3-23-2017

Leaders on their Best Behavior: Leader Behaviors Resulting in Effective Virtual Teams

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Leader Behaviors Resulting in Effective Virtual Teams

by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
with a concentration in Management
Department of Psychology
College of Arts and Sciences
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Date of Approval:
March 9, 2017

Keywords: Virtual leaders, teams, leader behaviors, consideration, initiating structure

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

A more globalized workforce, coupled with technological advances in electronic communication, have led organizations to turn to virtual work teams at a rapidly increasing rate (Gilson, Maynard, Young, Vartiainen, & Hakonen, 2015). Leadership has been shown to aid team performance across work domains (Morgeson, DeRue, & Karam, 2010), and there exist a host of functional leader behaviors that have been found to benefit face-to-face team performance (Burke, Stagl, Klein, Goodwin, Salas, & Halpin, 2006). Attention to leadership in this new era of work teams is necessary to identify those specific behaviors that enable effective *virtual* team functioning. Team performance, whether in the virtual context or face-to-face, requires attention to taskwork (i.e., what people do) as well as the required teamwork (i.e., how people work together to go about doing the tasking; Morgan Jr, Glickman, Woodard, Blaiwes, & Salas, 1986). Thus, drawing upon the Consideration and Initiating Structure classification of leader behaviors, the current study sought to determine which behaviors are most critical to virtual team effectiveness and other important outcomes, specifically within the context of a virtual team working on a decision-making task. This study determined that Consideration leader behaviors are most beneficial for virtual team performance, team member satisfaction, and team potency in a decision-making context. Further, perceived leader effectiveness was found to predict team member satisfaction and team potency. This work has important implications for both science and practice, including extending existing leadership theory to a new context (i.e., virtual teams) and influencing leader behaviors for decision-making teams across work domains.

CHAPTER ONE:

INTRODUCTION

A more globalized workforce, coupled with technological advances in electronic communication, have led to a rapid increase in organizational use of virtual work teams (i.e., "groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task"; Townsend, DeMarie, & Hendrickson, 1998, p. 17). More than 50% of organizations with 5,000 employees or more have used virtual teams (de Lisser, 1999), and over 60% of professional employees have worked in one or more (Kanawattanachai & Yoo, 2002) with 79% of some demographics (e.g., knowledge workers, such as software engineers) reporting that nearly all or all of their work is done through virtual teams (Ferrazzi, 2014). Large companies, such as PricewaterhouseCoopers and Whirlpool, use virtual teams throughout their organizations (Bell & Kozlowski, 2002), and a recent study found that 80% of large corporations (employing over 10,000 employees) surveyed predict using virtual teams in the future (i4cp, 2008).

This growing trend is not surprising given that organizations are facing pressures to adopt horizontal, decentralized, and more adaptive organizational structures (Badrinarayanan & Arnett, 2008), creating more opportunities to use virtual teams (Townsend et al., 1998). Most organizations already rely on teams as their fundamental work configuration, and technological advances have enabled these teams to operate without the requirement of being physically or temporally collocated (Gilson et al., 2015). Further, virtual teams allow for the best employees

with specific expertise to work together regardless of location, offer flexibility in regards to when and where employees complete their tasking, and allow for enhanced—and even increased—interaction among members in organizations (Townsend et al., 1998). These advantages are thought to have led to a 50% increase in employee retention in organizations that use virtual teams (Thompson & Caputo, 2009). This enables organizations to capitalize on the potential value added of virtual teams (e.g., integrating information, reaching decisions, and implementing actions worldwide without incurring the high costs typically associated with travel or relocation) with the added benefit of having a satisfied workforce (Davison & Ward, 1999; Thompson & Caputo, 2009). Thus, organizations and researchers alike argue that virtual teams can increase organizational competitiveness (Fan, Chen, Wang, & Chen, 2014) by not only increasing employee satisfaction, but also increasing employee productivity, with some examples noting gains of up to 43% (Thompson & Caputo, 2009).

Given the increased use of these teams across operational domains, it is imperative to understand what makes virtual teams effective. Multiple factors are thought to contribute to the success of virtual teams, including establishment of shared norms (Sarker, Lau, & Sahay, 2001), effective electronic communication (Powell, Piccoli, & Ives, 2004), a clear team structure (Kaiser, Tullar, & McKowen, 2000), and team leadership (Bell & Kozlowski, 2002; Blackburn, Furst, & Rosen, 2003; Fjermestad & Hiltz, 1998; Gilson et al., 2015; Hoch & Kozlowski, 2014; Huang, Kahai, & Jestice, 2010; Kahai, Fjermestad, Zhang, & Avolio, 2007; Kayworth & Leidner, 2002; Martins, Gilson, & Maynard, 2004; Powell et al., 2004). Leader effectiveness and team performance share a strong relationship (House & Baetz, 1979; Smith, Carson, & Alexander, 1984; R. M. Stogdill & Bass, 1981), making the impact of leadership in virtual settings a notable area of study. From a functional perspective, virtual team leaders—like their face-to-face counterparts—

are expected to fulfill the roles necessary, although not fully sufficient, for virtual teams to operate, including defining the mission, setting expectations, shaping the culture, and coaching and motivating members of the team (Blackburn et al., 2003). The literature has noted losses in teamwork processes (e.g., coordination and motivation) specific to virtual work arrangements (Bell & Kozlowski, 2002; Malhotra, Majchrzak, & Rosen, 2007; Martins et al., 2004; Zigurs, 2003). Researchers argue that leaders of virtual teams could also serve as mechanisms for reducing these losses, thereby mitigating the negative effects of disconnects that can accompany virtual work (Bearman, Paletz, Orasanu, & Thomas, 2010).

In contrast to the abundance of attention face-to-face team leadership has received in the scholarly literature (see Yukl, 1989) as well as the popular press (e.g., a search for "workplace leadership" produces 452 results in Harvard Business Review and 275 results in Bloomberg Business; C. C. Chen & Meindl, 1991), efforts investigating *virtual* team leadership is lacking (Gibson & Gibbs, 2006; Hambley, O'Neill, & Kline, 2007; Hoch & Kozlowski, 2014; Kirkman, Gibson, & Kim, 2012; Martins et al., 2004; O'Leary & Mortensen, 2010; Siebdraht, Hoegl, & Ernst, 2009). As such, there has been a call for research specifically looking at leadership of virtual teams (Badrinarayanan & Arnett, 2008). Purvanova and Bono (2009) stress the importance of considering the specific context of work when studying leadership. Martins and colleagues (2004) suggest that research should focus on how team leaders structure interactions, motivate effort, and provide feedback. Clearly, there is a need to empirically evaluate effective virtual team leader behaviors, but as Powell and colleagues (2004) echo the question that begs an answer: "Can a set of behaviors that promote effectiveness of a wide range of virtual teams be identified?" (p. 16).

First, to address the issue at hand, a definition of virtual teams is presented along with a discussion of how this type of team differs from a face-to-face team. This includes acknowledging

the advantages that virtual teams offer over and above traditional face-to-face teams as well as potential pitfalls associated with a virtual work context. Then, after laying the foundation of what constitutes virtual teams, leader behaviors and the relationships between these behaviors and team outcomes, mainly performance outcomes as well as perceived leader effectiveness, are examined. This is integrated to present a series of hypotheses regarding leader behavior effectiveness in virtual teams.

Virtual Teams

Virtual teams have been conceptualized as a strategic human resource (HR) management initiative (Germain & McGuire, 2014), as well as a new form of organizational and work structure (Iorio & Taylor, 2014; Schiller & Mandviwalla, 2007). These teams have also been described as an "effective structural mechanism" to effectively address the increased time, travel, coordination, and expenses necessary to form a team of individuals who are dispersed geographically, temporally, and/or functionally (Martins et al., 2004). Unfortunately, multiple definitions for virtual teams exist, and Fiol and O'Connor (2005) conclude there is little consensus among researchers on the exact meaning of virtual teams. One common definition refers to virtual teams as "groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task" (Townsend et al., 1998).

Virtual team members are generally diverse, as the nature of virtual teams enables greater collaboration across distance and time (e.g., Huang et al., 2010). Specifically, virtual team members are typically diverse in their experiences, functions, decision-making styles, and interests (Malhotra et al., 2007). Virtual teams also vary widely on their lifespans and fluidity of

memberships (Purvanova & Bono, 2009). The purposes of virtual teams can vary considerably depending on the organization, but these teams can exist to complete a specific task (temporary teams) or to address ongoing issues (more permanent teams; Townsend et al., 1998). Overall, virtual teams are often assigned to handle tasks of great importance (Kirkman, Rosen, Tesluk, & Gibson, 2004; Leenders, Van Engelen, & Kratzer, 2003).

Distinguishing Features and Advantages

The importance, and widespread use, of virtual teams stems from their distinguishing features and advantages above and beyond the more traditional face-to-face team. Virtual teams can possess different team structures, goals, and purposes than those of traditional teams (Bell & Kozlowski, 2002). Also, as previously discussed, virtual team members diverge from face-to-face team members in terms of diversity across geographic regions, experiences, and functions. Taking these differences into account, virtual teams also experience different hurdles to performance than face-to-face teams, which will be discussed in more detail later.

