes against each other in their opinions about selecting this idea to add to the program”. The two items had a Cronbach’s alpha of 0.94. We therefore averaged them together into a measure. We conducted a repeated measure ANOVA and found that perceived preference diversity ($M = 6.15$, $SD = 0.05$) was higher in diverse conditions than all-positive conditions ($M = 1.96$, $SD = 0.07$), all-negative conditions ($M = 1.95$, $SD = 0.07$), all-neutral conditions ($M = 1.97$, $SD = 0.07$), and no preference conditions ($M = 3.38$, $SD = 0.07$), $F(1,396) = 1475.40$, $p < .001$, $\eta_p^2 = .78$). The manipulations were effective.

Hypothesis Testing

The results of our hypothesis tests are summarized in Tables 4.8 and 4.9.

Table 4.8 Results of Multilevel Models in Study 2: Predicting Perceived Uncertainty

	Perceived Uncertainty	Perceived Ambiguity
Intercept	5.26(0.25)***	5.01(0.27)***
Age	-.01(0.01)	-.01(0.01)**
Gender	-.02(0.07)	.05(0.08)
Tolerance of Ambiguity	-.09(0.03)**	-.12(0.03)***
Familiarity with Fitness Products	-.04(0.02)	-.02(0.03)
Condition_allpositive	-1.02(0.13)***	-.47(0.13)***
Condition_allnegative	.04 (0.13)	-.29(0.13)*
Condition_allneutral	.20(0.13)	.40(0.13)**
Condition_diversity	.36(0.13)**	.40(0.13)**
Concreteness	-.02(0.15)	.03(0.15)
Condition_allpositive * Concreteness	.11(0.19)_	.12(0.19)
Condition_allnegative * Concreteness	-.10(0.19)	-.01(0.19)
Condition_allneutral* Concreteness	.01(0.19)	-.02(0.19)
Condition_diversity* Concreteness	-.06(0.19)	-.15(0.19)
-2 Log Likelihood	-3519.2	-3584.9
AIC	7068.4	7199.7

Notes. Models are testing Hypotheses 1 and 4. These models treats “No Preference” as the baseline condition. N= 1985 at level 1; N= 397 at level 2. These models illustrate the results of the fixed models, which indicates all the paths do not vary by Level 2 unit.

+ $p < .10$, * $p < .05$; ** $p < .01$; *** $p < .001$

Hypothesis 1 proposed that preference diversity would cause groups to experience greater uncertainty. We did not directly test this hypothesis at the group level, instead arguing that experiencing group preference diversity would cause individuals in these groups to experience greater uncertainty. As shown in Table 4.8, participants in preference diversity conditions had greater uncertainty ($b = .36$, $SE = 0.13$, $p = .005$). Similarly, participants who read the preference diversity manipulations also experienced greater ambiguity ($b = .40$, $SE = 0.13$, $p = .002$). Interestingly, the presence of all-positive preference in group discussions caused

participants to experience less uncertainty ($b = .36, SE = 0.13, p = .005$) and less ambiguity ($b = -.47, SE = 0.13, p < .001$). All-negative preference reduced participants' ambiguity ($b = -.29, SE = 0.13, p = .02$), but all-neutral preference increased it ($b = .40, SE = 0.13, p = .002$).

Hypothesis 2 suggested that informal diversity would make groups more averse to novelty: in this model, participants in diverse conditions should rank the more novel ideas more negatively. As shown in Model 2 in Table 4.9, the computed term Condition_diversity x Novelty did not have a significant impact on ranking ($b = -.04, SE = 0.22, p = 0.82$) and, as shown in Model 4 in Table 4.9, the computed term Condition_diversity x Novelty did not have a significant impact on investment support ($b = .01, SE = 0.26, p = 0.94$). Hypothesis 2 was not supported. However, participants who experienced greater uncertainty were less likely to rank creative ideas highly ($b = .14, SE = 0.12, p < .001$) or recommend ideas for further investment ($b = -.28, SE = 0.03, p < .001$).

Hypothesis 3 proposed that uncertainty perceptions would mediate the relationship between preference diversity and preference for novelty. A formal test of the indirect effect revealed a significant indirect effect of preference diversity on ranking through uncertainty perceptions (Indirect Effect = 0.03, $SE = 0.01$, 95 % Bootstrap CI = .01 to .06). After controlling for age, gender, tolerance of ambiguity, and familiarity with fitness products, we found that preference diversity conditions caused participants to experience greater uncertainty, and thus, be less likely to rank creative ideas at the top of the list for further development. Similarly, a formal test of the indirect effect showed a significant indirect effect of preference diversity on investment support through uncertainty perceptions (Indirect Effect = -0.05, $SE = 0.02$, 95 % Bootstrap CI = -.08 to -.02). Therefore, Hypothesis 3 was supported.

Table 4.9 Results of Multilevel Models in Study 2: Predicting Preference for Novelty

Variable	Uncertainty Perceptions		Ranking		Investment Support	
	Model 1	Model 2	Model 3	Model 4	Model 5	
Intercept	3.12(0.62)***	3.16(0.63)***	3.16(0.63)***	3.81(0.78)***	4.68(0.77)***	
Age	-.002(0.003)	.0002(.002)	.0002(.002)	-.004(0.003)	-.004(0.003)	
Gender	-.02(0.07)	-.003(0.05)	-.003(0.05)	-.03(0.08)	-.03(0.08)	
Tolerance of Ambiguity	-.09(0.03)**	.002(0.02)	.002(0.02)	-.07(0.03)*	-.09(0.03)**	
Familiarity with Fitness Products	-.04(0.03)	.001(0.02)	.001(0.02)	.06(0.03)	.04(0.03)	
Condition_allpositive	-.02(0.81)	.09(0.84)	.09(0.84)	1.03(1.04)	1.0(1.02)	
Condition_allnegative	-.04(0.81)	.40(0.84)	.39(0.84)	.60(1.04)	.58(1.02)	
Condition_allneutral	-.23(0.81)	-.83(0.84)	-.83(0.84)	.04(1.04)	.37(1.02)	
Condition_diversity	.56(0.81)	.27(0.84)	.27(0.84)	-.24(1.04)	-.11(1.02)	
Concreteness	-1.02(0.83)	-1.93(0.86)*	-1.93(0.86)*	1.96(1.06)	1.66(1.03)	
Novelty	.55(0.14)***	-.07(0.15)	-.07(0.15)	.16(0.19)	.31(.18)	
Condition_allpositive * Concreteness	.67(1.18)	-.06(1.21)	-.11(1.21)	-.83(1.51)	-.65(1.48)	
Condition_allnegative * Concreteness	-.22(1.18)	.68(1.21)	.68(1.21)	-2.98(1.51)	-3.05(1.48)*	
Condition_allneutral* Concreteness	.37(1.18)	2.27(1.21)	2.14(1.21)	-.86(1.51)	-.70(1.48)	
Condition_diversity* Concreteness	1.28(1.18)	.07(1.21)	-.26(1.21)	-1.14(1.51)	-.58(1.48)	
Condition_allpositive * Novelty	-.20(0.21)	-.11(0.21)	-.10(0.21)	-.15(0.26)	-.21(0.26)	
Condition_allnegative * Novelty	.02(0.21)	.05(0.21)	.04(0.21)	-.33(0.26)	-.32(0.26)	
Condition_allneutral* Novelty	-.27(0.21)	.29(0.21)	.32(0.21)	-.11(0.26)	-.18(0.26)	
Condition_diversity* Novelty	-.05(0.21)	-.04(0.22)	-.05(0.21)	.02(0.26)	.01(0.26)	
Concreteness * Novelty	.26(0.21)	.53(0.22)	.48(0.22)	-.52(0.27)*	-.44(0.26)	
Condition_allpositive * Concreteness * Novelty	-.15(0.30)	.001(.31)	.03(.31)	.21(0.38)	.17(0.37)	
Condition_allnegative * Concreteness* Novelty	.03(0.30)	-.21(.31)	-.20(.31)	.79(0.38)*	.80(0.37)*	
Condition_allneutral* Concreteness * Novelty	-.01(0.30)	-.64(.31)*	-.61(.31)*	.28(0.38)	.24(0.37)	
Condition_diversity* Concreteness*Novelty	-.51(0.30)+	-.07(.31)	.02(.31)	.35(0.38)	.21(0.37)	
Uncertainty Perceptions			.14(0.02)***		-.28(0.03)***	
-2 Log Likelihood	-3468.9	-3485.7	-3465.7	-3906.3	-3862.6	
AIC	6987.9	7001.4	6983.5	7862.6	7777.2	

Notes. Models are testing Hypotheses 1, 2, 3, and 4. This model treats No Preference as the baseline condition. N= 1985 at level 1; N= 397 at level 2. These models illustrate the results of the fixed models, which indicates all the paths do not vary by Level 2 unit. + $p < .10$, * $p < .05$; ** $p < .01$; *** $p < .001$

Hypothesis 4 argued that when ideas are concrete, the indirect effect of preference diversity and preference for novelty through uncertainty perceptions would be stronger. As shown in Model 1 in Table 4.9, the computed term “Condition_diversity*Concreteness*Novelty” was negatively associated with uncertainty perceptions ($b = -.51$, $SE = 0.30$, $p = .09$). Even though this result was marginal, it suggests that the moderated impact was on the first stage of the mediation model, which was consistent with our predictions. For ranking ideas, a formal moderated mediation effect test indicated a significant moderated mediation model on ranking (Index = 0.16, $SE = 0.08$, 95 % CI = .01 to .32). It suggests that when ideas are concrete, preference diversity would cause participants to rank more novel ideas higher because it reduces their uncertainty. In contrast, when ideas are abstract, informal diversity would make participants rank more novel ideas lower, because it increases their uncertainty. A formal moderated mediation effect test showed a significant moderated mediation model on investment support (Index = 0.16, $SE = 0.08$, 95 % CI = .01 to .32). It means that, when ideas are presented in a concrete way, preference diversity will make individuals more likely to invest in novel ideas because it reduces the uncertainty. When ideas are presented in an abstract way, preference diversity will make individuals less likely to invest in novel ideas because it increases the uncertainty. Therefore, Hypothesis 4 was supported.

Discussion

In Study 2, we found that knowing that other group members have diverse preference about an idea made individuals feel greater uncertainty about this idea: the more uncertain their perception, the less likely they are to prefer more novel ideas. Providing more concrete descriptions about novel ideas could mitigate the uncertainty

induced by preference diversity.

We explored different preference combinations. Compared with other reconcilable preference conditions, diverse preferences consistently created uncertainty. In all-positive preferences groups, individuals were less uncertain about ideas. All-negative and neutral preferences did not increase uncertainty from the baseline conditions (i.e., no preference conditions). We also measured perceived ambiguity in these conditions and found that perceived uncertainty is distinct from perceived ambiguity. Both all-positive and all-negative preferences made participants feel less ambiguous about the quality of ideas, but all-neutral preferences made people feel more ambiguity. Perceived ambiguity did not predict people's preference for novelty. In future studies, we will use all-positive preferences to manipulate homogeneous conditions.

Chapter Discussion

Group preference diversity, surprisingly, leads groups and individuals to prefer less novel ideas. In theory, preference diversity should improve a group's idea evaluation efforts by preventing them from reaching a premature consensus and encouraging groups to fully discuss ideas; yet, we suggested, and found, that preference diversity also increases uncertainty about novel ideas, causing groups to have a lower preference for and be less likely to select and resource them to implement. The uncertainty inherent in novel ideas can also be problematic for individuals and groups, leading to a preference for lower novelty ideas (Mueller et al., 2012). Moreover, we draw from social comparison theory (Festinger, 1954) and argue that providing evaluators with concrete details of how to make the ideas work is an effective approach to mitigate the influence of preference diversity.

Theoretical Implications

Our study contributes to an emerging interest in the processes of creative idea recognition (Berg, 2016; Criscuolo et al., 2017; Harvey & Kou, 2013; Mueller et al., 2018; Mueller et al., 2012) and the receiving side of creativity (Zhou et al., 2019). It extends the work on individual bias against novelty to show that groups are also subject to this. Previous research has often focused on individual evaluators (i.e., idea generators, managers, or gatekeepers) (Mueller et al., 2018; Mueller et al., 2012), yet groups are often tasked with making selection decisions for novel ideas (Harvey & Mueller, 2021). There is not enough research on group evaluations and their group micro-foundations for selecting and funding creative ideas (Criscuolo et al., 2017) and only limited prior evidence on group bias against novelty.

Our study highlights that a broader set of contextual factors can shape uncertainty about ideas. This adds a new perspective – how group context (e.g., preference diversity) and interactions (e.g., disagreements) shape uncertainty about novel ideas. Individuals mainly suffer from the uncertainty inherent in novel ideas in making decisions whereas a group's source of uncertainty is broader, and group context can highlight the uncertainty of novel ideas. Meanwhile, when we make ideas more concrete, individuals are less likely to rely on other group members' information or seek social validation and the negative effects of preference diversity would go away. Our research therefore calls for greater attention to the precise environments in which groups operate and the practices that they use to evaluate ideas. We speculate that other aspects of group context may also amplify uncertainty. For instance, uncertainty and preferences for novelty may be affected by whether ideas are considered alone or in sets, the extent to which groups share a common understanding of the group task, the expertise necessary to complete the task, evaluation criteria for selecting ideas, and the

discussion practices through which ideas are assessed.

Finally, our research also contributes to research on diversity and group creativity (Milliken et al., 2003; van Knippenberg & Hoeser, 2017). Preference diversity has been found to facilitate group decision-making because it prevents premature consensus and facilitates elaborative discussions (Janis, 1982; Nemeth & Nemeth-Brown, 2003). However, when it comes to making decisions about novel ideas, preference diversity can also lead to dysfunctional biases and disagreements, highlighting the uncertainty of novel ideas. The present research reveals the negative consequences of preference diversity on decision making, especially when group members have irreconcilable preferences. We speculate that preference diversity may benefit decisions that have clear evaluation criteria and an optimal choice, but is not so good for decisions involving a great deal of uncertainty and where there are no clear evaluation criteria. Moreover, our study reveals a potentially nuanced relationship between preference and role diversity. These two forms of diversity are often grouped together as similar manifestations of deep level diversity, yet we found strong effects for preference diversity on group uncertainty and preferences for novelty, but no significant effects of role diversity. The key difference here is whether group members have reconcilable perspectives. Role diversity without irreconcilable preference may boost group members' confidence about novel ideas. Preference diversity, however, may reduce group members' confidence about novel ideas. Future research could explore how group members perceive the value of these two sources of diversity and disagreements arising from them, to better understand how they may relate to group creativity.

Limitations and Future Research

This study represents an initial step towards understanding which group

contexts amplify uncertainty when groups are evaluating ideas to implement. This study has several limitations, which indicate directions for future research. First, we did not study this mechanism in a setting in which the groups generated their own ideas and then evaluated them: individuals forecast the success of their own ideas less accurately than that of other's (Berg, 2016). People's psychological attachment to their own ideas would also create interesting dynamics in groups. When groups need to evaluate their own ideas, group members still face the challenge of uncertainty in novel ideas. If a novice/inexperienced member generates the novel idea, its uncertainty would be amplified. However, if a star/experienced member comes up with a novel idea, the uncertainty inherent in this idea may be ignored, since people assume their ability will assure the novel idea's success. We did not explore these interesting phenomena here, but encourage future research to study how groups evaluate their own ideas and the role of group context in novel idea preference.

In this study, we also collected some qualitative data to understand why groups chose a particular idea to implement. We asked them to write down the top three reasons for their choices as groups and also recorded the group discussions. Using this information, we could better understand the group dynamics and their actual concerns about these ideas. For example, we could use their group discussion to code their perceived uncertainty. Moreover, our sample size is relatively small. In future papers, we will work on these limitations.

Finally, we did not explore how the consensus pressure influences groups' preferences regarding novelty. Groups tend to agree on a safer decision in order to reach consensus because they usually only have a limited time to work on their tasks: the more novel ideas require more discussion than the less novel ones and so group members sacrifice their own stances so that the group can reach an agreement within a

reasonable time period. Thus, they sacrifice their own opinions not because they are convinced or persuaded by their peers, but because they care about finishing the task and maintaining a harmonious atmosphere in the group. Therefore, consensus pressure may be another factor driving people to settle for a less novel idea. Future research should explore this mechanism.

Conclusion

In conclusion, preference diversity, which has been found to stimulate the generation of new ideas and to be associated with effective decision making for selecting high quality ideas, is also most likely to produce a bias against novel ideas. Group contexts that benefit idea generation might dampen idea evaluation because they promote uncertainty and doubt. Future research should pay more attention to the processes involved in determining which ideas to retain, develop, adopt, resource and implement and the links between idea generation and these processes.

Chapter 5 General Discussion

There are two research streams in this thesis: shared leadership and team creativity. In this chapter I will discuss a few central messages and overarching implications for future research of each stream.

Shared Leadership

Research has found that leadership is often informally shared among multiple team members, also known as shared leadership (Contractor et al., 2012). The traditional leadership models emphasize individual leaders' qualities for leadership success. However, the characteristics and behaviors of leaders represent just the tip of the iceberg of the leadership phenomenon (Wellman, 2013). Shared leadership models conceptualize leadership as a dynamic, interactive, influence process among group members (Carson et al., 2007) and shared leadership research has demonstrated the advantageous effect of shared leadership on team performance over the traditional leadership approach (Hoch et al., 2010). Yet, the shared leadership literature suffers from limitations of its own: for example, a focus on the density of leadership activity in groups, and an emphasis on the consequences of shared leadership.

In this thesis, I have attempted to advance shared leadership theory by integrating shared leadership with classical views of leadership, such as implicit leadership theory (Lord & Maher, 1991), the attributional view of leadership (Meindl, 1995), and the contingency leadership models (Vroom & Jago, 2007). I have done so by addressing the following research questions: 1) Under which conditions might people believe that shared leadership is advantageous for teams? 2) How do people's context-sensitive beliefs about shared leadership affect stakeholders' decision making? and, 3) How do followers' context-sensitive beliefs about shared leadership affect their

leadership attributions to multiple members?

To address these questions, I developed theoretical models and tested them with online experiments and survey-based studies of student project teams. I will review the results of these studies as they bear on each of my three research questions and discuss the theoretical implications for future research.

1) Under which conditions might people believe that shared leadership is advantageous for teams?

The results of Chapters 2 and 3 supported my baseline prediction, that people's beliefs about shared leadership, like implicit beliefs about individual leaders, are sensitive to context.

In Chapter 2, in Study 1 (n = 443), we confirmed that people generally hold hierarchical beliefs about team leadership. In Study 2 (n = 154), we explored the task characteristics under which these hierarchical beliefs were stronger or weaker. In Study 3 (n = 126) and Study 4 (n = 342), we found that complex tasks evoke more communal beliefs about team leadership, and thus lead to decisions favoring teams with shared leadership.

In Chapter 3, we hypothesized that when members perceive the environment to be more uncertain, they tend to believe that sharing leadership is desirable. We found support for this hypothesis in Studies 1a (n = 352 individuals, 46 teams) and 1b (n = 101 individuals, 15 teams) which used multi-wave data from student project teams. Study 2, an experimental study (n = 397 individuals), established the causal direction of this relationship.

We conclude that beliefs about team leadership structure are contingent on the complexity of the task and uncertain environments. These insights have implications for theory on shared leadership in teams. The perceptions of the task and situation are

systematic influences on how and why a communal belief emerges. Future research should explore other situational factors which may drive people's beliefs about shared leadership. Future research can also explore if there is an overarching situational factor which explains the emergence of shared leadership beliefs in teams.

2) *How do stakeholders' context-sensitive beliefs about shared leadership affect stakeholders' decision making?*

A series of experiments (Studies 1-4 (n = 1067)), in Chapter 2 showed that stakeholders draw on their hierarchical or communal beliefs about team leadership to develop expectations about teams. This research broadens the scope of beliefs about shared leadership from a within-team view to a social perception view of teams (Satterstrom et al., 2019). Future research should continue this path and put less emphasis on leaders and/or their actions and instead focus on how beliefs about leadership affect observer/stakeholder selection decisions. Our research integrates the central message of implicit leadership theory (Lord & Maher, 1991) into research on shared leadership in teams. Since team leadership beliefs affect expectations for teams, they are likely to affect outcomes of importance in organizations, such as assigning teams to tasks (Cabrera et al., 2009; Meyer, 1994), providing help and resources to teams (Fisher et al., 2018), hiring (Groysberg et al., 2008) and 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.

3) *How do followers' context sensitive beliefs about shared leadership affect their leadership attributions to multiple members?*

In Chapter 3, Studies 1a (n = 352 individuals, 46 teams) and 1b (n= 101 individuals, 15 teams) used multi-wave data from student project teams to show that

when individuals perceive the environment as more uncertain, they adopt more communal leadership beliefs and, thus, are more likely to attribute leadership to multiple teammates. Study 2 (n = 397 individuals) demonstrated these relationships in an experimental study. This research integrates the attributional view of leadership with shared leadership literature. It weakens the assumption that leadership is a leader-centric phenomenon and adds the followers' perspective to more comprehensively understand the emergence of shared leadership.

Future research should build on this thesis to explore the group dynamics that eventually lead individuals' leadership attributions to shared leadership structures. Moreover, this research has implications for the dynamism of leadership: it implies that perceptions of uncertainty may be a catalyst for change in informal leadership structures. As research moves toward mapping change in leadership structures over time, it will be critical to also theorize and measure followers' perceptions of the task and environment.

Team Creativity

A large body of literature has focused on improving creative idea generation (e.g., Nemeth & Ormiston, 2007; Nijstad & Stroebe, 2006; Paulus, 2000), but the process of idea evaluation has been relatively unexplored. Many organizations outsource idea generation activities and improving the evaluation process has become their most important innovation endeavor. A key challenge to organizations is that they often reject novel ideas. This line of literature focuses on individuals' bias against novelty and finds the underlying driver of such bias is uncertainty (Mueller et al., 2012). Groups also suffer from novelty bias: research has found teams tend to select mediocre ideas (Criscuolo et al., 2017) but we know little about why this happens and

how to mitigate the bias. Therefore, in my thesis I explore 1) What kind of group context amplifies groups' bias against novelty? and, 2) How to make groups more likely to support and select novel ideas?

To address these questions, I developed theoretical models and tested them with a face-to-face group experiment and an online experiment. I will review the results of these studies as they bear on each of my two research questions and discuss the theoretical implications for future research.

1) What kind of group context will amplify groups' bias against novelty?

Organizations often form a panel with diverse information, functional roles, and perspectives to evaluate creative ideas. Preference diversity comes from differences in the information, leading group members to hold different opinions and attitudes (Jehn et al., 1999). We argued that preference diversity will raise disagreement about the pros and cons of an idea, making people worry about how well the group understands the idea, its risks, and its chance of success. The lack of consensus increases their sense of uncertainty, and thus makes groups shy away from novel ideas. In Chapter 4, we found support for these arguments in Study 1 using face-to-face group experiment data (n = 186, 62 teams) and in Study 2 using online experiment data (n = 397). This research adds a new perspective to creative idea evaluation literature: that group context and group interactions may create or amplify the uncertainty of novel ideas.

2) How to make groups more likely to support and select novel ideas?

Study 2 in Chapter 4 showed that providing evaluators with concrete information about novel ideas (compared with abstract information) mitigated the uncertainty in groups with preference diversity, and thus led them to select more novel ideas. Drawing from social comparison theory, we argued that when lacking concrete information, evaluators will be more likely to seek social approval or rely on their team

members' opinions. In contrast, if evaluators have concrete information, they will be less subject to the influence of preference diversity.

This research represents an initial step towards understanding the group context that amplifies uncertainty when groups are evaluating ideas. Preference diversity, which stimulates the generation of new ideas and is associated with effective decision-making for selecting high quality ideas, is also most likely to produce a bias against novel ideas. It might dampen idea evaluation because it promotes uncertainty and doubt. Future research should pay more attention to the processes involved in determining which ideas to retain, develop, adopt, resource and implement, and the links between idea generation and these processes.

To summarize this thesis: people believe shared leadership is more effective when they perceive the task to be complex and the team operating in uncertain situations. People's beliefs about shared leadership influence stakeholders' decision making and team members' leadership attributions, and groups with high preference diversity will have a stronger bias against novel ideas since diversity highlights their uncertainty.