There are multiple reasons organizations choose to use virtual teams, such as the ability to enhance collaboration among employees in different locations, improve productivity, minimize travel costs, and allow for global projects (Society for Human Resource Management, 2013). Other advantages associated with this type of team include high flexibility for employees (Bell & Kozlowski, 2002) and combination of expertise and talent regardless of geographic region (Kirkman, Rosen, Gibson, Tesluk, & McPherson, 2002). Additionally, this type of team offers more flexibility in scheduling, including allowing employees to telecommute (Solomon, 2001). In the same vein, virtual teams also offer staffing flexibility to meet market demands and decreased travel expenses (Hoch & Kozlowski, 2014; Kirkman et al., 2012).

However, attention must also be paid to the disadvantages associated with virtual teams, especially those that can hurt team performance, including lower levels of task satisfaction, trust, team commitment, and team cohesion (Hoch & Kozlowski, 2014). To an extent, these disadvantages can be avoided by employing effective team leaders (Avolio, Kahai, & Dodge, 2001; Iorio & Taylor, 2014). Yet, most researchers agree that leading virtual teams is more difficult than leading traditional, face-to-face teams due to the dispersion of team members as well as the reduced face-to-face contact among team members (Bell & Kozlowski, 2002; Duarte & Snyder, 2001; Gibson & Cohen, 2003; Hinds & Kiesler, 2002; Lipnack & Stamps, 2000). Therefore, as organizations increasingly rely on virtual teams, it is imperative that organizations, leaders, and team members alike, understand the behaviors that allow these teams to be most successful.

Virtual Leadership

Ferrazzi (2014) suggests that appropriate leadership is one of the four "must-have features" of successful virtual teams. However, the Society for Human Resource Management found that 25% of HR professionals cite leading virtual teams as being a common challenge (Society for Human Resource Management, 2012). Unfortunately, this claim is not surprising, as past research has concluded that traditional teams typically experience higher levels of effective leadership compared to virtual teams (K. Burke & Aytes, 1998; Eveland & Bikson, 1988). Additionally, work by Kirkman and colleagues (2002) outlines common challenges and associated solutions for virtual teams, including establishing trust, creating synergy, experiencing inclusiveness and involvement, utilizing teamwork and technical skills, assessing performance accurately, and developing and supporting team members through feedback and coaching. Fortunately, theory can provide insight that will help translate proven effective face-to-face team leader behaviors to

virtual team environments by focusing on the previously described virtual team features and challenges associated with this type of team.

Effective Leader Behaviors

As noted above, it has been established that, in general, leadership aids team performance across work domains (Morgeson, DeRue, & Karam, 2010). The specific behaviors enacted by team leaders are important as they relate to leadership functions that can create the conditions needed for effectiveness (C. S. Burke et al., 2006). There exist a host of leader behaviors that benefit face-to-face team performance, such as those associated with task accomplishment. Specifically, leaders are often charged with delegating tasks among team members (Tyran, Tyran, & Shepherd, 2003), as well as ensuring team members understand objectives and develop routines to accomplish those objectives. Further, effective leaders create conditions for their teams that foster attention and motivation (Gersick & Hackman, 1990). Corroborating the importance of such behaviors, studies enlisting the behavioral perspective with a focus on leadership have thrived in past years (C. S. Burke et al., 2006).

For example, C.S. Burke and colleagues (2006) created a framework that highlights the importance of the relationships between the functions of leaders, specific behaviors of leaders, and team performance. In addition, consistent with functional leadership theory (McGrath, 1962), Morgeson and colleagues (2010) argue that specific leadership functions exist within teams, allowing for critical team needs to be met. This approach asserts that the ultimate goal is to improve team effectiveness, through the process of team needs being satisfied as a result of leadership functions. In an effort to compile all leader behaviors, a taxonomy of 15 leadership functions was created, which includes functions such as establishing expectations, sense making, providing

feedback, providing resources, and supporting the social climate (Morgeson et al., 2010). The current work is important as it stemmed from these previous efforts to understand the behaviors leaders truly need to focus on in virtual teams, as there are both tasks to complete and individuals to manage.

Consideration and Initiating Structure Classification of Behaviors

As noted by Fleishman and colleagues (1991), a trend emerged from the classification systems used to describe behaviors, specifically the dichotomization of leader behaviors into two categories: behaviors involving task accomplishment and behaviors involving team interaction and/or development. Leaders must engage in both task-focused behaviors, such as the task distribution within the team, in addition to interpersonal behaviors, like communicating the team's vision to team members (Tyran et al., 2003). As such, leader behaviors can be categorized into two common classifications of leader behaviors, known as Consideration and Initiating Structure (Fleishman, 1973). These two categories also are referred to as the Ohio State leader behaviors (Judge, Piccolo, & Ilies, 2004), with the predominant studies conducted by Ohio State University researchers Stogdill, Shartle, and Hemphill (1950). Consideration refers to leader behaviors that involve concern for employees' well-being, support, and approachability and facilitate team interaction and development. This classification has also been defined as the degree to which leaders show concern and respect for followers, concern for the followers' welfare, and an expression of appreciation and support (Bass, 1990). These behaviors focused on individuals facilitate interactions, cognitive structures, and attitudes that need to be in place prior to team members working effectively together (Salas, Dickinson, Converse, & Tannenbaum, 1992), and these behaviors help to maintain cohesive social relationships within the team (C. S. Burke et al.,

2006). Leaders who perform Consideration behaviors are more empathetic (Fleishman & Salter, 1963) and should be skilled at sensing and fulfilling needs of followers (Judge et al., 2004).

Initiating Structure refers to leader behaviors that involve clarifying task responsibilities, providing direction, and setting expectations for subordinates and focus on task accomplishment. This category of behaviors has also been defined as the degree to which leaders outline and organize roles, are oriented toward the attainment of goals, and establish clear patterns and methods for communication (Fleishman, 1973). C. S. Burke and colleagues (2006) note that these leader behaviors emphasize accomplishment of task-related objectives through the reduction of conflict and role ambiguity. These task-focused behaviors enable the obtainment of information related to the task, as well as an understanding of task requirements and procedures (Salas et al., 1992). Leaders engaging in Initiating Structure behaviors would be expected to be more effective at meeting role expectations (Halpin, 1957). Although these two categories of behaviors can appear mutually exclusive in terms of the classification of behaviors, it should be noted that it is possible for a leader to display both types of behaviors (Chung, 1987; Hacioglu, Dincer, & Ipekci, 2014).

After the discovery of these leader behaviors in the 1940s, Consideration and Initiating Structure permeated the leadership literature until the popularity of transformational leadership took hold in the 1970s (Judge et al., 2004). Even still, the behavioral categories were understood to be among "the most robust of leadership concepts" (Fleishman, 1995, p. 51). More recently, a meta-analysis conducted by Judge and colleagues (2004) revealed that Consideration and Initiating Structure are still valid measures of leadership. Specifically, the researchers used 163 correlations for Consideration and 159 correlations for Initiating Structure to determine both have moderately strong, positive relationships with a variety of leadership outcomes (with corrected correlations of .48 and .29, respectively). The authors determined that Consideration was more closely related to

follower satisfaction (e.g., with the leader, with the job), while Initiating Structure was more related to performance (e.g., of the leader, group, and organization). Moreover, others have voiced concern over the neglect of this framework, stating the categorization of leader behaviors has gone awry when the framework was dismissed widely (Pearce et al., 2003). Logically, it is advantageous to use the Consideration and Initiating Structure categorization for studying leader behaviors in virtual teams, as researchers argue that we need to apply existing frameworks previously validated in face-to-face teams to virtual teams as a basis for comparison to truly advance virtual team research by identifying potential boundary conditions to existing theory (Martins et al., 2004).

These categorizations posited by Fleishman (1973) have gained other titles over the years, such as taskwork and teamwork behaviors (McIntyre & Salas, 1995; Morgan Jr et al., 1986), task and interpersonal behaviors (Reaser, Vaughan, & Kriner, 1974), task and socio-emotional processes (Powell et al., 2004), directive and participative behaviors, task-focused and person-focused behaviors (C. S. Burke et al., 2006), task-oriented and relationship-oriented behaviors (Yukl, 1989), and task-oriented and human relations behaviors (Yoo & Alavi, 2004), among others.

Regardless of how one conceptualizes the classification of behaviors, the overarching themes are task-related behaviors and interpersonal-related behaviors. C. S. Burke and colleagues (2006)'s meta-analysis suggests both types of leader behaviors are functional for teams. Specifically, they determined that both task-focused behaviors (r = .20) and person-focused behaviors (r = .28) were related to team productivity. However, C. S. Burke and colleagues (2006) note that context may play a role in which behaviors are most effective.

The virtuality of teams is one contextual factor that requires replicating use of such behaviors to determine the degree to which these relationships hold true. As compared to face-to-

face teams, virtual teams are characterized by their complex tasking, as well as their diverse team memberships, which could require the use of either Consideration behaviors, Initiating Structure behaviors, or both types. Additionally, virtual teams face unique challenges, including lack of physical and social interaction, loss of face-to-face synergies, absence of trust, and greater concerns with predictability and reliability (Cascio & Shurygailo, 2003). With these differences in mind, Zigurs (2003) concluded that virtual team leaders cannot simply transfer behaviors used in traditional teams over to virtual teams and expect to be successful to the same degree in the new environments. As such, virtual team leaders may need to lead in such a manner that differs from that of traditional team leaders (Powell et al., 2004). However, researchers theorizing about the virtual team context (Bell & Kozlowski, 2002; Gilson et al., 2015) generally agree that leadership, of any kind, is necessary as it is widely held that effective leader behaviors aid team performance, regardless of context.