References

- Adler, P. S., Kwon, S.-W., & Heckscher, C. (2008). Perspective—professional work: The emergence of collaborative community. *Organization Science*, *19*(2), 359–376. <https://doi.org/10.1287/orsc.1070.0293>
- Agle, B. R., Nagarajan, N. J., Sonnenfeld, J. A., & Srinivasan, D. (2006). Does CEO charisma matter? An empirical analysis of the relationships among organizational performance, environmental uncertainty, and top management team perceptions of CEO charisma. *Academy of Management Journal*, *49*(1), 161–174. <https://doi.org/10.5465/AMJ.2006.20785800>
- Aime, F., Humphrey, S., DeRue, D. S., & Paul, J. B. (2013). The riddle of heterarchy: Power transitions in cross-functional teams. *Academy of Management Journal*, *57*(2), 327–352. Retrieved from <http://amj.aom.org/content/57/2/327.full>
- Amabile, T. M. (1988). A model of creativity and innovation in organizations. *Research in Organizational Behavior*, *10*, 123–167.
- Anderson, C., & Brown, C. E. (2010). The functions and dysfunctions of hierarchy. *Research in Organizational Behavior*, *30*(C), 55–89.
- Anderson, C., Willer, R., Kilduff, G. J., & Brown, C. E. (2012). The origins of deference: when do people prefer lower status? *Journal of Personality and Social Psychology*, *102*(5), 1077–1088. <https://doi.org/10.1037/a0027409>
- Averill, J. R. (1973). Personal control over aversive stimuli and its relationship to stress. *Psychological Bulletin*, *80*(4), 286.
- Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Science*, *9*(3), 75–78.
- Bandura, A. (2001). Social cognitive theory : An agentic perspective. *Annual Review of Psychology*, *52*, 1–26.
- Bauer, D. J., Preacher, K. J., & Gil, K. M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: New procedures and recommendations. *Psychological Methods*, *11*(2), 142–163. <https://doi.org/10.1037/1082-989X.11.2.142>
- Bendersky, C., & Hays, N. a. (2012). Status conflict in groups. *Organization Science*, *23*(2), 323–340.
- Berg, J. M. (2016). Balancing on the creative highwire: Forecasting the success of novel ideas in organizations. *Administrative Science Quarterly*, *61*(3), 433–468. Retrieved from <http://asq.sagepub.com/content/early/2016/03/25/0001839216642211?papetoc>
- Berg, J. M. (2019). When silver is gold: Forecasting the potential creativity of initial ideas. *Organizational Behavior and Human Decision Processes*, *154*(July), 96–

117. <https://doi.org/10.1016/j.obhdp.2019.08.004>

- Berger, J., Berger, J., Fisek, M. H., & Norman, R. Z. (1977). *Status characteristics and social interaction: An expectation-states approach*. Elsevier New York.
- Blair, C. S., & Mumford, M. D. (2007). Errors in idea evaluation: Preference for the unoriginal? *Journal of Creative Behavior*, *41*(3), 197–222.
<https://doi.org/10.1002/j.2162-6057.2007.tb01288.x>
- Brewer, M. B., & Gardner, W. (1996). Who is this “we”? Levels of collective identity and self representations. *Journal of Personality and Social Psychology*, *71*(1), 83–93. <https://doi.org/10.1037//0022-3514.71.1.83>
- Brown, D. J., Scott, K. A., & Lewis, H. (2004). Information processing and leadership. In J. Antonakis, A. T. Cianciolo, & R. J. Sternberg (Eds.), *The nature of leadership* (pp. 125–147). London: Sage Publications.
- Buhr, K., & Dugas, M. J. (2006). Investigating the construct validity of intolerance of uncertainty and its unique relationship with worry. *Journal of Anxiety Disorders*, *20*(2), 222–236.
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon’s Mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, *6*(1), 3–5.
- Bunderson, J. S. (2003). Recognizing and utilizing expertise in work groups: A status characteristics perspective. *Administrative Science Quarterly*, *48*(4), 557–591.
- Cabrera, S. F., Sauer, S. J., & Thomas-Hunt, C. M. (2009). The evolving manager stereotype: The effects of industry gender typing on performance expectations for leaders and their teams. *Psychology of Women Quarterly*, *33*(4), 419–428.
<https://doi.org/10.1111/j.1471-6402.2009.01519.x>
- Camerer, C., & Weber, M. (1992). Recent developments in modeling preferences: Uncertainty and ambiguity. *Journal of Risk and Uncertainty*, *5*(4), 325–370.
- Campbell, D. J. (1988). Task complexity: A review and analysis. *The Academy of Management Review*, *13*(1), 40–52. <https://doi.org/10.5465/AMR.1988.4306775>
- Campion, M. A., Medsker, G. J., & Higgs, A. C. (1993). Relations between work group characteristics and effectiveness: implications for designing effective work groups. *Personnel Psychology*, *46*, 823–850.
- Carnabuci, G., Emery, C., & Brinberg, D. (2018). Emergent leadership structures in informal groups: A dynamic, cognitively informed network model. *Organization Science*, *29*(1), 118–133. <https://doi.org/10.1287/orsc.2017.1171>
- Carnes, A., Houghton, J. D., & Ellison, C. N. (2015). What matters most in leader selection? The role of personality and implicit leadership theories. *Leadership & Organization Development Journal*, *36*(4), 360–379.

- Carson, J. B., Tesluk, P. E., & Marrone, J. A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *The Academy of Management Journal*, *50*(5), 1217–1234.
- Carter, D. R., Dechurch, L. A., Braun, M. T., & Contractor, N. S. (2015). Social Network Approaches to Leadership: An Integrative Conceptual Review. *Journal of Applied Psychology*, *100*(3), 597–622.
- Chandler, J., Paolacci, G., Peer, E., Mueller, P., & Ratliff, K. A. (2015). Using nonnaive participants can reduce effect sizes. *Psychological Science*, *26*(7), 1131–1139.
- Chesbrough, H. (2003). *Open innovation*. Boston: Harvard Business School Press.
- Cheung, J., K. Burns, D., Sinclair, R., & Sliter, M. (2017). Amazon mechanical turk in organizational psychology: An evaluation and practical recommendations. *Journal of Business and Psychology*, *32*, 347–361. <https://doi.org/10.1007/s10869-016-9458-5>
- Chrobot-Mason, D., & Gerbasi, A. (2016). Predicting leadership relationships: The importance of collective identity. *The Leadership Quarterly*, *27*(2), 298–311. <https://doi.org/10.1016/J.LEAQUA.2016.02.003>
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Mahwah, NJ: Erlbaum (3rd ed.).
- Coleman, J. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94*, S95–S120. <https://doi.org/10.1016/B978-0-7506-7222-1.50005-2>
- Colquitt, J. A., LePine, J. A., Piccolo, R. F., Zapata, C. P., & Rich, B. L. (2012). Explaining the justice-performance relationship: Trust as exchange deepener or trust as uncertainty reducer? *Journal of Applied Psychology*, *97*(1), 1–15. <https://doi.org/10.1037/a0025208>
- Contractor, N. S., DeChurch, L. A., Carson, J., Carter, D. R., & Keegan, B. (2012). The topology of collective leadership. *The Leadership Quarterly*, *23*(6), 994–1011.
- Criscuolo, P., Dahlander, L., Grohsjean, T., & Salter, A. (2017). Evaluating novelty: The role of panels in the selection of R&D PROJECTS. *Academy of Management Journal*, *60*(2), 433–460. <https://doi.org/10.5465/amj.2014.0861>
- Crone, D. L., & Williams, L. A. (2017). Crowdsourcing participants for psychological research in Australia: A test of microworkers. *Australian Journal of Psychology*, *69*(1), 39–47.
- Cronshaw, S. F., & Lord, R. G. (1987). Effects of categorization, attribution, and encoding processes on leadership perceptions. *Journal of Applied Psychology*, *72*(1), 97–106.
- Cullen-Lester, K. L., & Yammarino, F. J. (2016). Collective and network approaches to

leadership: Special issue introduction. *The Leadership Quarterly*, 27(2), 173–180. Retrieved from <http://dx.doi.org/10.1016/j.leaqua.2016.02.001>

- D’Innocenzo, L., Mathieu, J. E., & Kukenberger, M. R. (2016). A meta-analysis of different forms of shared leadership–team performance relations. *Journal of Management*, 42(7), 1964–1991.
- Danneels, E., & Kleinschmidt, E. J. (2001). Product innovativeness from the firm’s perspective: Its dimensions and their relation with project selection and performance. *Journal of Product Innovation Management: An International Publication of the Product Development & Management Association*, 18(6), 357–373.
- Denis, J. L., Langley, A., & Sergi, V. (2012). Leadership in the Plural. *Academy of Management Annals*. <https://doi.org/10.1080/19416520.2012.667612>
- DeRue, D. S., & Ashford, S. J. (2010). Who will lead and who will follow? A social process of leadership identity construction in organizations. *The Academy of Management Review*, 35(4), 627–647.
- DeRue, D. S., Nahrgang, J. D., & Ashford, S. J. (2015). Interpersonal perceptions and the emergence of leadership structures in groups: A network perspective. *Organization Science*, 26(4), 1192–1209.
- Dimoka, A., Hong, Y., & Pavlou, P. A. (2012). On product uncertainty in online markets: Theory and evidence. *MIS Quarterly*, 395–426.
- Dóci, E., & Hofmans, J. (2015). Task complexity and transformational leadership: The mediating role of leaders’ state core self-evaluations. *Leadership Quarterly*, 26(3), 436–447. <https://doi.org/10.1016/j.leaqua.2015.02.008>
- Douglas, S. P., & Craig, C. S. (2007). Collaborative and Iterative Translation: An Alternative Approach to Back Translation. *Journal of International Marketing*, 15(1), 30–43. <https://doi.org/10.1509/jimk.15.1.030>
- Eagly, A. H., & Carli, L. L. (2003). The female leadership advantage: An evaluation of the evidence. *The Leadership Quarterly*, 14(6), 807–834. <https://doi.org/10.1016/j.leaqua.2003.09.004>
- Eagly, A. H., & Karau, S. J. (2002). Role congruity theory of prejudice toward female leaders. *Psychological Review*, 109(3), 573–598. <https://doi.org/10.1037//0033-295X.109.3.573>
- Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, 2(44), 350–383.
- Elsbach, K. D., & Hargadon, A. B. (2006). Enhancing creativity through “mindless” work: A framework of workday design. *Organization Science*, 17(4), 470–483.
- Epitropaki, O., & Martin, R. (2004). Implicit leadership theories in applied settings: Factor structure, generalizability, and stability over time. *Journal of Applied*

Psychology, 89(2), 293–310.

- Epitropaki, O., Sy, T., Martin, R., Tram-Quon, S., & Topakas, A. (2013). Implicit Leadership and Followership Theories “in the wild”: Taking stock of information-processing approaches to leadership and followership in organizational settings. *The Leadership Quarterly*, 24(6), 858–881. Retrieved from <http://dx.doi.org/10.1016/j.leaqua.2013.10.005>
- Faucheux, C., & Mackenzie, K. D. (1966). Task dependency of organizational centrality: Its behavioral consequences. *Journal of Experimental Social Psychology*, 2(4), 361–375.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2017). Gpower Manual. Bonn, Germany: Universitat Bonn.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*. <https://doi.org/10.1177/001872675400700202>
- Festinger, L., & Hutte, H. A. (1954). An experimental investigation of the effect of unstable interpersonal relations in a group. *The Journal of Abnormal and Social Psychology*, 49(4p1), 513.
- Fiedler, F. E. (1978). The contingency model and the dynamics of the leadership process. *Advances in Experimental Social Psychology*, 11.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research Reading, MA: Addison-Wesley*, 6.
- Fisher, C. M. (2017). An ounce of prevention or a pound of cure? Two experiments on in-process interventions in decision-making groups. *Organizational Behavior and Human Decision Processes*, 138, 59–73. <https://doi.org/10.1016/j.obhdp.2016.11.004>
- Fisher, C. M., Pillemer, J., & Amabile, T. M. (2018). Deep help in complex project work: Guiding and path-clearing across difficult terrain. *The Academy of Management Journal*, 61(4), 1524–1553. <https://doi.org/10.5465/amj.2016.0207>
- Fiske, A. P. (1992). The four elementary forms of sociality : Framework for a unified theory social relations. *Psychological Review*, 99(4), 689–723.
- Foti, R. J., Knee, R. E., & Backert, R. S. G. (2008). Multi-level implications of framing leadership perceptions as a dynamic process. *The Leadership Quarterly*, 19(2), 178–194.
- Foti, R. J., & Lord, R. G. (1987). Prototypes and scripts: The effects of alternative methods of processing information on rating accuracy. *Organizational Behavior and Human Decision Processes*, 39(3), 318–340.
- Fox, C. R., & Tversky, A. (1995). Ambiguity aversion and comparative ignorance. *The Quarterly Journal of Economics*, 110(3), 585–603.

- Franke, N., Gruber, M., Harhoff, D., & Henkel, J. (2006). What you are is what you like-similarity biases in venture capitalists' evaluations of start-up teams. *Journal of Business Venturing*, *21*(6), 802–826. <https://doi.org/10.1016/j.jbusvent.2005.07.001>
- Freeman, L. C., Roeder, D., & Mulholland, R. R. (1979). Centrality in social networks: II. Experimental results. *Social Networks*, *2*(2), 119–141.
- Friedrich, T. L., Vessey, W. B., Schuelke, M. J., Ruark, G. A., & Mumford, M. D. (2009). A framework for understanding collective leadership: The selective utilization of leader and team expertise within networks. *The Leadership Quarterly*, *20*, 933–958. <https://doi.org/10.1016/j.leaqua.2009.09.008>
- Gersick, C., & Davis-Sacks, M. (1990). *Groups That Work (and Those That Don't): Creating Conditions For Effective Teamwork*. San Francisco, CA: Jossey-Bass.
- Gibb, C. A. (1954). Leadership. In G. Lindzey (Ed.), *Handbook of Social Psychology* (Vol. 2, pp. 877–917). Reading: MA: Addison Wesley.
- Gilson, L. L., & Shalley, C. E. (2004). A little creativity goes a long way: An examination of teams' engagement in creative processes. *Journal of Management*, *30*(4), 453–470.
- Goncalo, J. A., & Staw, B. M. (2006). Individualism-collectivism and group creativity. *Organizational Behavior and Human Decision Processes*, *100*(1), 96–109. <https://doi.org/10.1016/j.obhdp.2005.11.003>
- Goodman, J. K., & Paolacci, G. (2017). Crowdsourcing consumer research. *Journal of Consumer Research*, *44*(1), 196–210.
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*, 504–528. [https://doi.org/10.1016/S0092-6566\(03\)00046-1](https://doi.org/10.1016/S0092-6566(03)00046-1)
- Greer, L. L., de Jong, B. A., Schouten, M. E., & Dannals, J. E. (2018). Why and when hierarchy impacts team effectiveness: A meta-analytic integration. *Journal of Applied Psychology*, *103*(6), 591–613. <https://doi.org/10.1037/apl0000291>
- Groysberg, B., Lee, L.-E., & Nanda, A. (2008). Can they take it with them? The portability of star knowledge workers' performance. *Management Science*, *54*(7), 1213–1230. <https://doi.org/10.1287/mnsc.1070.0809>
- Gruenfeld, D. H. (1995). Status, ideology, and integrative complexity on the US Supreme Court: Rethinking the politics of political decision making. *Journal of Personality and Social Psychology*, *68*(1), 5.
- Hackman, J. R. (2002). *Leading teams: Setting the stage for great performance*. Boston: Harvard Business School Press.
- Hackman, J. R., & Oldham, G. R. (1975). Development of the Job Diagnostic Survey. *Journal of Applied Psychology*, *60*(2), 159–170. <https://doi.org/10.1037/h0076546>

- Hackman, J. R., & Wageman, R. (2007). Asking the right questions about leadership: Discussion and conclusions. *American Psychologist*, *62*(1), 43–47. <https://doi.org/10.1037/0003-066X.62.1.43>
- Hackman, J. R., & Morris, C. G. (1975). Group Tasks, Group Interaction Process, and Group Performance Effectiveness: A Review and Proposed Integration I. *Advances in Experimental Social Psychology*, *8*, 45–99. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0065260108602488>
- Hærem, T., Pentland, B. T., & Miller, K. D. (2015). Task complexity: Extending a core concept. *The Academy of Management Review*, *40*(3), 446–460. <https://doi.org/10.5465/amr.2013.0350>
- Hanges, P., Lord, R. G., & Dickson, M. (2000). An Information-processing perspective on leadership and culture: A case for connectionist architecture. *Applied Psychology*, *49*(1), 133–161.
- Hargadon, A. B., & Bechky, B. A. (2006). When collections of creatives become creative collectives: A field study of problem solving at work. *Organization Science*, *17*(4), 484–500.
- Harrison, D. A., & Klein, K. J. (2007). What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of Management Review*, *32*(4), 1199–1228. <https://doi.org/10.5465/AMR.2007.26586096>
- Harvey, S. (2013). A different perspective: The multiple effects of deep level diversity on group creativity. *Journal of Experimental Social Psychology*, *49*(5), 822–832. <https://doi.org/10.1016/j.jesp.2013.04.004>
- Harvey, S., & Kou, C.-Y. (2013). Collective engagement in creative tasks: The role of evaluation in the creative process in groups. *Administrative Science Quarterly*, *58*(3), 346–386. <https://doi.org/10.1177/0001839213498591>
- Harvey, S., & Mueller, J. S. (2021). Staying Alive: Toward a Diverging Consensus Model of Overcoming a Bias Against Novelty in Groups. *Organization Science*, *32*(2), 293–314.
- Haslam, N., & Fiske, A. P. (1992). Implicit relationship prototypes: Investigating five theories of the cognitive organization of social relationships. *Journal of Experimental Social Psychology*, *28*(5), 441–474. [https://doi.org/10.1016/0022-1031\(92\)90041-H](https://doi.org/10.1016/0022-1031(92)90041-H)
- Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. *White Paper*. Judd & Kenny MacKinnon. [https://doi.org/978-1-60918-230-4](https://doi.org/10.1016/j.jesp.2013.04.004)
- Hayes, A. F., & Rockwood, N. J. (2017). Regression-based statistical mediation and moderation analysis in clinical research: Observations, recommendations, and implementation. *Behaviour Research and Therapy*, *98*, 39–57.
- Hayes, A. F., & Rockwood, N. J. (2020). Conditional Process Analysis: Concepts,

- Computation, and Advances in the Modeling of the Contingencies of Mechanisms. *American Behavioral Scientist*, 64(1), 19–54.
<https://doi.org/10.1177/0002764219859633>
- Hayes, A. F., & Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: Does method really matter? *Psychological Science*, 24(10), 1918–1927.
- Hays, N. A., & Bendersky, C. (2015). Not all inequality is created equal: Effects of status versus power hierarchies on competition for upward mobility. *Journal of Personality and Social Psychology*, 108(6), 867–882.
- Hebl, M. R., & Kleck, R. E. (2000). The social consequences of physical disability.
- Hirokawa, R. Y. (1985). Discussion procedures and decision-making performance: A test of functional perspective. *Human Communication Research*, 12(2), 203–224.
<https://doi.org/10.1111/j.1468-2958.1985.tb00073.x>
- Hoch, Julia E. (2013). Shared leadership and innovation: The role of vertical leadership and employee integrity. *Journal of Business and Psychology*, 28(2), 159–174.
<https://doi.org/10.1007/s10869-012-9273-6>
- Hoch, Julia Elisabeth, Pearce, C. L., & Welzel, L. (2010). Is the most effective team leadership shared? The impact of shared leadership, age diversity, and coordination on team performance. *Journal of Personnel Psychology*, 9(3), 105–116. <https://doi.org/10.1027/1866-5888/a000020>
- Hogg, M. A. (2001). A social identity theory of leadership. *Personality and Social Psychology Review*, 5(3), 184–200.
https://doi.org/10.1207/S15327957PSPR0503_1
- Hogg, M. A. (2007). Uncertainty–identity theory. *Advances in Experimental Social Psychology*, 39, 69–126.
- Hogg, M. A., & Adelman, J. (2013). Uncertainty–identity theory: Extreme groups, radical behavior, and authoritarian leadership. *Journal of Social Issues*, 69(3), 436–454.
- Huang, L., & Pearce, J. L. (2015). Managing the unknowable: The effectiveness of early-stage investor gut feel in entrepreneurial investment decisions. *Administrative Science Quarterly*, 60(4), 634–670.
- Icek, A. (1991). The theory of planned behavior organizational behavior and human decision processes. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Ilgen, D. R. (1999). Teams embedded in organizations: Some implications. *American Psychologist*, 54(2), 129–139. <https://doi.org/10.1037/0003-066X.54.2.129>
- Janis, I. L. (1982). *Groupthink: Psychological studies of policy decisions and fiascoes* (Vol. 349). Houghton Mifflin Boston.

- Jehn, K. A. (1995). A Multimethod Examination of the Benefits and Detriments of Intragroup Conflict. *Administrative Science Quarterly*, *40*(2), 256–282. Retrieved from <http://www.jstor.org/stable/2393638>
- Jehn, K. A., Northcraft, G. B., & Neale, M. A. (1999). Why differences make a difference: A field study of diversity, conflict, and performance in workgroups. *Administrative Science Quarterly*, *44*(4), 741–763. <https://doi.org/10.2307/2667054>
- Jensen, J. D., & Hurley, R. J. (2012). Conflicting stories about public scientific controversies: Effects of news convergence and divergence on scientists' credibility. *Public Understanding of Science*, *21*(6), 689–704.
- Johns, G. (2006). The Essential Impact of Context on Organizational Behavior. *Academy of Management Review*, *31*(2), 386–408. <https://doi.org/10.5465/AMR.2006.20208687>
- Jost, J. T. (2019). A quarter century of system justification theory: Questions, answers, criticisms, and societal applications. *British Journal of Social Psychology*, *58*(2), 263–314. <https://doi.org/10.1111/bjso.12297>
- Judge, T. A., Bono, J. E., Ilies, R., & Gerhardt, M. W. (2002). Personality and leadership: a qualitative and quantitative review. *Journal of Applied Psychology*, *87*(4), 765.
- Julian, J. W., Regula, C. R., & Hollander, E. P. (1968). Effects of prior agreement by others on task confidence and conformity. *Journal of Personality and Social Psychology*, *9*(2p1), 171.
- Junker, N. M., & van Dick, R. (2014). Implicit theories in organizational settings: A systematic review and research agenda of implicit leadership and followership theories. *The Leadership Quarterly*, *25*(6), 1154–1173.
- Kakkar, H., & Sivanathan, N. (2017). When the appeal of a dominant leader is greater than a prestige leader. *Proceedings of the National Academy of Sciences*, *201617711*. <https://doi.org/10.1073/pnas.1617711114>
- Kameda, T., Takezawa, M., Hastie, R., Boyd, R., Tindale, R. S., Whitmeyer, J., ... Takahashi, N. (2003). The Logic of Social Sharing: An Evolutionary Game Analysis of Adaptive Norm Development. *Personality and Social Psychology Review*, *7*(1), 2–19. Retrieved from https://lynx.let.hokudai.ac.jp/~kameda/Kameda_Takezawa_Hastie_PSPR_2003.pdf
- Kameda, T., Takezawa, M., Tindale, R. S., & Smith, C. M. (2002). Social sharing and risk reduction exploring a computational algorithm for the psychology of windfall gains. *Evolution and Human Behavior*, *23*(1), 11–33. [https://doi.org/10.1016/S1090-5138\(01\)00086-1](https://doi.org/10.1016/S1090-5138(01)00086-1)
- Kaplan, H., & Hill, K. (1985). Hunting ability and reproductive success among male Ache foragers: Preliminary results. *Current Anthropology*, *26*(1), 131–133.