Virtual Leader Behaviors and Behavioral Complexity Theory

Theory regarding virtual team leadership has grown extensively in recent years, with a great deal of attention given to leader behaviors (C. S. Burke et al., 2006). For instance, Solomon (2001) concluded that successful managers of virtual teams understand how to foster communication and collaboration among team members despite temporal and/or geographic distance, outlining specific guidelines to set virtual teams up for success, including standardizing protocols for working, creating clear goals, and identify barriers inhibiting collaboration – behaviors that leaders can implement in teams. Others argue that an effective virtual team leader must be flexible and willing to let other team members take the lead when necessary (Eveland & Bikson, 1988). Still others suggest that establishing routines and clearly defining roles is key (Bell

& Kozlowski, 2002). This seems contradictory as some are arguing for an emphasis on Consideration behaviors, while others are arguing for a focus on Initiating Structure behaviors.

Behavioral complexity theory posits that leaders who exhibit sets of behaviors that are *complex* and *diverse* are perceived as more effective than leaders who rely on just a few simple behaviors that are similar in nature (Denison, Hooijberg, & Quinn, 1995). Specifically, the most effective leaders show a wider range of both task (i.e., initiating structure) and relationship (i.e., consideration) behaviors (Hooijberg, Hunt, & Dodge, 1997). Such diversity in behaviors is necessary given the nature of today's work, with leaders often facing paradox and contradiction (Kayworth & Leidner, 2002; Zhang, Fjermestad, & Tremaine, 2005). This argument for diverse behaviors is logical within a virtual team setting due to the need for tasking and relationship guidance from leaders of virtual teams. Because virtual team members are often not physically or temporally collocated (Gilson et al., 2015) and tend to possess differential expertise, while at the same time experiencing enhanced, and even increased, interaction with other team members (Townsend et al., 1998), Consideration behaviors are necessary to address teamwork issues that may arise in this context. Additionally, because virtual teams offer team members flexibility in terms of timelines and locations for completing tasks, Initiating Structure behaviors assist with the taskwork component of virtual teams.

As noted above, researchers argue that virtual teams may require more relationship-focused leader behaviors due to the lack of opportunity for members to interact via traditional means (Howell & Hall-Merenda, 1999). Yet, there is no evidence to suggest that virtual teams need less Initiating Structure behaviors as their tasking is just as, if not more complex, than face-to-face teams (Wakefield, Leidner, & Garrison, 2008). Drawing from behavioral complexity theory, we can argue that effective virtual leaders need to display a wide range of behaviors, specifically

through activities related to relationships and tasks, supporting the use of both Consideration and Initiating Structure behaviors as an effective leadership practice (Kayworth & Leidner, 2002). Thus, I further hypothesize:

> *Hypothesis 1: The use of both Consideration and Initiating Structure leader behaviors will result in greater virtual team performance than one set of behaviors alone.*

With the belief that these sets of behaviors will predict virtual team performance, it is still important to determine (a) if both sets of behaviors used together are better for virtual team performance than only one set of behaviors and (b) if one set of behaviors alone is better for virtual team performance than the other set of behaviors. Given the nature of virtual teams, there can be limited time for leaders to interact with team members. In such instances, leaders need to know what to focus on for maximum effectiveness when constrained by tight timelines. However, based on previous research, it is difficult to determine which type of behavior is more important. In face-to-face teams, Consideration behaviors have been shown to possess a stronger relationship with team productivity (r = .28) than task-focused behaviors (r = .20; C. S. Burke et al., 2006), as well as stronger relationships with various leadership outcomes (Judge et al., 2004). A limited body of research has provided some empirical support to effective virtual team leader behaviors, finding that the most effective were regular communication, diligence in answering team member questions, and providing timely feedback and directions (Kayworth & Leidner, 2002). Those deemed as the most effective virtual team leaders also assumed a mentoring role on the team, while exhibiting a high degree of understanding or empathy toward their team members (Fan et al., 2014). Other work has suggested that virtual teams benefit from the "caretaker" roles inherent in leaders, supporting regular communication within teams to identify responsibilities of team

members (Vogel et al., 2001). This suggests that Consideration behaviors might be more important. On the other hand, however, Initiating Structure behaviors that are chiefly focused on task accomplishment have been found to clarify path-goal relationships for subordinates and lead to higher performance rates for tasks that are not autonomous (House, 1971). Further, these behaviors are more strongly related to group-organization performance than Consideration behaviors (Judge et al., 2004). As there is mixed evidence regarding which single set of behaviors is more important for effectiveness and a lack of guiding theory, the current work will address the following two research questions:

Research Question: Will the use of either only Initiating Structure leader behaviors or only Consideration leader behaviors result in greater virtual team performance?

In addition to objective measures of team performance, subjective measures (e.g., team members' attitudes) can offer additional insight into the functioning of a team. The attitudinal construct of team member satisfaction, or perceived team member satisfaction, indicates the degree to which team members are satisfied with their experiences as a team (Gladstein, 1984). The satisfaction of team members seems to have an impact on the "overall well-being" of teams (Jeanquart Miles & Mangold, 2002, p. 114) and is correlated with the presence of effective communication and cooperation, as well as workload sharing and social support (Campion, Medsker, & Higgs, 1993). Conceptualized as both an output and an input in the widely used Input-Mediator-Output-Input model (Ilgen, Hollenbeck, Johnson, & Jundt, 2005), team member satisfaction emerges as both an outcome of team processes and performance cycles and also serves as an input for future team interactions (Li, Li, & Wang, 2009). As an outcome, team member satisfaction has been found to result from leadership performance (Jeanquart Miles & Mangold, 2002). As such, researchers have called for more work examining the impact of leadership on

emergent affective states, such as satisfaction (C. S. Burke et al., 2006). Given that behavioral complexity theory argues diverse sets of leader behaviors are more effective, and more effective leadership leads to greater satisfaction, it follows that both Consideration and Initiating Structure together would result in the highest levels of team satisfaction, particularly in virtual teams where a clear structure enables effective communication (Kayworth & Leidner, 2002). Castaneda and Nahavandi (1991) determined that followers' satisfaction within face-to-face teams was highest when leaders' behavioral approaches included both Consideration and Initiating Structure behaviors. However, when considering just one behavior alone, Consideration behaviors can cause subordinates to feel that their leaders are concerned and caring, which in turn, should increase satisfaction. Indeed, Mullen, Symons, Hu, and Salas (1989) discovered that Consideration behaviors demonstrated a stronger relationship (r = .26) with subordinate satisfaction than Initiating Structure behaviors (r = .19) in face-to-face teams. Based on this previous evidence, I hypothesize:

> *Hypothesis 2: The use of both Consideration and Initiating Structure leader behaviors will result in the highest levels of satisfaction and those who only experience Initiating Structure leader behaviors will report the lowest levels of satisfaction.*

Another important outcome related to team leadership is potency. Group potency is defined as a group's collective belief that it can be effective in accomplishing various types of tasks (Guzzo, Yost, Campbell, & Shea, 1993), which enables team effectiveness (Hackman, 1990). Specifically, team potency directs team members' attention to the team goals, increases the team's efforts, and allows the team to succeed even in adverse conditions (Bandura & Locke, 2003). Bass (1990) found a strong positive relationship between transformational leadership and team potency.

Transformational leadership relates to both Consideration (ρ = .74) and Initiating Structure (ρ = .50) behaviors (Piccolo et al., 2012), which aligns with behavioral complexity theory. Sosik, Avolio, and Kahai (1997) determined that leadership styles affected subsequent group potency beliefs in face-to-face teams. More specifically, Hu and Liden (2011) discovered links between team potency and servant leadership (characterized by the leader acting in the best interests of subordinates and caring about members' needs and growth), suggesting that certain types of leader behaviors (e.g., Consideration) are related to team potency. As such, it seems both behaviors may be necessary for higher levels of perceived team potency, with Consideration perhaps being more strongly related to potency than Initiating Structure alone. Therefore, considering these previous works, I hypothesize:

> *Hypothesis 3: The use of both Consideration and Initiating Structure leader behaviors will result in the highest levels of potency and those who experience only Initiating Structure leader behaviors will report the lowest levels of potency.*

Perceptions of Virtual Leader Effectiveness

Another subjective measure important to team outcomes of interest relates to member perceptions. For instance, Foo, Sin, and Yiong (2006) conclude that team perceptions of important variables, such as common interests and feelings of commitment, are influential in team decision making specifically. Because leadership is embedded in complex interpersonal interactions over time (Leidner, Kayworth, & Mora-Tavarez, 1999), perceptions of leadership can have implications for multiple team functions and outcomes, including performance. As Giessner, Van Knippenberg, and Sleebos (2009) demonstrated, employees who viewed their leaders as successful performers also rated their leaders as effective, and as the researchers added, the effects of perceived leader

effectiveness, as outcomes of team interactions and processes, should not be discounted. For example, Gaddis, Connelly, and Mumford (2004) found that lower perceptions of leader effectiveness in followers was related to lower quality performance. As an argument for the importance of perceived leader effectiveness and its effects on performance outcomes as a result of team interactions has been previously made, I hypothesize:

Hypothesis 4: Perceived leader effectiveness will predict virtual team performance, such that individuals who report greater perceived leader effectiveness will experience higher virtual team performance compared to individuals who report lower perceived leader effectiveness.