- Kaplan, H., & Hill, K. (2017). The evolutionary ecology of food acquisition. In *Evolutionary ecology and human behavior* (pp. 167–202). Routledge.
- Kaplan, M. F., & Miller, C. E. (1987). Group decision making and normative versus informational influence: Effects of type of issue and assigned decision rule. *Journal of Personality and Social Psychology*, *53*(2), 306.
- Kay, A. C., Whitson, J. A., Gaucher, D., & Galinsky, A. D. (2009). Compensatory control. *Current Directions in Psychological Science*, *18*(5), 264–268.
- Kelman, H. C. (2017). *Further thoughts on the processes of compliance, identification, and internalization*. Routledge.
- Kerr, S., & Jermier, J. M. (1978). Substitutes for leadership: Their meaning and measurement. *Organizational Behavior and Human Decision Processes*, *22*, 375–403.
- Klein, K. J., & Knight, A. P. (2005). Innovation implementation: Overcoming the challenge. *Current Directions in Psychological Science*, *14*(5), 243–246.
- Klein, K. J., Ziegert, J. C., & Knight, A. P. (2006). Dynamic delegation: Shared, hierarchical, and deindividuated leadership In extreme action teams. *Administrative Science Quarterly*, *51*(4), 590–621.
- Klotz, A. C., Hmieleski, K. M., Bradley, B. H., & Busenitz, L. W. (2014). New venture teams: A review of the literature and roadmap for future research. *Journal of Management*, *40*(1), 226–255. <https://doi.org/10.1177/0149206313493325>
- Knight, F. H. (1921). Risk, uncertainty and profit. *New York: Hart, Schaffner and Marx*.
- Kossinets, G. (2003). Effects of missing data in social networks *. Retrieved from <https://arxiv.org/pdf/cond-mat/0306335.pdf>
- Kozlowski, S. W. J., Gully, S. M., Nason, E. R., & Smith, E. M. (1999). Developing adaptive teams: A theory of compilation and performance across levels and time. *Pulakos (Eds.), The Changing Nature of Work Performance: Implications for Staffing, Personnel Actions, and Development*, *240*, 292.
- Kreft, I., & de Leeuw, J. (1998). Varying and random coefficient models. *Introducing Multilevel Modeling*, 35–56.
- Kulich, C., Ryan, M. K., & Haslam, S. A. (2007). Where is the romance for women leaders? The effects of gender on leadership attributions and performance-based pay. *Applied Psychology: An International Review*, *56*(4), 582–601.
- Lampel, J., Lampel, J., Shamsie, J., & Shapira, Z. (2009). Experiencing the improbable: Rare events and organizational learning. *Organization Science*, *20*(5), 835–845. <https://doi.org/10.1287/orsc.1090.0479>
- Landau, M. J., Kay, A. C., & Whitson, J. A. (2015). Compensatory control and the

- appeal of a structured world. *Psychological Bulletin*, *141*(3), 694.
- Laughlin, P. R. (1988). Collective induction: Group performance, social combination processes, and mutual majority and minority influence. *Journal of Personality and Social Psychology*, *54*(2), 254.
- Litman, L., Robinson, J., & Abberbock, T. (2017). TurkPrime. com: A versatile crowdsourcing data acquisition platform for the behavioral sciences. *Behavior Research Methods*, *49*(2), 433–442.
- Liu, P., & Li, Z. (2012). Task complexity: A review and conceptualization framework. *International Journal of Industrial Ergonomics*, *42*(6), 553–568. <https://doi.org/10.1016/j.ergon.2012.09.001>
- Long Lingo, E., & O'Mahony, S. (2010). Nexus work: Brokerage on creative projects. *Administrative Science Quarterly*, *55*(1), 47–81.
- Lord, R. G., Brown, D. J., Harvey, J. L., & Hall, R. J. (2001). Contextual constraints on prototype generation and their multilevel consequences for leadership perceptions. *The Leadership Quarterly*, *12*(3), 311–338.
- Lord, R. G., Hannah, S. T., & Jennings, P. L. (2011). A framework for understanding leadership and individual requisite complexity. *Organizational Psychology Review*, *1*(2), 104–127. <https://doi.org/10.1177/2041386610384757>
- Lord, R. G., & Maher, K. J. (1991). *Leadership and information processing: Linking perceptions and performance*. London: Routledge.
- Lord, R. G., Epitropaki, O., Foti, R. J., & Hansbrough, T. K. (2020). Implicit leadership theories, implicit followership theories, and dynamic processing of leadership information. *Annual Review of Organizational Psychology and Organizational Behavior*, *7*(1), 49–74. <https://doi.org/10.1146/annurev-orgpsych-012119-045434>
- Lord, R. G., Foti, R. J., & Phillips, J. S. (1982). A theory of leadership categorization. *Leadership: Beyond Establishment Views*, *104*, 121.
- Lu, S., Bartol, K. M., Venkataramani, V., Zheng, X., & Liu, X. (2019). Pitching novel ideas to the boss: The interactive effects of employees' idea enactment and influence tactics on creativity assessment and implementation. *Academy of Management Journal*, *62*(2), 579–606. <https://doi.org/10.5465/amj.2016.0942>
- Magee, J. C., & Galinsky, A. D. (2008). Social hierarchy: The self reinforcing nature of power and status. *The Academy of Management Annals*, *2*(1), 351–398.
- Manz, C. C., & Sims, H. P. (1987). Leading workers to lead themselves: The external leadership of self-managing work teams. *Administrative Science Quarterly*, *32*(1), 106–129.
- McGrath, J. E. (1962). *Leadership behavior: Some requirements for leadership training*. Washington, DC: U.S. Civil Service Commission, Office of Career Development.

- McLain, D. L. (1993). The MSTAT-I: A new measure of an individual's tolerance for ambiguity. *Educational and Psychological Measurement, 53*(1), 183–189.
- McMullen, J. S., & Shepherd, D. A. (2006). Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur. *Academy of Management Review, 31*(1), 132–152. <https://doi.org/10.5465/AMR.2006.19379628>
- Mehra, A., Dixon, A. L., Brass, D. J., & Robertson, B. (2006). The Social Network Ties of Group Leaders: Implications for Group Performance and Leader Reputation. *Organization Science, 17*(1), 64–79. <https://doi.org/10.1287/orsc>.
- Meindl, J. R. (1995). The romance of leadership as a follower-centric theory: A social constructionist approach. *The Leadership Quarterly, 6*(3), 329–341.
- Meindl, J. R., Ehrlich, S. B., & Dukerich, J. M. (1985). The romance of leadership. *Administrative Science Quarterly, 30*(1), 78–102.
- Melrose, J., Perroy, R., & Careas, S. (2015). Self- and Observer-Reports of Personality. *Statewide Agricultural Land Use Baseline 2015, 1*. Retrieved from http://www.personality-arp.org/html/newsletter07/docs/14_teaching_self_observer.pdf
- Menon, T., Morris, M. W., Chiu, C. Y., & Hong, Y. Y. (1999). Culture and the construal of agency: Attribution to individual versus group dispositions. *Journal of Personality and Social Psychology, 76*(5), 701–717.
- Meyer, M. A. (1994). The dynamics of learning with team production: Implications for task assignment. *The Quarterly Journal of Economics, 109*(4), 1157–1184. <https://doi.org/10.2307/2118359>
- Milliken, F. J. (1987). Three Types of Perceived Uncertainty About the Environment: State, Effect, and Response Uncertainty. *Academy of Management Review, 12*(1), 133–143. Retrieved from <http://amr.aom.org/cgi/doi/10.5465/AMR.1987.4306502>
- Milliken, F. J., Bartel, C. A., & Kurtzberg, T. R. (2003). Diversity and creativity in work groups: A dynamic perspective on the affective and cognitive processes that link diversity and performance. *Group Creativity: Innovation through Collaboration, 32–62*.
- Morgeson, F. P., DeRue, D. S., & Karam, E. P. (2010). Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management, 36*(1), 5–39.
- Morgeson, F. P., & Hofmann, D. A. (1999). The structure and function of collective constructs: Implications for multilevel research and theory development. *The Academy of Management Review, 24*(2), 249–265.
- Morgeson, F. P., & Humphrey, S. E. (2006). The work design questionnaire (wdq): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology, 91*(6), 1321–1339.

- Mueller, J., Melwani, S., Loewenstein, J., & Deal, J. J. (2018). Reframing the decision-makers' dilemma: Towards a social context model of creative idea recognition. *Academy of Management Journal*, *61*(1), 94–110. <https://doi.org/10.5465/amj.2013.0887>
- Mueller, J. S., Kamdar, D., & Dishan, K. (2011). Why seeking help from teammates is a blessing and a curse: A theory of help seeking and individual creativity in team contexts. *Journal of Applied Psychology*, *96*(2), 263.
- Mueller, J. S., Melwani, S., & Goncalo, J. A. (2012). The bias against creativity why people desire but reject creative ideas. *Psychological Science*, *23*(1), 13–17.
- Mueller, J. S., Wakslak, C. J., & Krishnan, V. (2014). Construing creativity: The how and why of recognizing creative ideas. *Journal of Experimental Social Psychology*, *51*, 81–87. <https://doi.org/10.1016/j.jesp.2013.11.007>
- Myers, D. G., & Lamm, H. (1976). The group polarization phenomenon. *Psychological Bulletin*, *83*(4), 602.
- Nemeth, C., & Nemeth-Brown, B. (2003). Better than individuals. *Group Creativity: Innovation through Collaboration*, 63–84.
- Nemeth, Charlan J. (1986). Differential contributions of majority and minority influence. *Psychological Review*, *93*(1), 23.
- Nemeth, Charlan Jeanne, & Ormiston, M. (2007). Creative idea generation: Harmony versus stimulation. *European Journal of Social Psychology*, *37*(3), 524–535. <https://doi.org/10.1002/ejsp.373>
- Nicolaides, V. C., LaPort, K. A., Chen, T. R., Tomassetti, A. J., Weis, E. J., Zaccaro, S. J., & Cortina, J. M. (2014). The shared leadership of teams: A meta-analysis of proximal, distal, and moderating relationships. *The Leadership Quarterly*, *25*(5), 923–942.
- Nijstad, B. A., & Kaps, S. C. (2008). Taking the Easy Way Out: Preference Diversity, Decision Strategies, and Decision Refusal in Groups. *Journal of Personality and Social Psychology*, *94*(5), 860–870. <https://doi.org/10.1037/0022-3514.94.5.860>
- Nijstad, B. A., & Stroebe, W. (2006). How the group affects the mind: A cognitive model of idea generation in groups. *Personality and Social Psychology Review*, *10*(3), 186–213. https://doi.org/10.1207/s15327957pspr1003_1
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review*, *108*(2), 291–310.
- Offermann, L. R., Kennedy, J. K., & Wirtz, P. W. (1994). Implicit leadership theories: Content structure and generalizability. *The Leadership Quarterly*, *5*(1), 43–58.
- Olshavsky, R. W. (1979). Task complexity and contingent processing in decision making: A replication and extension. *Organizational Behavior and Human*

- Performance*, 24(3), 300–316. [https://doi.org/10.1016/0030-5073\(79\)90032-1](https://doi.org/10.1016/0030-5073(79)90032-1)
- Oreg, S., & Sverdlik, N. (2011). Ambivalence toward imposed change: the conflict between dispositional resistance to change and the orientation toward the change agent. *Journal of Applied Psychology*, 96(2), 337.
- Osborn, R. N., Hunt, J. G., & Jauch, L. R. (2002). Toward a contextual theory of leadership. *Leadership Quarterly*, 13(6), 797–837. [https://doi.org/10.1016/S1048-9843\(02\)00154-6](https://doi.org/10.1016/S1048-9843(02)00154-6)
- Packard, M. D., Clark, B. B., & Klein, P. G. (2017). Uncertainty Types and Transitions in the Entrepreneurial Process. *Organization Science*, (September), 1–17. <https://doi.org/10.1287/orsc.2017.1143>
- Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2010). Running experiments on amazon mechanical turk.
- Paulus, P. (2000). Groups, teams, and creativity: The creative potential of idea-generating groups. *Applied Psychology: An International Review*, 49(2), 237–262.
- Paunova, M. (2015). The emergence of individual and collective leadership in task groups: A matter of achievement and ascription. *Leadership Quarterly*, 26(6), 935–957. <https://doi.org/10.1016/j.leaqua.2015.10.002>
- Payne, J. W. (1976). Task complexity and contingent processing in decision making: An information search and protocol analysis. *Organizational Behavior and Human Performance*, 16(2), 366–387. [https://doi.org/10.1016/0030-5073\(76\)90022-2](https://doi.org/10.1016/0030-5073(76)90022-2)
- Payne, J. W. (1982). Contingent decision behavior. *Psychological Bulletin*, 92(2), 382.
- Pearce, C. L. (2004). The future of leadership: Combining vertical and shared leadership to transform knowledge work. *The Academy of Management Executive*, 18(1), 47–57. <https://doi.org/10.5465/AME.2004.12690298>
- Pearce, C. L., Conger, J. A., & Locke, E. A. (2008). Shared leadership theory. *The Leadership Quarterly*, 19(5), 622–628.
- Pearce, C. L., Hoch, J. E., Jeppesen, H. J., & Wegge, J. (2010). New forms of management: Shared and distributed leadership in organizations. *Journal of Personnel Psychology*, 9(4), 151–153.
- Pearce, C. L., & Sims, H. P. (2002). Vertical versus shared leadership as predictors of the effectiveness of change management teams: An examination of aversive, directive, transactional, transformational, and empowering leader behaviors. *Group Dynamics: Theory, Research, and Practice*, 6(2), 172–197. <https://doi.org/10.1037/1089-2699.6.2.172>
- Pearce, C. L., Yoo, Y., & Alavi, M. (2004). Leadership, social work, and virtual teams. *Improving Leadership in Nonprofit Organizations*, Edited by Ronald E. Riggio and Sarah Smith Orr, 180–199.

- Peer, E., Brandimarte, L., Samat, S., & Acquisti, A. (2017). Beyond the Turk: Alternative platforms for crowdsourcing behavioral research. *Journal of Experimental Social Psychology, 70*, 153–163.
- Phillips, J. S., & Lord, R. G. (1986). Notes on the practical and theoretical consequences of implicit leadership theories for the future of leadership measurement. *Journal of Management, 12*(1), 31–41.
<https://doi.org/10.1177/014920638601200104>
- Porr, D., & Fields, D. (2006). Implicit leadership effects on multi-source ratings for management development. *Journal of Managerial Psychology, 21*(7), 651–668.
- Porter, C. O. L. H., Outlaw, R., Gale, J. P., & Cho, T. S. (2019). The use of online panel data in management research: A review and recommendations. *Journal of Management, 45*(1), 319–344. <https://doi.org/10.1177/0149206318811569>
- Preacher, K. J., Zhang, Z., & Zyphu, M. J. (2011). Alternative methods for assessing mediation in multilevel data: The advantages of multilevel sem. *Structural Equation Modeling, 18*(2), 161–182.
<https://doi.org/10.1080/10705511.2011.557329>
- Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods, 15*(3), 209–233. <https://doi.org/10.1037/a0020141>
- Putman, V. L., & Paulus, P. B. (2009). Brainstorming, brainstorming rules and decision making. *The Journal of Creative Behavior, 43*(1), 29–40.
- Rietzschel, E. F., Nijstad, B. A., & Stroebe, W. (2006). Productivity is not enough: A comparison of interactive and nominal brainstorming groups on idea generation and selection. *Journal of Experimental Social Psychology, 42*(2), 244–251.
 Retrieved from <http://linkinghub.elsevier.com/retrieve/pii/S0022103105000600>
- Rietzschel, E. F., Nijstad, B. a., & Stroebe, W. (2010). The selection of creative ideas after individual idea generation: Choosing between creativity and impact. *British Journal of Psychology, 101*(1), 47–68.
- Rockwood, N. J., & Hayes, A. F. (2017). MLmed: An SPSS macro for multilevel mediation and conditional process analysis. In *Poster presented at the annual meeting of the Association of Psychological Science (APS), Boston, MA*.
- Rosette, A. S., & Tost, L. P. (2010). Agentic women and communal leadership: How role prescriptions confer advantage to top women leaders. *Journal of Applied Psychology, 95*(2), 221–235. <https://doi.org/10.1037/a0018204>
- Roux, C., Goldsmith, K., & Bonezzi, A. (2015). On the psychology of scarcity: When reminders of resource scarcity promote selfish (and generous) behavior. *Journal of Consumer Research, 42*(4), 615–631. <https://doi.org/10.1093/jcr/ucv048>
- Satterstrom, P., Polzer, J. T., Kwan, L. B., Hauser, O. P., Wiruchnipawan, W., & Burke, M. (2019). Thin slices of workgroups. *Organizational Behavior and*

Human Decision Processes, 151, 104–117.
<https://doi.org/10.1016/j.obhdp.2018.12.007>

- Schulz-Hardt, S., Brodbeck, F. C., Mojzisch, A., Kerschreiter, R., & Frey, D. (2006). Group decision making in hidden profile situations: Dissent as a facilitator for decision quality. *Journal of Personality and Social Psychology*, 91(6), 1080–1093. <https://doi.org/10.1037/0022-3514.91.6.1080>
- Schulz-Hardt, S., Frey, D., Lüthgens, C., & Moscovici, S. (2000). Biased information search in group decision making. *Journal of Personality and Social Psychology*, 78(4), 655–669. <https://doi.org/10.1037/0022-3514.78.4.655>
- Scott, K. A., & Brown, D. J. (2006). Female first, leader second? Gender bias in the encoding of leadership behavior. *Organizational Behavior and Human Decision Processes*, 101(2), 230–242. <https://doi.org/10.1016/j.obhdp.2006.06.002>
- Shamir, B., & Howell, J. M. (1999). Organizational and contextual influences on the emergence and effectiveness of charismatic leadership. *Leadership Quarterly*, 10(2), 257–283. [https://doi.org/10.1016/S1048-9843\(99\)00014-4](https://doi.org/10.1016/S1048-9843(99)00014-4)
- Shondrick, S. J., Dinh, J. E., & Lord, R. G. (2010). Developments in implicit leadership theory and cognitive science: Applications to improving measurement and understanding alternatives to hierarchical leadership. *The Leadership Quarterly*, 21(6), 959–978.
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: new procedures and recommendations. *Psychological Methods*, 7(4), 422.
- Simonton, Dean K. (1980). Land battles, generals, and armies: Individual and situational determinants of victory and casualties. *Journal of Personality and Social Psychology*, 38(1), 110–119.
- Simonton, Dean Keith. (1999). Creativity as blind variation and selective retention: Is creative process darwinian. *Psychological Inquiry*, 10(4), 309–328.
- Smith, E. R., & Collins, E. C. (2009). Contextualizing person perception: Distributed social cognition. *Psychological Review*, 116(2), 343.
- Smith, J. A., & Foti, R. J. (1998). A pattern approach to the study of leader emergence. *Leadership Quarterly*, 9(2), 147–160. [https://doi.org/10.1016/S1048-9843\(98\)90002-9](https://doi.org/10.1016/S1048-9843(98)90002-9)
- Srikanth, K., Harvey, S., & Peterson, R. S. (2017). A dynamic perspective on diverse teams: Moving from the dual-process model to a dynamic coordination-based model of diverse team performance. *Academy of Management Annals*, 10(1), 453–493.
- Stasser, G., & Titus, W. (1985). Pooling of unshared information in group decision making: Biased information sampling during discussion. *Journal of Personality and Social Psychology*, 48(6), 1467.

- Staw, B. M., & Ross, J. (1980). Commitment in an experimenting society: A study of the attribution of leadership from administrative scenarios. *Journal of Applied Psychology, 65*(3), 249–260.
- Suedfeld, P. (1996). Intuitive perceptions of decision-making strategy: Naive assessors' concepts of integrative complexity. *International Journal of Psychology, 31*(5), 177–190.
- Sy, T., Shore, L. M., Strauss, J., Shore, T. H., Tram, S., Whiteley, P., & Ikeda-Muromachi, K. (2010). Leadership perceptions as a function of race-occupation fit: The case of Asian Americans. *Journal of Applied Psychology, 95*(5), 902–919. <https://doi.org/10.1037/a0019501>
- Taggar, S., Hackett, R., & Saha, S. (1999). Leadership emergence in autonomous work groups: Antecedents and outcomes. *Personnel Psychology, 52*(4), 899–926. <https://doi.org/10.1111/j.1744-6570.1999.tb00184.x>
- Timmermans, D. (1993). The impact of task complexity on information use in multi-attribute decision making. *Journal of Behavioral Decision Making, 6*(2), 95–111. <https://doi.org/10.1002/bdm.3960060203>
- Tomaka, J., Blascovich, J., Kelsey, R. M., & Leitten, C. L. (1993). Subjective, physiological, and behavioral effects of threat and challenge appraisal. *Journal of Personality and Social Psychology, 65*(2), 248.
- Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review, 117*(2), 440–463. Retrieved from <http://doi.apa.org/getdoi.cfm?doi=10.1037/a0018963>
- van't Veer, A. E., & Giner-Sorolla, R. (2016). Pre-registration in social psychology—A discussion and suggested template. *Journal of Experimental Social Psychology, 67*, 2–12. <https://doi.org/10.1016/j.jesp.2016.03.004>
- van Knippenberg, D., & Hoever, I. J. (2017). Team Diversity and Team Creativity. *Team Creativity and Innovation, 41*.
- van Knippenberg, D., Lossie, N., & Wilke, H. (1994). In-group prototypicality and persuasion: Determinants of heuristic and systematic message processing. *British Journal of Social Psychology, 33*(3), 289–300. <https://doi.org/10.1111/j.2044-8309.1994.tb01026.x>
- van Knippenberg, D., & Schippers, M. C. (2007). Work Group Diversity. *Annual Review of Psychology, 58*(1), 515–541. <https://doi.org/10.1146/annurev.psych.58.110405.085546>
- van Knippenberg, D., van Knippenberg, B., & van Dijk, E. (2000). Who Takes the Lead in Risky Decision Making? Effects of Group Members' Risk Preferences and Prototypicality. *Organizational Behavior and Human Decision Processes, 83*(2), 213–234. <https://doi.org/10.1006/obhd.2000.2907>
- van Lange, P. A. M., De Bruin, E., Otten, W., & Joireman, J. A. (1997). Development

- of prosocial, individualistic, and competitive orientations: theory and preliminary evidence. *Journal of Personality and Social Psychology*, 73(4), 733.
- van Lange, P. A. M., De Cremer, D., van Dijk, E., & van Vugt, M. (2007). Self-interest and beyond. *Social Psychology: Handbook of Basic Principles*, 540–561.
- van Lange, P. A. M., & Kuhlman, D. M. (1994). Social value orientations and impressions of partner's honesty and intelligence: A test of the might versus morality effect. *Journal of Personality and Social Psychology*, 67(1), 126.
- Vinkenburg, C. J., van Engen, M. L., Eagly, A. H., & Johannesen-Schmidt, M. C. (2011). An exploration of stereotypical beliefs about leadership styles: Is transformational leadership a route to women's promotion? *The Leadership Quarterly*, 22(1), 10–21.
- Vroom, V. H., & Jago, A. G. (2007). The role of the situation in leadership. *American Psychologist*, 62(1), 17–24.
- Wageman, R. (2001). How leaders foster self-managing team effectiveness: Design choices versus hands-on coaching. *Organization Science*, 12(5), 559–577. <https://doi.org/10.1287/orsc.12.5.559.10097>
- Wageman, R., & Fisher, C. (2014). Who's in charge here? The team leadership implications of authority structure. In D. V. Day (Ed.), *The handbook of leadership and organizations* (pp. 455–481). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199755615.013.022>
- Wageman, R., Fisher, C. M., & Hackman, J. R. (2009). Leading teams when the time is right: Finding the best moments to act. *Organizational Dynamics*, 38(3), 192–203. <https://doi.org/10.1016/j.orgdyn.2009.04.004>
- Wageman, R., Hackman, J. R., & Lehman, E. (2005). Team diagnostic survey development of an instrument. *Journal of Applied Behavioral Science*, 41(4), 373–398.
- Waldman, D. A., Ramírez, G. G., House, R. J., & Puranam, P. (2001). Does leadership matter? CEO leadership attributes and profitability under conditions of perceived environmental uncertainty. *Academy of Management Journal*, 44(1), 134–143. <https://doi.org/10.2307/3069341>
- Walter, S. L., Seibert, S. E., Goering, D., & O'Boyle, E. H. (2019). A tale of two sample sources: Do results from online panel data and conventional data converge? *Journal of Business and Psychology*, 34(4), 425–452.
- Wang, D., Waldman, D. A., & Zhang, Z. (2014). A meta-analysis of shared leadership and team effectiveness. *Journal of Applied Psychology*, 99(2), 181–198.
- Wang, L., Han, J., Fisher, C. M., & Pan, Y. (2017). Learning to share: Exploring temporality in shared leadership and team learning. *Small Group Research*, 48(2), 165–189. <https://doi.org/10.1177/104649647100200201>

- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>
- Wellman, E. M. (2013). *Enabling shared leadership in hierarchical groups*.
- Wellman, N. (2017). Authority or community? A relational models theory of group-level leadership emergence. *Academy of Management Review*, 42(4), 596–617.
- Wellman, N., Ashford, S. J., DeRue, D. S., & Sanchez-Burks, J. (2014). *How many should lead? leadership structure schemas and informal leadership emergence in groups*. University of Michigan, Ann Arbor.
- White, L., Currie, G., & Lockett, A. (2016). Pluralized leadership in complex organizations: Exploring the cross network effects between formal and informal leadership relations. *The Leadership Quarterly*, 27(2), 280–297. <https://doi.org/10.1016/j.leaqua.2016.01.004>
- White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, 66(5), 297.
- Whitson, J. A., & Galinsky, A. D. (2008). Lacking control increases illusory pattern perception. *Science*, 322(5898), 115–117. <https://doi.org/10.1126/science.1159845>
- Wood, R. E. (1986). Task complexity: Definition of the construct. *Organizational Behavior and Human Decision Processes*, 37(1), 60–82. [https://doi.org/10.1016/0749-5978\(86\)90044-0](https://doi.org/10.1016/0749-5978(86)90044-0)
- Wright, P. (1975). Consumer choice strategies: Simplifying vs. optimizing. *Journal of Marketing Research*, 12(1), 60–67.
- Yates, J. F., Jagacinski, C. M., & Faber, M. D. (1978). Evaluation of partially described multiattribute options. *Organizational Behavior and Human Performance*, 21(2), 240–251.
- Yukl, G., & Michel, J. (2006). Proactive influence tactics and leader member exchange. In C. A. Schriesheim & L. L. Neider (Eds.), *Power and influence in organizations: New empirical and theoretical perspectives* (pp. 87–103). Greenwich, CT: Information Age Publishing.
- Yukl, G., Gordon, A., & Taber, T. (2002). Taxonomy of Leadership Behavior : Half Century of Behavior Research. *Journal of Leadership & Organizational Behavior*, 9(1), 15–32. <https://doi.org/10.1177/107179190200900102>
- Zaccaro, S. J. S. J., Rittman, L. A., Marks, M. A. M. A., Rittman, A. L., & Marks, M. A. M. A. (2001). Team leadership. *The Leadership Quarterly*, 12, 451–483. Retrieved from <https://www.sciencedirect.com/science/article/pii/S1048984301000935>
- Zarutskie, R. (2010). The role of top management team human capital in venture

capital markets: Evidence from first-time funds. *Journal of Business Venturing*, 25(1), 155–172. <https://doi.org/10.1016/j.jbusvent.2008.05.008>

Zhang, C., Nahrgang, J. D., Ashford, S. J., & DeRue, D. S. (2020). The Risky Side of Leadership: Conceptualizing Risk Perceptions in Informal Leadership and Investigating the Effects of Their Over-Time Changes in Teams. *Organization Science*.