Links between other outcomes of interest and perceptions of the effectiveness of a leader have also been studied. Sharbrough, Simmons, and Cantrill (2006) determined a relationship exists between perceived leader effectiveness and employee satisfaction; the more a leader is perceived to be effective in his or her role, the more satisfaction the employee or follower reports. For instance, Kayworth and Leidner (2002) determined that effective leaders of virtual teams have team members that are satisfied with communication and perceive the leader to be effective in communication. As Barczak and Wilemon (2001) also found in product development teams, effective leadership led to team member satisfaction. Following the same reasoning, I hypothesize:

Hypothesis 5: Perceived leader effectiveness will predict perceived team member satisfaction, such that individuals who report greater perceived leader effectiveness will also report higher team member satisfaction compared to individuals who report lower perceived leader effectiveness.

In addition to the effects of perceived leader effectiveness on performance and satisfaction, perceptions of leader behavior have been positively linked to group potency (Shamir, Zakay,

Breinin, & Popper, 1998). As previously mentioned, team potency has been defined as "generalized beliefs about the capabilities of the team across tasks and contexts" (Gully, Incalcaterra, Joshi, & Beaubien, 2002, p. 820), and followers' perceptions of leadership can influence their perceptions of team potency (Sivasubramaniam, Murry, Avolio, & Jung, 2002). However, there is not a wealth of information regarding the antecedents of team potency perceptions, but it has been established that leadership styles and team potency are related (Hu & Liden, 2011). Based on this previous evidence, I hypothesize:

Hypothesis 6: Perceived leader effectiveness will predict perceived team potency, such that individuals who report greater perceived leader effectiveness will also report higher team potency compared to individuals who report lower perceived leader effectiveness.

Additionally, the manner in which perceptions of leader effectiveness interact with other contextual variables should be examined. Specifically, a question of interest is: how do individual perceptions of leader effectiveness within virtual teams affect the relationships between leader behaviors and subjective outcomes of interest? Past research has determined that perceptions of leader effectiveness are associated with communication satisfaction (Leidner et al., 1999), as well as leader satisfaction, the psychological salience of teams, and team identification (Hogg et al., 2005). Further, as already mentioned, a relationship exists between perceived leader effectiveness and employee satisfaction (Sharbrough et al., 2006). Thus, regardless of what type of behaviors a leader exhibits, if the team members perceive the leader as effective, they are likely to be satisfied. Therefore, I hypothesize:

Hypothesis 7: Perceived leader effectiveness will moderate the relationship between enacted leader behaviors and perceived team member satisfaction, such

that individuals who experience Initiating Structure leader behaviors, but perceive their leader to be effective, will report similar levels of satisfaction to those who experience Consideration leader behaviors.

As previously mentioned, research has shown that subordinates' perceptions of leadership also influence perceptions of team potency (Sivasubramaniam et al., 2002). Specifically, research has demonstrated that perceived transformational leadership affects team potency (Schaubroeck, Lam, & Cha, 2007). Further, perceptions of leader supportive behavior have been linked to group potency (Shamir et al., 1998). Taken together, this suggests that there may be a similar moderating effect on the relationship between leader behaviors and perceived team potency. Specifically, I hypothesize:

Hypothesis 8: Perceived leader effectiveness will moderate the relationship between enacted leader behaviors and perceived team potency, such that individuals who experience Initiating Structure leader behaviors, but perceive their leader to be effective, will report similar levels of team potency as compared to those who experience Consideration leader behaviors.

All hypotheses for the study can be found in Table 1, and the relationships are depicted in Figure 1.

Table 1

Study Hypotheses

H1	The use of both Consideration and Initiating Structure leader behaviors will result in greater virtual team performance than one set of behaviors alone.
RQ	Will the use of either only Initiating Structure leader behaviors or only Consideration leader behaviors result in greater virtual team performance?
H2	The use of both Consideration and Initiating Structure leader behaviors will result in the highest levels of satisfaction and those who only experience Initiating Structure leader behaviors will report the lowest levels of satisfaction.
H3	The use of both Consideration and Initiating Structure leader behaviors will result in the highest levels of potency and those who experience only Initiating Structure leader behaviors will report the lowest levels of potency.
H4	Perceived leader effectiveness will predict virtual team performance, such that individuals who report greater perceived leader effectiveness will experience higher virtual team performance compared to individuals who report lower perceived leader effectiveness.
H5	Perceived leader effectiveness will predict perceived team member satisfaction, such that individuals who report greater perceived leader effectiveness will also report higher team member satisfaction compared to individuals who report lower perceived leader effectiveness.
H6	Perceived leader effectiveness will predict perceived team potency, such that individuals who report greater perceived leader effectiveness will also report higher team potency compared to individuals who report lower perceived leader effectiveness.
H7	Perceived leader effectiveness will moderate the relationship between enacted leader behaviors and perceived team member satisfaction, such that individuals who experience Initiating Structure leader behaviors, but perceive their leader to be effective, will report similar levels of satisfaction to those who experience Consideration leader behaviors.
H8	Perceived leader effectiveness will moderate the relationship between enacted leader behaviors and perceived team potency, such that individuals who experience Initiating Structure leader behaviors, but perceive their leader to be effective, will report similar levels of team potency as compared to those who experience Consideration leader behaviors.

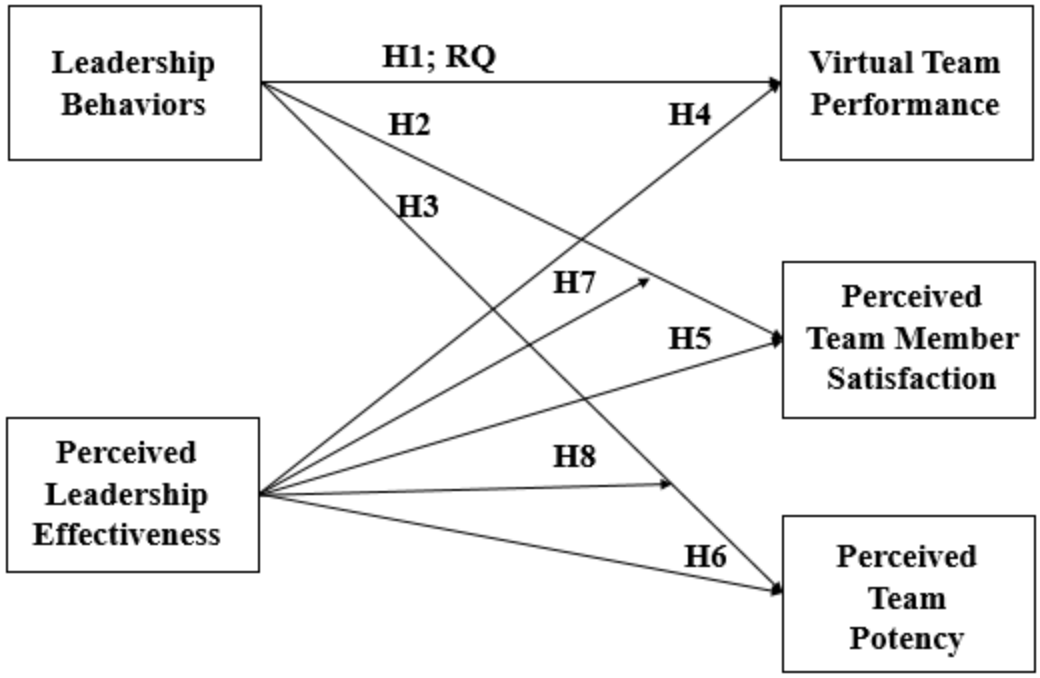

Figure 1. Hypotheses tested in the study.

CHAPTER TWO

METHOD

This study examined virtual teams engaged in a decision-making task with a confederate external leader, who was trained on behaviors to engage in periodically — either with an emphasis on Initiating Structure or taskwork behaviors (e.g., creating schedules, assigning tasks), Consideration or teamwork behaviors (e.g., providing team member support, engaging in friendly conversations), or both types of behaviors. These behaviors were scripted and implemented via an online discussion board, resulting in three conditions to measure the effects of leader behaviors.

Participants

Eighty-four teams, totaling 252 participants were recruited through the undergraduate participant pool at a large southeastern university. After removing five teams (15 participants) due to technical issues and 16 teams (63 participants) due to suspicion of confederates being used in the study, 58 teams (174 participants) remained. However, only teams whose participants passed the familiarity with technology check and the attention checks were retained. Three individuals indicated they were "completely unfamiliar with technology", and therefore, they and their teams were removed from the analyses. Further, nine participants failed at least one of the three attention checks (i.e., three different participants failed each of the checks), resulting in a final sample of 165 participants and 55 teams. See Figure 2 for a depiction of removed cases.