Zhou, J., Wang, X. M., Bavato, D., Tasselli, S., & Wu, J. (2019). Understanding the receiving side of creativity: A multidisciplinary review and implications for management research. *Journal of Management*, 45(6), 2570–2595. <https://doi.org/10.1177/0149206319827088>

Zitek, E. M., & Tiedens, L. Z. (2012). The fluency of social hierarchy: The ease with which hierarchical relationships are seen, remembered, learned, and liked. *Journal of Personality and Social Psychology*, 102(1), 98–115. <https://doi.org/10.1037/a0025345>

Appendices

Appendix 2. A Scenarios and Figures Used in Studies 1 & 4 of Chapter 2

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.

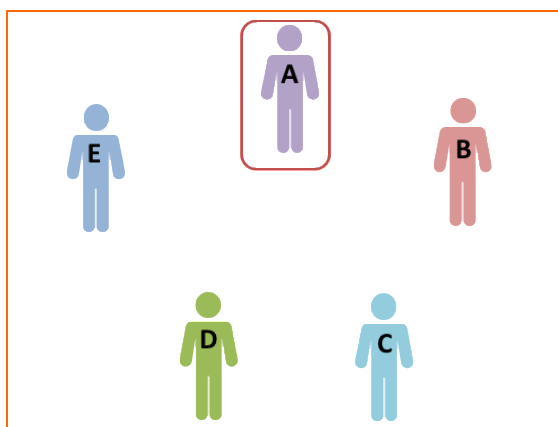
Please predict some aspects of the team's processes and performance.

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 2.A.1: Studies 1 & 4 Diagrams

Single Leadership



Shared Leadership

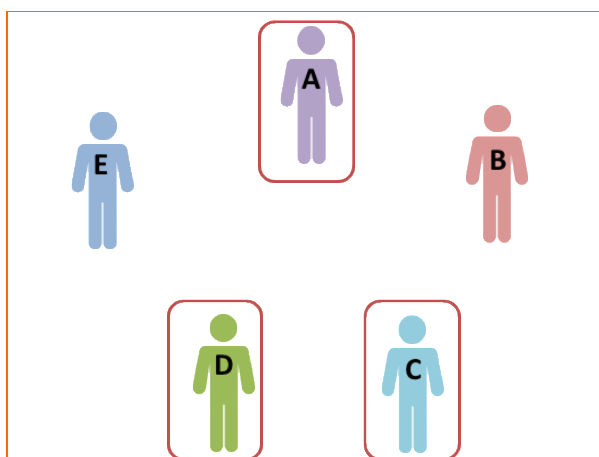
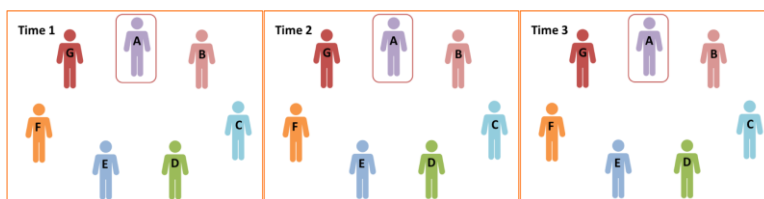
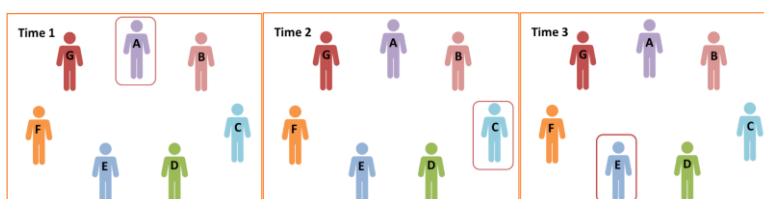


Figure 2.A.2. Studies 2, B2, B3, and B4 Diagrams ²⁵

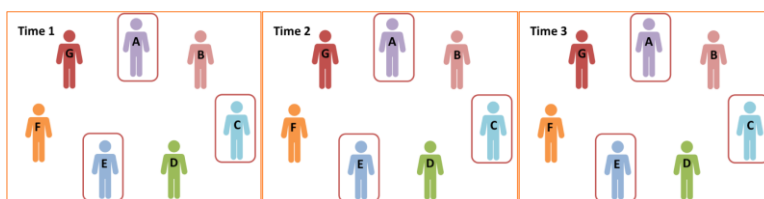
[Condition 1: Single-Stable Leadership Structure]



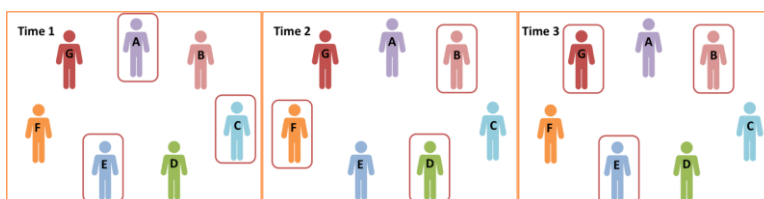
[Condition 2: Single-Dynamic Leadership Structure]



[Condition 3: Multiple-Stable Leadership Structure]



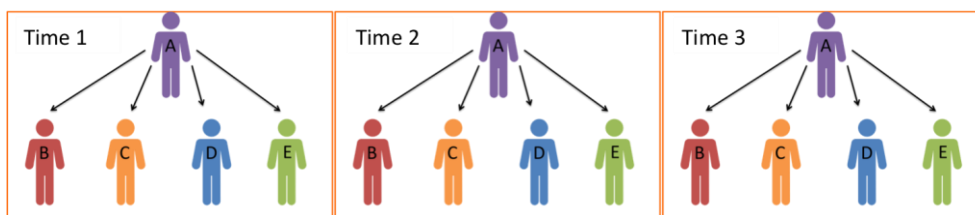
[Condition 4: Multiple-Dynamic Leadership Structure]



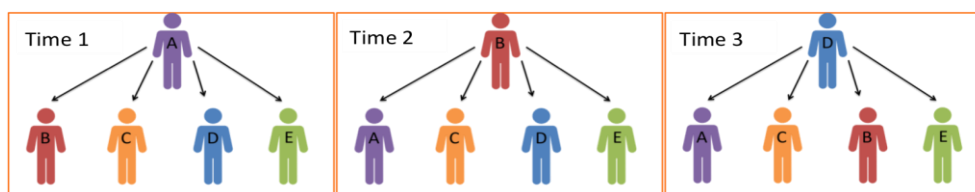
²⁵ We asked participants to read the following instructions: “In the diagrams, each member who is enclosed in a rectangular box is an INFORMAL LEADER of the team. An INFORMAL LEADER is an individual who other members agree took responsibility for providing leadership to the team, regardless of official role. Providing leadership means that the member influenced the behavior of other members toward accomplishing team goals”.

Figure 2.A.3. Study B1 Diagrams²⁶

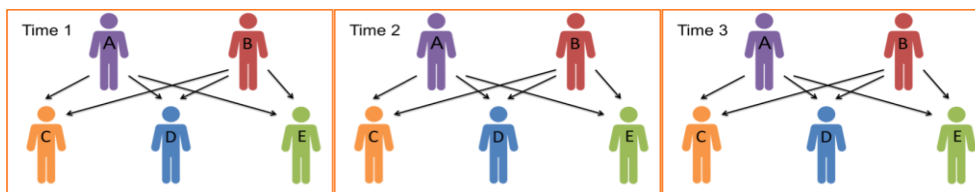
[Condition 1: Single and Stable Leadership Structure]



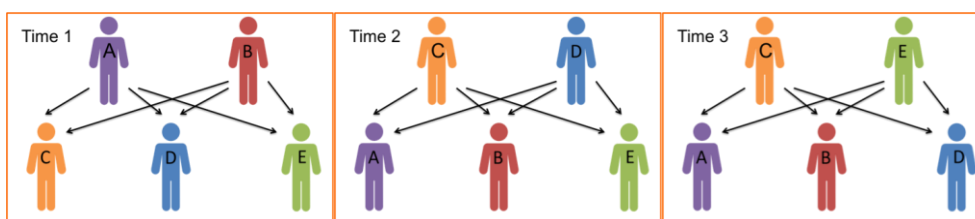
[Condition 2: Single and Dynamic Leadership Structure]



[Condition 3: Multiple and Stable Leadership Structure]



[Condition 4: Multiple and Dynamic Leadership Structure]



²⁶ 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 2. B The Results of Pilot and Replication Studies of Chapter 2

Appendix 2. 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 2.B.1 and 2.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 ($M = 4.23$, $SD = 1.23$); $t(170) = -.26$, $p = .396$, $\eta_p^2 = .00$. 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%) ($Z = 0.96$, $p = .169$, Cohen's $h = 0.247$). 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%) ($Z = 2.84$, $p = .004$, Cohen's $h = 0.765$). 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 ($M = 5.11$, $SD = 1.04$), $F(1, 455) = 3.48$, $p = .063$, $\eta_p^2 = .012$. 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 ($t(96) = 2.45$, $p = .016$), 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 2.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 2.B.1. *Studies Replicating Study 1*

	Study B1	Study B2
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 2.A.3	see Figure 2.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 expectations.	Neither age nor gender moderated the effects of conditions on team effectiveness expectations.

Table 2.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.

	Study B3	Study B4
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 2.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 2.B.3. Means by Experimental Condition for Leadership Structure Schema (LSS) and Team Effectiveness Expectations 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)				

^a 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.

^b 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)

^c 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 2. C Task Complexity Scenarios used in Studies 3 and 4 of Chapter 2

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.

Appendix 2. D Correlation Tables of Studies 1-4 in Chapter 2

Table 2.D.1

Descriptive Statistics and Correlations for Study 1

	<i>M</i>	<i>SD</i>	1	2	3	4
1. Condition	.51	.50				
2. LSS	3.69	1.18	.14**			
3. Effectiveness expectations	4.97	1.06	-.27**	.17**		
4. Gender	.53	.51	.01	.05	.12*	
5. Age	35.95	11.98	-.03	.01	.02	.10*

Notes: Conditions: Single leadership is coded as “0” and Shared leadership is coded as “1”; Gender: Male is coded as “0”, and Female is coded as “1”. *n*=443. + *p*<.10, * *p*<.05, ** *p*<.01

Table 2.D.2. Descriptive Statistics and Correlations for Study 2

	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Single-stable	.25	.44																
2. Single-unstable	.25	.44	-.34**															
3. Multiple-stable	.24	.43	-.33**	-.33**														
4. Multiple-unstable	.49	.44	-.34**	-.34**	-.33**													
5. Autonomy	4.86	1.19	-.12	.01	-.05	.16*												
6. Participation	5.03	1.26	-.17*	.06	-.12	.24**	.73**											
7. Task variety	5.25	1.24	-.12	-.17*	.09	.20*	.56**	.61**										
8. Significance	4.86	1.21	-.04	-.11	.01	.13	.50**	.49**	.67**									
9. Flexibility	5.17	1.23	-.18*	-.09	-.01	.28**	.55**	.64**	.70**	.61**								
10. Complexity	3.23	1.48	-.09	.18*	-.16	.07	-.09	.08	.03	-.16*	-.03							
11. Information processing	5.08	1.18	-.15	-.08	.05	.18*	.47**	.49**	.73**	.69**	.60**	-.05						
12. Problem solving	4.97	1.02	-.14	-.08	.08	.14	.43**	.46**	.66**	.60**	.58**	-.14	.72**					
13. Skill variety	5.27	1.17	-.08	-.08	.03	.14	.41**	.53**	.72**	.60**	.54**	-.01	.76**	.64**				
14. Interdependence	5.16	1.20	-.16*	-.03	.08	.11	.60**	.64**	.69**	.63**	.68**	-.10	.67**	.59**	.60**			
15. Coordination complexity	5.20	1.12	-.03	-.15	.12	.07	.39**	.42**	.60**	.64**	.52**	-.08	.72**	.59**	.75**	.58**		
16. Gender	.46	.51	-.12	.03	.03	.06	.07	.02	.08	.17	-.09	-.02	.10	.03	.07	.03	.04	
17. Age	35.91	11.52	.13	-.10	-.01	-.02	-.03	.04	.15	.06	.08	-.16	.07	.09	.13	.16	.02	.07