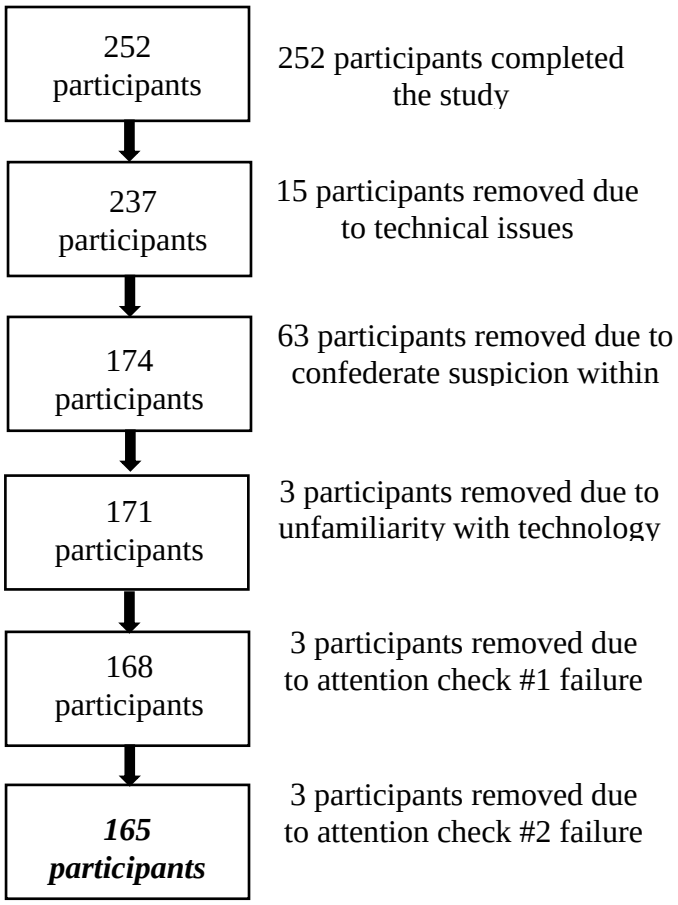

Figure 2. Data removal for analyses flowchart.

Each participating team consisted of four individuals. The three team members were participants, and the leader of each team was the confederate, representing a team with a formally appointed leader. On average, participants were at least 18, with a mean of roughly 21 years old (*SD* = 3.11). Seventy-six percent of participants were female. In terms of ethnicity, 40% of participants were Caucasian, 20% were Hispanic, 13% were African American, 8% were Asian, and 13% of participants indicated "Other" with about 6% choosing not to disclose. Of the participants, about 16% were college freshmen, 20% were sophomores, 30% were juniors, 30% were seniors, and 4% were at levels higher than senior. As such, about 77% of the sample

possessed a high school diploma at the time of the study, 20% held an Associate of Arts degree, 2.5% held a Bachelor's degree, and 0.5% possessed a doctorate degree. Participants were required to have previous work experience. At the time of the study, participants had worked in their job position for about one and a half years on average (*SD* = 22.76), with the highest tenure being 16 years and the lowest being one month. The industries in which the participants worked are diverse, with a few example responses ranging from medical assistant and retail associate to server and consultant. This particular sample of employed college students is justified for a number of reasons. First, by imposing the requirement of employment for participation, the data represents working individuals who have most likely been involved with at least one work team during their job tenure. Second, regardless of the specific industries in which the participants are employed, these individuals likely have reached decisions as members of teams, equipping them with previous experience of the type of experimental task being utilized.

Measures

The full list of scales and items that were used in this study can be found in Appendix A. In addition to the variables of interest already mentioned, the team aggregates of individual collective orientation and attitudes to teamwork were measured to be used as covariates to control for teamwork-related variables that may have affected the performance of teams. Using these variables as covariates allows for an accurate interpretation of virtual team performance as affected by the leader behaviors of interest, regardless of preexisting individual differences related to teamwork. Further, an individual-level measure of cognitive ability was used to capture this variable as a covariate in the individual-level analyses. This construct has been found to be one of the strongest predictors of job performance (Hunter & Hunter, 1984), and using this variable as a

covariate allows for an accurate interpretation of individual perceptions regardless of this specific individual difference.

Collective Orientation

Collective orientation, which can be defined as the propensity to work in a collective manner in team settings (Driskell, Salas, & Hughes, 2010), was analyzed as a potential covariate. The 15-item scale demonstrated good reliability ($\alpha = .84$). Example items include: *"I always ask for information from others before making any important decision"* and *"When solving a problem, it is very important to make your own decision and stick by it."* Items were rated using a five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*).

Attitudes to Teamwork

Attitudes to teamwork were also measured as a potential covariate in this study. A scale measuring participants' attitudes to teamwork was used to assess the participants' preconceptions regarding working in team settings. The five-item scale used in the present study was adapted from the work of Crichton (2005). An example of one of the items included in the scale is: "*The culture of a team makes it easy to ask questions where there is something I do not understand.*" Items were rated using a five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). The Cronbach's alpha of the five-item scale in the current study was poor ($\alpha = .39$). Removing one item ("*I consider it better to agree with other team members than to voice a different opinion.*") improved alpha to an extent ($\alpha = .65$), yet still not to an acceptable level. Thus, given the poor reliability, this variable was excluded from further analysis.

Familiarity with Technology

To ensure participants had adequate levels of familiarity with technology, specifically computers, one item developed for this study was administered to participants: "*How comfortable are you with technology, specifically computers?*" Participants responded using a five-point Likert-type scale (1 = *completely uncomfortable*, 5 = *completely comfortable*).

Demographics

Participants were asked to report their age, gender, and ethnicity. They were also asked to report their educational status (grade in college), any academic degrees they earned, their current job title, how long they have been in their current position (at the time of the study), and the average number of work hours per week.

Cognitive Ability

The individual-level covariate of this study is cognitive ability, which was measured in two ways: SAT and ACT scores and the International Cognitive Ability Resource measure (ICAR). First, cognitive ability was measured using the participants' standardized testing scores on two widely used and known tests. The Scholastic Assessment Test (SAT) and American College Test (ACT) have been found to correlate highly with established measures of cognitive ability, indicating that both are acceptable measures of general intelligence (Koenig, Frey, & Detterman, 2008; Schmidt, 1988). Additionally, SAT and ACT scores tend to be highly related to each other (Koenig et al., 2008) reporting a relationship of $r = .87$. Further, researchers have frequently used standardized tests as indicators of cognitive ability previously (e.g., LePine, Hollenbeck, Ilgen, & Hedlund, 1997; LePine, LePine, & Jackson, 2004; Phillips & Gully, 1997). Participants were asked

to report their composite score on the SAT (math and critical reading scores only; no writing scores) or ACT score. Participants were given the option to not respond to this question if they could not remember their scores. If the participant provided his or her ACT score instead of the SAT score, the ACT score was converted to an SAT score in order for the cognitive ability data to be consistent across participants. The College Board has provided a concordance table which was used to convert ACT composite scores into SAT composite (math and critical reading) scores.

In addition to reporting their SAT and ACT scores, participants also completed the ICAR (α = .73; Condon & Revelle, 2014), which is a public-domain assessment tool to measure cognitive abilities. Condon and Revelle (2014) determined that the ICAR measure was a valid and reliable option for measuring cognitive reliability and concluded the measure is moderately to strongly correlated with other measures of cognitive ability and achievement. For the purposes of this study, the 16-item measure provided through ICAR (also referred to as ICAR16) was administered to participants. This measure has been deemed appropriate for online administration and is composed of four sets with four questions each assessing verbal reasoning, letter and number series, matrix reasoning, and three-dimensional rotation, respectively. The verbal reasoning section assesses an individual's ability to work with words and sentences. The letter and number series section measures an individual's ability to identify patterns in alphanumerical data. The matrix reasoning section assesses an individual's capability to solve problems and think logically. Lastly, the three-dimensional rotation section evaluates an individual's spatial reasoning ability through the rotation of three-dimensional shapes. Each question has one correct answer which was used to score the responses. Participants were allotted the recommended 20 minutes to complete the ICAR16. The reliabilities of each subscale are .54, .67, .40, and .76, respectively. As mentioned earlier, the

number of items a scale contains affects reliability, and with only four items per subscale, reliability can be expected to be lower. Combining the four subscales yielded an alpha of .74.

Attention Check

To ensure each team member was participating in the study, an attention check was operationalized in the form of an evaluation of whether the team members participated in the team discussion necessary for the decision-making task. If a participant did not interact with team members or participate in discussion, the team's data was to be removed from analyses. However, all participants interacted via the chat feature, and thus, no teams were removed from analyses for this specific reason. Additionally, two items in the survey also served as attention checks (e.g., "*Please respond "Strongly Disagree" to this item"*). Three participants failed to correctly respond to the first attention check item, and thus, were removed from analyses. Further, an additional three participants failed the second attention check and were also removed from analyses.

Perceptions of Leader Behavior Quantity

Participants were asked to rate their team's leader (the confederate role) on how often he or she engaged in specific behaviors. This measure, developed for this study, serves as the manipulation check to ensure the behaviors of the leaders were perceived by the participants. The confederates only engaged in a specific, limited number of leader behaviors throughout the study, but this questionnaire posed a larger host of behaviors to participants to gauge their perceptions of the enacted behaviors, as well as behaviors not used by the confederate leaders (for a total of 28 behaviors). One Consideration behavior and one Initiating Structure behavior used (dependent on the condition) were presented to the participants among the other behaviors (e.g., 26 of the

behaviors listed were not scripted for the leaders). The stem of the items containing the behaviors read *"Please indicate the extent to which your team leader engaged in each of the following behaviors"*, and the response scale for these items was as follows: 1 = "*not at all"* to 5 = *"all of the time"*. The scale for the Consideration behaviors consisting of eight items showed good reliability (α = .90), as did the 13-item scale for Initiating Structure behaviors (α = .96).

Perceived Leader Effectiveness

Despite the experimental manipulations of leader behaviors, consideration should still be given to the perceptions of the participants regarding leadership. To measure the team members' perceptions of the effectiveness of their team leaders, the leader effectiveness items (α = .97 in this study) created by Denison et al. (1995) were adapted for use. An example item from this five-item measure is: *"I would rate the overall leadership effectiveness of my virtual team leader as:"* with response options ranging from 1 = *"poor"* to 5 = *"excellent".*

Team Member Satisfaction

Team member satisfaction was measured by adapting Gladstein (1984)'s three items as done by Van Der Vegt, Emans, and Van De Vliert (2001). The scale demonstrated good reliability in the current study (α = .95). An example item from this scale is*: "I am satisfied with my present team members."* The items were rated using a five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*).

Team Potency

Team potency was rated by team members using Riggs and Knight's (1994) seven-item scale, also referred to as the collective efficacy beliefs scale. This measure showed good reliability in the present study as well ($\alpha = .91$). An example item is *"The team I work with has above average ability."* The items were rated using a five-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*).

Experimental Task

The Desert Survival task (Lafferty & Pond, 1974) was used as the decision-making task, which required team members to order 15 items (e.g., folding knife, parachute, etc.) by importance with the goal of team survival when faced with the scenario of being stranded in a desert environment. The scenario was titled "Archaeological Dig in Egypt" for the experiment. Participants were told to imagine that their team (comprised of three archaeologists - themselves and two team members) was stranded during their research dig in the Egyptian desert after their plane crashed and was destroyed. To allow for specific individual tasks to be assigned by the leader within the scenario for the two conditions containing Initiating Structure behaviors, materials regarding desert survival and the Egyptian desert were available to the participants. A similar scenario is presented in Duh and Wen (2002). This task was appropriate for the research objectives because it is a content-free simulation, meaning participants were most likely not familiar with the content of the task, thus allowing their attention to be directed to the overarching group problem-solving process (Szumal, 2000). Typically, the Desert Survival task can be described as a disjunctive task, meaning the team can solve the problem and reach a decision if any one member of the team can do so (Laughlin & Bitz, 1975). Therefore, with this type of task, performance often

depends on the strongest team member (Colquitt, Hollenbeck, Ilgen, LePine, & Sheppard, 2002). However, to ensure that interaction between virtual team members was necessary for effective performance, the materials and readings on desert survival each team member received contained distributed information requiring team members to work together to complete the task. Therefore, the current experimental task required input from all team members and allowed for leader behaviors, team interactions, and performance indicators to be measured objectively.

This specific task (sometimes with differing contexts, such as a lunar or artic scenario) has successfully been used in team and group research (e.g., Dabbs & Ruback, 1987; Witte, 2007), in leadership studies (e.g., Murphy, Blyth, & Fiedler, 1992; Rus, van Knippenberg, & Wisse, 2012), and in virtual settings (e.g., Hauber, Regenbrecht, Hills, Cockburn, & Billinghurst, 2005; Potter & Balthazard, 2002). The full descriptive scenario presented to the participants can be found in Appendix B.

The dependent variable of virtual team performance was measured by the quality of the team's decision; the task has a correct ranking order of the 15 items predetermined by subject matter experts who designed the task (see Appendix C). Because the interest of this research is on the teams' decisions regarding the ranking of the items, virtual team performance was determined by comparing the teams' decisions to the correct decisions produced by the experts. The numerical distance of the team's final ranking for each item from the ranking of the experts was calculated to produce a score for the team. The lower the score, the better the team performed on the task. For example, if the experts ranked an item as fifth in terms of importance and the team ranked the same item as seventh, the team would receive two points for that item. Additionally, if the direction of the difference between a team's ranking of an item and the experts' ranking of the same item is reversed (with the team ranking being fifth and the expert ranking seventh), the team would still

receive two points for that specific item. Thus, the absolute values of the distances were used to calculate the summation of the distances between the teams' and the experts' rankings. The lowest (and best) possible score a team could receive was zero, and the highest (and worst) possible score was 112 (obtained by ordering the items completely backwards; e.g., last item as first, etc.). The average performance score was 72.21 (*SD* = 15.77). The worst obtained score was 112, and the best obtained score was 42. These scores were subtracted from the highest total possible score of 112 to recode for ease of interpretation, with higher scores representing higher levels of performance.

Procedure

Multiple teams completed the study at a time, by using large classrooms with numerous computers. To simulate virtual teams, when recruited, participants were instructed to arrive in one of three study rooms. After arrival, participants were assigned to specific pseudo names within their teams (e.g., Alpha, Bravo, and Delta) to use during the study, to ensure the anonymity of participants and confederates. Because gender may have an effect on perceptions, the names were gender neutral and culturally ambiguous. Additionally, all confederate leaders were given the same proxy name to ensure consistency across the roles (e.g., Leader). All Alpha team members were located in one room, all Bravo team members in another room, etc. Once a participant arrived, he or she was told that the rest of his/her team members, including the team leader, were located in other rooms to simulate a virtual team. Participants were not allowed to interact unless they were assigned to the same team, and to encourage participants in the same rooms (e.g., the Alphas) and participants across sessions (e.g., friends or classmates completing the study at different times) to not communicate with each other regarding the task, they were told that the teams were competing

in the task, and an artificial “leader board” of the top five teams in terms of performance was displayed in each room.

In terms of allowed communication, the members of a team could only communicate via the Google Hangouts technology through accounts created specifically for the study. Participants were logged into their accounts with unique usernames and passwords. The accounts utilized the Google Docs feature of Google Drive (where the actual task information and instructions were located in a word processing window and where the team prepared and saved its final decision on the task) and the Google Hangouts feature (only the chat feature; no audio or visual options were available to the participants).

Figure 3 details the steps of the study procedure. After receiving the aforementioned instructions regarding team members’ locations and before beginning the experimental task, the participants completed the first set of measures. Then, after the surveys were completed, the directions of the task were presented to the participants. Teams were instructed that they had 20 minutes (time limit based on previous studies; e.g., Setlock, Fussell, & Neuwirth, 2004; Setlock, Quinones, & Fussell, 2007) to complete the task but that they were allowed to finish early if all team members agreed that their team had reached its final rank-order list of the items and required no more changes to the list. Following the task, participants completed a second set of measures.

Bell and Kozlowski (2002) provide eleven propositions to improve virtual team functioning, calling for research on topics such as the distributed nature of expertise in virtual teams, the effective regulation of information and collaboration in virtual teams, the leadership functions necessary for virtual team leaders, and the creation of structures within the teams to manage and monitor performance. Based on the propositions provided, as well as the items used

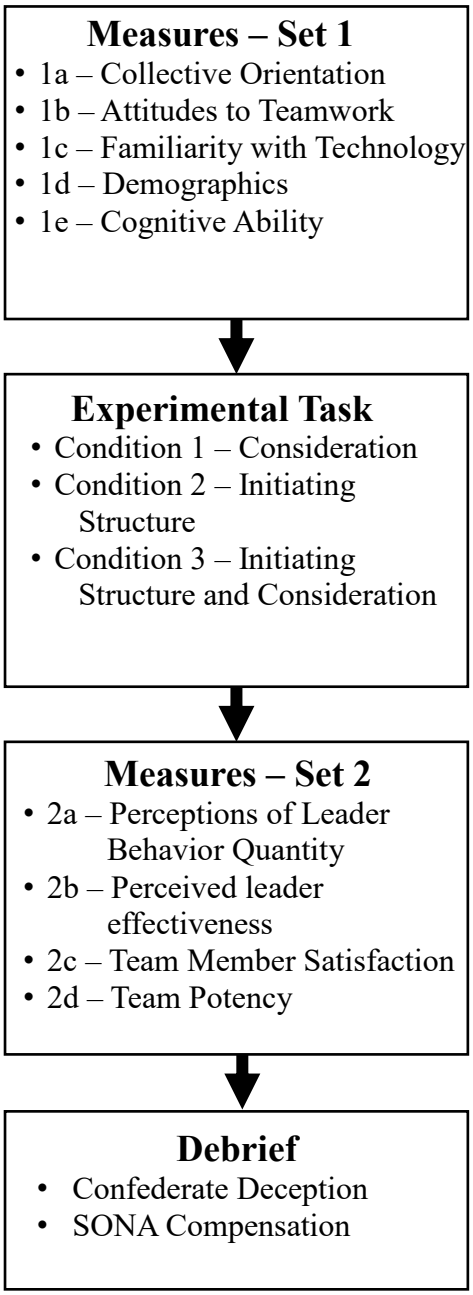

Figure 3. Study procedure.

in the Leader Behavior Description Questionnaire (LBDQ; R. M. Stogdill, 1962), specific behaviors were selected for both the Consideration and Initiating Structure categories in the current study. For the full list of behaviors used in this study, see Table 2. These six behaviors were selected because they represent some of the most salient and critical behaviors in the sets of interest

Table 2

Consideration and Initiating Structure Leader Behaviors

Behavior	Category
1. Encouraging and building trust among team members	Consideration
2. Acting after consulting the team beforehand	Consideration
3. Giving advanced notices of changes	Consideration
4. Constructing and maintaining schedules for the team	Initiating Structure
5. Assigning team members to particular tasks	Initiating Structure
6. Creating structures and routines for the team	Initiating Structure

based on existing theory (Bell & Kozlowski, 2002; Ralph M Stogdill, 1950). The behaviors enacted for this study were also based on the decision-making nature of the experimental task.

See Appendix D for the scripts that were used by the confederates to enact the behaviors. The scripts only contained language necessary for the leaders to enact the behaviors; the scripts provided no content knowledge or expertise regarding the task itself. Specifically, the script used in the Consideration condition only used communication necessary to enact the following behaviors: encouraging and building trust among team members; acting after consulting the team beforehand; and giving advanced notice of changes. Likewise, the script for the Initiating Structure condition only used communication necessary to enact the behaviors of creating structures and routines for the team; constructing and maintaining schedules for the team; and assigning team members to particular tasks. To ensure that the scripts focused on leader behaviors, they were used in pilot testing, and minor alterations (e.g., adding clarification on task) were made to the scripts and to the instructions based on the pilot testing.