Notes: We created a dummy variable for each experimental condition: “single-stable”, “single-unstable”, “multiple-stable”, “multiple-unstable”. Gender: Male is coded as “0”, and Female is coded as “1”. $n = 154$. + $p < .10$, * $p < .05$, ** $p < .01$

Table 2.D.3*Descriptive statistics and Correlations for Study 3*

	<i>Mean</i>	<i>SD</i>	1	2	3
1. Condition	.50	.50			
2. LSS	4.02	1.24	.19*		
3. Gender	.68	.47	-.05	.02	
4. Age	36.99	10.99	.06	-.18*	-.19*

Notes: Conditions: Low task complexity is coded as “0” and High task complexity is coded as “1”; Gender: Male is coded as “0”, and Female is coded as “1”. $n = 126$. + $p < .10$, * $p < .05$, ** $p < .01$

Table 2.D.4*Descriptive Statistics and Correlations for Study 4*

	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6
1. Condition	.49	.50						
2. LSS	4.20	1.38	.19**					
3. Team effectiveness expectations (single leadership)	.498	.47	-.23**	-.56**				
4. Team effectiveness expectations (shared leadership)	5.11	1.13	.08	.61**	-.17**			
5. Team Choice	.58	.49	.20**	.73**	-.49**	.48**		
6. Gender	.56	.50	.17**	-.05	-.08	-.10	-.07	
7. Age	37.39	11.76	.04	-.06	.10	.01	-.08	-.08

Notes: Conditions: Low task complexity is coded as “0” and High task complexity is coded as “1”. Team choice: Choosing the team with single leadership is coded as “0”, choosing the team with shared leadership is coded as “1”. Gender: Male is coded as “0”, and Female is coded as “1”. $n = 342$. + $p < .10$, * $p < .05$, ** $p < .01$

Appendix 3. A The Items of Perceived Uncertainty of Chapter 3

Table 3. A

Studies 1a and 1b Items of Perceived Uncertainty

Items	Factor 1	Factor 2
Perceived uncertainty (Study 1a)	-	-
My team is performing in an environment that is very risky, one false step can mean the firm's undoing	-	-
The market my team is facing is very rapidly expanding through the expansion of old markets and the emergence of new ones	-	-
The environment my team is facing is dynamic and changing rapidly in many dimensions	-	-
The environment my team is facing is very stressful	-	-
Perceived uncertainty (Study 1b)		
The potential impact of environmental changes is unpredictable	.87	-.02
The environment that team faces is very uncertain	.92	.13
The environment that my team faces is very dynamic and changing rapidly in many dimensions	.88	.15
It is difficult to know whether particular responses to the environment might be successful	.73	.34

Notes. In Study 1b, N= 105 at level 1; CFA shows that the proposed two-factor model fit the data ($\chi^2[13] = 33.60$; CFI = 0.958; TLI = 0.933; RMSEA = 0.124; SRMR = 0.063) and that it is better than the one-factor model ($\chi^2[1] = 89.46, p < .001$).

Appendix 4. A The Manipulation of Preference Diversity in Study 1 of Chapter 4

Preference diversity conditions:

Preference manipulation 1 (negative information about NanoRun, positive information about GoShoe):

Additional Information

NanoRun

People who previously worked with the developers of NanoRun have found them rather difficult to work with.

It would be difficult to develop NanoRun in a variety of different colours or shapes.

GoShoe

It is expected that GoShoe will work well in a variety of different terrains.

Individual investors who partner with the accelerator were very impressed with how passionate the team behind GoShoe were about their idea.

After reading this information most people prefer GoShoe.

Preference manipulation 2 (positive information about NanoRun, negative information about GoShoe):

Additional Information

NanoRun

People who previously worked with the developers of NanoRun have found them rather difficult to work with.

It would be difficult to develop NanoRun in a variety of different colours or shapes.

GoShoe

It is expected that GoShoe will work well in a variety of different terrains.

Individual investors who partner with the accelerator were very impressed with how passionate the team behind GoShoe were about their idea.

After reading this information most people prefer GoShoe.

Preference manipulation 3 (neutral information about NanoRun, neutral information about GoShoe):

Additional Information

NanoRun

The results of a focus group with professional sprinters indicated that 9/10 participants felt that NanoRun would significantly improve their running experience.

One reviewer commented that without a prototype it might be difficult to forecast the longevity of NanoRun.

GoShoe

A leading sports magazine gave GoShoe 4.5/5 stars for addressing the needs of long-distance runners.

One seasoned sprinter who was told about this shoe was not impressed by its features – he said that it does not provide significant benefits over existing products.

After reading this information people do not have a clear preference

Preference homogeneity condition:

NanoRun

- The group of entrepreneurs who developed NanoRun have significant experience in successfully developing sports apparel.
- It is expected that NanoRun can help runners perform consistently despite harsh weather conditions and to maintain their speed and form.
- People who previously worked with the developers of NanoRun have found them rather difficult to work with.
- It would be difficult to develop NanoRun in a variety of different colours or shapes.
- The results of a focus group with professional sprinters indicated that 9/10 participants felt that NanoRun would significantly improve their running experience.
- One reviewer commented that without a prototype it might be difficult to forecast the longevity of NanoRun.

GoShoe

- It is expected that GoShoe will work well on a variety of different terrains.
- Individual investors who partner with the accelerator were very impressed with how passionate the team behind GoShoe were about their idea.
- This is the first entrepreneurial venture for the developers of GoShoe.
- GoShoe does not provide runners with any protection from bad weather like excessive heat or rain.
- A leading sports magazine gave GoShoe 4.5/5 stars for addressing the needs of long-distance runners.
- One seasoned sprinter who was told about this shoe was not impressed by its

Appendix 4. B The Manipulation of Role Diversity in Study 1 of Chapter 4

Role diversity condition:

Role 1 manipulation:

Your Role

Imagine you are an *innovation consultant* who has been contracted by the accelerator. The innovation consultant's greatest concern is the *benefit to consumers* provided by new ideas. Many new products often fall short of providing a significant *benefit to consumers*. When deciding on the best idea for the accelerator to support, please consider its potential *benefit to consumers*.

Role 2 manipulation:

Your Role

Imagine you are a *project management consultant* who has been contracted by the accelerator. The project management consultant's greatest concern is the *feasibility* of new ideas. New products often remain in the R&D stage for a very long time because of low *feasibility*. When deciding on the best idea for the accelerator to support, please consider whether its development seems *feasible*.

Role 3 manipulation:

Your Role

Imagine you are a *financial consultant* who has been contracted by the accelerator. The financial consultant's greatest concern is the *profitability* of new ideas. New products often fail to capture market share from existing products and generate *profits*. When deciding on the best idea for the accelerator to support, please consider whether the product is likely to be *profitable*.

Role homogeneity conditions:**Your Role**

The accelerator usually has three consultants assess ideas – an innovation consultant, a project management consultant, and a financial consultant. One key concern for consultants is the benefit to consumers provided by new ideas. Many new products often fall short of providing a significant benefit to consumers. When deciding on the best idea for the accelerator to support, please consider its potential benefit to consumers. Another important concern is the feasibility of new ideas. New products often remain in the R&D stage for a very long time because of low feasibility. When deciding on the best idea for the accelerator to support, please consider whether its development seems feasible. A final core concern is the profitability of new ideas. New products often fail to capture market share from existing products and generate profits. When deciding on the best idea for the accelerator to support, please consider whether the product is likely to be profitable.

Appendix 4. C Concrete vs. Abstract Descriptions of Five Ideas in Study 2 of

Chapter 4

Idea A: Child-safe treadmill

Concrete

A treadmill with childproof and child-entertaining features. It is surrounded by a flexible screen, strong enough to keep kids out. The screen can also show movies, tv shows, or other online content by connecting to wifi. It could also show games and could be a touch screen projector to keep the kids interested and around while users are doing exercise.

Abstract

A treadmill meant to help parents exercise without worrying about the safety of their children. Parents care about the safety of their children and want their children around. However, they also need to do exercise and keep fit. While exercising, they may not be able to keep an eye on their children. This treadmill is designed to solve this problem.

Idea B: Exercise office chair

Concrete

An office chair with an ab-working machine attached to its back. A strap goes around it like a belt to stimulate users' abs and lower back. This machine will have all the gadgets needed to keep track of the progress the users are making. It can be tracked directly on their phone or any other electronic device they use.

Abstract

An office chair meant to help people exercise at work. Many office workers these days have to stay seated for long hours during their workdays. This habit can create severe health problems in the long run, but many workers just do not have the time or motivation to pause their work and exercise. This chair is designed to solve this problem.

Idea C: Multifunctional exercise unit

Concrete

An exercise unit that combines various equipment such as a headset, some dumbbells, and a jump rope. Users can choose from different workouts such as cardio or strength training. A built-in personal training program will help users notice wrong forms, monitor vitals, and calculate nutrition needs. There is also a multiplayer mode where users can work out with their friends online.

Abstract

A multi-functional exercise unit meant to assist with personal training. Exercising by oneself could be both challenging and boring. Without an extra person to help, one may not be able to exercise in the right posture or push to the limits. They could also easily get bored and feel less motivated. This exercise unit is designed to address this problem.

Idea D: Bedroom treadmill

Concrete

A small and foldable bedroom treadmill. It has a touchscreen computer to help users keep track of their progress with health goals. It also has an alarm that will not shut off completely until a predetermined time or distance has been run on the treadmill. Users can select their favorite wake-up music by connecting it to their phone and computers.

Abstract

A treadmill meant for bedroom use. Working out at home by oneself could be challenging for many people. On the one hand, most exercise equipment is large in size, which does not fit the limited space of most houses and apartments. On the other hand, people lack the motivation to exercise alone. This treadmill is designed to solve these two problems.

Idea E: Pull-up bar

Concrete

A carbon fiber folding pull-up bar. It is lightweight because of the material. It can be attached over a door frame like a typical at-home pull-up bar. It can also be folded in half. At the center point where the bar folds, there are locking pins so that it remains secure and straight during use.

Abstract

A pull-up bar that is meant to assist pull-ups at home. Pull-ups are a simple way to exercise, and people may find themselves in need to do pull-ups at home. However, there is no space in a typical house or apartment that is naturally suitable to do such an exercise. This device is designed to solve this problem.

Appendix 4. D Preference Diversity Manipulation in Study 2 of Chapter 4

Experimental manipulations

All-positive

The rest of your team is already on the chat page and have been discussing these ideas for some time. Please read the last few lines of conversation on the group chat page.

Participant A: I'm going to put my foot down and say that I think this idea is good. Because a group of expert trainers thought this idea was very promising.

Participant B: Yeah, a group of potential customers thought this idea was very promising.

Participant C: Likewise, I know that a group of retailers of fitness products thought this idea was very promising.

All-negative

The rest of your team is already on the chat page and have been discussing these ideas for some time. Please read the last few lines of conversation on the group chat page.

Participant A: I'm going to say that I think this idea is not so good. Because a group of expert trainers was totally unimpressed by this idea.

Participant B: Yeah, a group of potential customers was also not impressed by this idea.

Participant C: Indeed, I know that a group of retailers of fitness products was not impressed by this idea.

Diverse

The rest of your team is already on the chat page and have been discussing these ideas for some time. Please read the last few lines of conversation on the group chat page.

Participant A: I'm going to say that I think this idea is good. Because a group of expert trainers thought this idea was very promising.

Participant B: I strongly disagree. Because a group of potential customers were totally unimpressed by this idea.

Participant C: I am on the fence. A group of retailers of fitness products gave this idea a neutral rating.

All-neutral

The rest of your team is already on the chat page and have been discussing these ideas for some time. Please read the last few lines of conversation on the group chat page.

Participant A: What I heard is that a group of expert trainers felt neutral about this idea.

Participant B: Yeah, I also got information about a group of potential customers gave this idea a neutral rating.

Participant C: I know that a group of retailers of fitness products felt neutral about this idea.

No preference

The rest of your team has not yet discussed this idea.