After the task was completed by the team, the participants individually responded to the items regarding the perceived quantity of behaviors enacted by their team leaders as well as the

scale for perceived leader effectiveness. After participation, participants were debriefed and informed of the deception and justification for using confederates in the study (as per the Institutional Review Board's guidelines) and compensated with the appropriate amount of SONA participant pool credits based on the total length of time necessary to complete the study (1.5 hours).

CHAPTER THREE:

RESULTS

Before conducting main analyses with the collected data, analyses were conducted to determine whether the manipulation was successful and to examine the relationships between the study variables. Correlations, as well as the means and standard deviations of the measures used, are shown in Table 3. Further, the means, standard deviations, and confidence intervals for the various outcomes by conditions can be found in Table 4. Regarding the manipulation check, the participants receiving the Consideration condition and participants receiving the Consideration and Initiating Structure condition were more likely than participants in the Initiating Structure condition to rate their leader as using the Consideration behavior experienced ("*Encouraging and building trust among team members*") with either a 4 score or a 5 = *"all of the time"* response. Alternatively, the participants receiving the Initiating Structure condition and participants receiving the Consideration and Initiating Structure condition were more likely than participants in the Consideration condition to rate their leader as using the Initiating Structure behavior experienced ("*Creating structures and routines for the team*") with either a 4 score or a 5 = *"all of the time"* response. These response patterns indicate the behavioral manipulations appear to have worked as intended.

First, Hypothesis 1, stating that the use of both leader behaviors would result in greater virtual team performance, was tested using regression analysis at the team-level (e.g., N = 55 teams). Using dummy coding, the conditions were entered into the regression equation following

Table 3

Correlations, Means, and Standard Deviations of Study Variables (N = 165)

		M	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12
1.	Consideration Condition	47.94	14.83	-											
2.	Initiating Structure Condition	40.28	12.28	**-.47****	-										
3.	Both Consideration and Initiating Structure Condition	35.35	14.83	**-.51****	**-.53****	-									
4.	Performance (Team)	71.15	14.89	**.32****	-.03	**-.28****	-								
5.	Collective Orientation (Team)	2.93	0.31	-.09	**.18***	-.08	-.04	(.84)							
6.	Perceived Leader Effectiveness (Individual)	2.97	1.22	-.04	**.18***	-.14	.08	.07	(.97)						
7.	Team Member Satisfaction (Individual)	3.60	1.08	**.23****	.00	**-.22****	.09	.04	**.49****	(.95)					
8.	Team Potency (Individual)	3.49	0.96	**.20****	.04	**-.24****	.13	.02	**.57****	**.78****	(.91)				
9.	ICAR (Individual Cognitive Ability)	8.14	3.17	-.10	-.05	.15	.11	-.06	**-.16***	**-.20***	-.15	(.74)			
10.	SAT Score (Individual)	1400.00	347.85	**-.28***	.12	.17	-.18	-.16	-.14	**-.44****	**-.31***	**.43****	-		
11.	Perceptions of Consideration Leader Behavior Quantity (Individual)	2.85	1.00	.07	-.10	.03	.06	.08	**.65****	**.42****	**.39****	**-.22****	-.21	(.90)	
12.	Perceptions of Initiating Structure Leader Behavior Quantity (Individual)	3.17	0.99	-.11	**.21****	-.11	.06	.10	**.82****	**.45****	**.49****	-.13	-.22	**.76****	(.96)

Note: $^{**}p \leq 0.01$ (2-tailed). $^{*}p \leq 0.05$ level (2-tailed). $N = 165$. Reliabilities are located in parentheses along the diagonal. The means and standard deviations for the conditions reflect the performance values for each. The correlations between the conditions are meaningless and should not be interpreted as they are artifacts of the dummy coding. The reliability for the full ICAR measure of 16 items is displayed. See method section for subscale reliabilities.

Table 4

Means, Standard Deviations, and Confidence Intervals for Outcomes by Condition

			Confidence Interval (CI)	
Variable	*M*	*SD*	*LL 95% CI*	*UL 95% CI*
Virtual Team Performance				
Consideration	47.94	14.83	43.78	52.10
Initiating Structure	40.28	12.28	36.94	43.62
Both Consideration and Initiating Structure	35.35	14.83	31.53	39.17
Perceived Team Member Satisfaction				
Consideration	3.96	0.94	3.70	4.22
Initiating Structure	3.60	1.11	3.30	3.90
Both Consideration and Initiating Structure	3.28	1.08	3.00	3.56
Perceived Team Potency				
Consideration	3.78	0.85	3.54	4.02
Initiating Structure	3.55	1.04	3.27	3.83
Both Consideration and Initiating Structure	3.19	0.89	2.96	3.42

Note. N = 165. Performance is recoded with a higher performance score indicating better performance. Confidence intervals computed with standard errors; LL = lower limit; UL = upper limit.

the approach taken by DeRue and colleagues (2008) as it allows one to examine the independent effects of each condition on virtual team performance. As aforementioned, proposed control variables used for the team-level analyses were the team aggregates of collective orientation and attitudes to teamwork. However, neither of these constructs were significantly correlated with performance (r = -.04, p > .05; r = .03; p > .05, respectively), so they were not included in this analysis. These results can be found in Table 5. As indicated in the table, teams in the Consideration condition (β = 12.59, $SE(\beta)$ = 2.68, p = .00, $CI_{95\%}$ = [7.23, 17.95]) and the Initiating Structure condition (β = 4.93, $SE(\beta)$ = 2.64, p = .06, $CI_{95\%}$ = [-0.35, 10.21]) performed significantly

Table 5

Hypothesis 1 Results Predicting Team Performance

Variable	*β*	*SE*	*t*	*p*	*Confidence Interval (CI)*	
					LL 95% CI	*UL 95% CI*
Constant[a]	**35.35[**]**	**1.81**	**19.49**	**.00**	**31.73**	**38.97**
Consideration Condition[b]	**12.59[**]**	**2.68**	**4.71**	**.00**	**7.23**	**17.95**
Initiating Structure Condition[b]	4.93	2.64	1.87	.06	-0.35	10.21

Note. [a]Constant in this equation in dummy-coded variable with both leader behaviors. [b]Dummy-coded variables: condition of interest = 1; others = 0; Results shown are unstandardized. The recoded performance variable was used. $N = 55$ teams. Confidence intervals computed with standard errors; LL = lower limit; UL = upper limit. $^{**}p \leq .01$; $^{*}p \leq .05$.

better than teams in the condition with both types of leader behaviors (used as the reference group in this analysis). Therefore, Hypothesis 1 was not supported. Interpreting these results further, it is possible to answser the research question regarding which singular type of leader behaviors would lead to the greatest levels of performance. Teams in the Consideration condition had the highest levels of performance ($M = 47.94$), followed by those in the Initiating Structure condition ($M = 40.28$).

Next, the other quantitative data analyses at the team level were conducted using Hierarchical Linear Modeling (HLM) within Mplus 7.3 (Muthen & Muthen, 1998-2010) to account for the nested nature of the data (e.g., individuals within teams). To ensure HLM was necessary for analysis, unconditional models were used to determine the intra-class correlations (ICCs) for the three within-level variables of interest. Following the rule of thumb used by McCoach and Adelson (2010), an ICC value greater than .10 signifies the need to use multilevel modeling to account for dependencies in the data. The ICC's for perceived leader effectiveness, perceived team member satisfaction, and perceived team potency were 0.12, 0.18, and 0.24,

respectively. When significant cross-level variance is determined to exist in dependent variables of interest, as indicated by moderate to large ICC values, HLM is believed to be an appropriate technique for modeling the multilevel relationships (Raudenbush, Bryk, Cheong, & Congdon Jr., 2004) and therefore, analyses involving these outcomes required the use of HLM.

First, following the procedure used by G. Chen and colleagues (2007), all measures used in the study, except for the outcomes, were standardized within their respective levels to aid interpretation of the results. The standardization of variables also, in effect, grand-mean centered the variables (Gavin & Hofmann, 2002). For Hypothesis 2, the control variable was the participants' ICAR score (cognitive ability). The ICAR scores were used for analyses instead of SAT scores because not all participants could recall their accurate SAT scores, but data was available for all participants on the ICAR since they were required to complete the measure for study credit. The correlation between ICAR scores and SAT scores indicates a significant relationship between the two (r = .43, p < .01), offering further support for using ICAR scores as a covariate of cognitive ability. In this analysis, ICAR scores were significantly correlated with the outcome of interest, team member satisfaction (r = -.20, p < .05), so it was included as a control variable.

To address Hypothesis 2, an HLM regression was run. The results are located in Table 6. As previously mentioned, the condition with both leader behaviors served as the reference group (e.g., the intercept) for these regressions. As shown in Table 6, the Consideration condition (β = 0.62, $SE(\beta)$ = 0.20, p = .00, $CI_{95\%}$ = [0.22, 1.02]) and the intercept were significant (β = 3.31, $SE(\beta)$ = 0.14, p = .00, $CI_{95\%}$ = [3.03, 3.59]). The Initiating Structure condition was not a significant predictor (β = 0.27, $SE(\beta)$ = 0.23, p = .24, $CI_{95\%}$ = [-0.19, 0.73]). Overall, this model accounted for 9% (R^2 = 0.09, p = .05) of the variance in perceived team member satisfaction. As indicated by

Table 6

Hypothesis 2 Results Predicting Perceived Team Member Satisfaction

					Confidence Interval (CI)	
Variable	*β*	*SE*	*t*	*p*	*LL 95% CI*	*UL 95% CI*
Intercept	**3.31****	**0.14**	**23.51**	**.00**	**3.03**	**3.59**
ICAR score (cognitive ability)	**-0.18***	**0.09**	**-2.09**	**.04**	**-0.36**	**0.00**
Consideration condition	**0.62****	**0.20**	**3.03**	**.00**	**0.22**	**1.02**
Initiating Structure condition	0.27	0.23	1.18	.24	-0.19	0.73
$\boldsymbol{R^2}$	**0.09***	**0.05**	**2.08**	**.04**	**-0.01**	**0.19**

Note. Results shown are unstandardized. N = 165. Confidence intervals computed with standard errors; LL = lower limit; UL = upper limit. $^{**}p \leq .01$; $^{*}p \leq .05$.

the beta weights of the regression, individuals in the Consideration condition (M = 3.96) and the Initiating Structure condition (M = 3.60) reported higher levels of perceived team member satisfaction than individuals in the condition with both types of leader behaviors (M = 3.28). Thus, Hypothesis 2 was not supported as the use of both Consideration and Initiating Structure behaviors did not result in the highest levels of reported satisfaction, but rather, resulted in the lowest levels.

To address Hypothesis 3, an HLM regression was again conducted to account for the nested nature of the data. Because ICAR score was not significantly related to perceived team potency (r = -.15, p > .05), this variable was not included as a control as originally proposed. The results of these regressions can be found in Table 7. The Consideration condition (β = 0.59, $SE(\beta)$= 0.19, p = .00, $CI_{95\%}$ = [0.21, 0.97]), as well as the intercept (e.g., the condition with both types of leader behaviors; β = 3.19, $SE(\beta)$ = 0.14, p = .00, $CI_{95\%}$ = [2.91, 3.47]) were significant predictors of perceived team potency. The Initiating Structure condition (β = 0.36, $SE(\beta)$ = 0.21, p = .09, $CI_{95\%}$ = [-0.06, 0.78]), however, was not. The overall model accounted for 7% (R^2 = 0.07, p = .13) of the

Table 7

Hypothesis 3 Results Predicting Perceived Team Potency

					Confidence Interval (CI)	
Variable	*β*	*SE*	*t*	*p*	*LL 95% CI*	*UL 95% CI*
Intercept	**3.19****	**0.14**	**23.56**	**.00**	**2.91**	**3.47**
Consideration condition	**0.59****	**0.19**	**3.07**	**.00**	**0.21**	**0.97**
Initiating Structure condition	0.36	0.21	1.71	.09	-0.06	0.78
R^2	0.07	0.04	1.52	.13	-0.01	0.15

Note. Results shown are unstandardized. N = 165. Confidence intervals computed with standard errors; LL = lower limit; UL = upper limit. $^{**}p \leq .01$; $^{*}p \leq .05$.

variance in perceived team potency. As indicated by the beta weights in the regression, individuals in the Consideration condition (M = 3.78) and the Initiating Structure condition (M = 3.55) reported higher levels of perceived team potency than individuals experiencing both types of leader behaviors (M = 3.19). Therefore, Hypothesis 3 was not supported, in that the use of both behaviors by leaders did not result in the highest levels of potency across conditions, and in fact, led to the lowest levels.

Hypothesis 4 stated that perceived leader effectiveness will predict virtual team performance. Specifically, it was hypothesized that individuals who report higher levels of perceived leader effectiveness will experience higher team performance. Using HLM, a multilevel regression analysis was conducted with perceived leader effectiveness (at the within/individual level) predicting team performance (at the between/team level). Due to the individual-level variable of perceived leader effectiveness, ICAR score was proposed as a control variable. However, ICAR scores were not significantly correlated with virtual team performance (r = .11, p > .05). Therefore, the analysis was conducted without the inclusion of this control variable. The

multilevel regression indicated that perceived leader effectiveness did not significantly predict virtual team performance (β = 1.16, $SE(\beta)$ = 1.41, p = .41, $CI_{95\%}$ = [-1.66, 3.98]). See Table 8. Therefore, Hypothesis 4 was not supported.

To test Hypothesis 5, that perceived leader effectiveness would predict perceived team member satisfaction such that individuals who report greater perceived leader effectiveness would also report higher team member satisfaction compared to individuals who report lower perceived leader effectiveness, an HLM regression analysis was conducted. For this analysis, the estimates from the level-1 HLM regression equation represent the within-individual effects of interest. Since ICAR scores and perceived team member satisfaction are significantly correlated (r = -.20; p < .05), the regression analysis for perceived leader effectiveness predicting perceived team member satisfaction was conducted with ICAR score as a control variable. Substantiating the fact that perceived leader effectiveness and perceived team member satisfaction are significantly related (r = .49, p < .01), the results showed that perceived leader effectiveness (β = 0.51, $SE(\beta)$ = 0.08, p = 00, $CI_{95\%}$ = [0.35, 0.67] was a significant predictor. Again, see Table 8 for the full results. Thus, Hypothesis 5 was supported.

Additionally, perceived leader effectiveness was hypothesized to positively predict perceived team potency (Hypothesis 6). ICAR score was not significantly related to perceived team potency, so the analysis was conducted without this control variable. Using a regression approach within HLM again, perceived leader effectiveness significantly and positively predicted perceived team potency (β = 0.54, $SE(\beta)$ = 0.07, p = .00, $CI_{95\%}$ = [0.40, 0.68]), supporting Hypothesis 6. See Table 8 for the results.

To explore whether certain conditions moderate the relationship between perceived leader effectiveness and the outcomes of interest, interaction terms for each of the leader behavior

Table 8

Hypothesis 4-6 Results Perceived Leader Effectiveness

Variable	*β*	*SE*	*t*	*p*	*Confidence Interval (CI)*	
					LL 95% CI	*UL 95% CI*
Team Performance (H4)						
Intercept	**40.88****	**1.98**	**20.67**	**.00**	**36.92**	**44.84**
Perceived leader effectiveness	1.16	1.41	0.82	.41	-1.66	3.98
R^2	0.01	0.01	0.43	.67	-0.01	0.03
Perceived Team Member Satisfaction (H5)						
Intercept	3.60	0.08	47.72	.00	3.44	3.76
ICAR score (cognitive ability)	-0.13	0.08	-1.59	.11	-0.29	0.03
Perceived leader effectiveness	**0.51****	**0.08**	**6.73**	**.00**	**0.35**	**0.67**
$\boldsymbol{R^2}$	**0.26****	**0.06**	**4.09**	**.00**	**0.14**	**0.38**
Perceived Team Potency (H6)						
Intercept	**3.50****	**0.07**	**53.97**	**.00**	**3.36**	**3.64**
Perceived leader effectiveness	**0.54****	**0.07**	**7.90**	**.00**	**0.40**	**0.68**
$\boldsymbol{R^2}$	**0.32****	**0.07**	**4.36**	**.00**	**0.18**	**0.46**

Note. Results shown are unstandardized. N = 165. Confidence intervals computed with standard errors; LL = lower limit; UL = upper limit; $^{**}p \leq .01$; $^{*}p \leq .05$.

conditions (Consideration, Initiating Structure, or both) and perceived leader effectiveness were included in HLM regression equations to analyze moderation effects on individual-level perceptions of team member satisfaction (Hypothesis 7) and individual-level perceptions of team potency (Hypothesis 8). Using ICAR score as a covariate, results indicated there was no significant interaction between perceived leader effectiveness and the Consideration condition (β = -0.09, $SE(\beta)$ = 0.19, p = .65, $CI_{95\%}$ = [-0.47, 0.29]). However, the interaction between the Initiating

Structure condition and perceived leader effectiveness was significant (β = 0.32, $SE(\beta)$ = 0.17, p = .05, $CI_{95\%}$ = [-0.02, 0.66]). Overall, this model accounted for about 34% of the variability in satisfaction (R^2 = 0.34, p = .00). The full results can be found in Table 9. As shown in Figure 4, as perceived leader effectiveness increased in the Initiating Structure condition, perceived team member satisfaction increased at a faster rate as compared to the other two conditions. Therefore, Hypothesis 7 was partially supported.

Hypothesis 8 stated that the relationship between behaviors and perceived team potency would be moderated by perceived leader effectiveness, resulting in similar levels of potency regardless of condition if the leader was perceived as effective. As the ICAR score was not significantly related to perceived team potency, it was not included in the analysis. The interaction term between the Consideration condition and perceived leader effectiveness was non-significant (β = 0.02, $SE(\beta)$ = 0.17, p = .89, $CI_{95\%}$ = [-0.32, 0.36]). Similarly, the interaction between the Initiating Structure condition and perceived leader effectiveness was not significant (β = 0.28, $SE(\beta)$ = 0.17, p = .10, $CI_{95\%}$ = [-0.06, 0.62]). Overall, the model accounted for about 39% (R^2 = 0.39, p = .00) of the variance in potency but failed to support Hypothesis 8 (see Table 10).

Table 9

Hypothesis 7 Results of Perceived Leader Effectiveness Moderating Leader Behaviors-Team Member Satisfaction Relationship

					Confidence Interval (CI)	
Variable	*β*	*SE*	*t*	*p*	*LL 95% CI*	*UL 95% CI*
Intercept	**3.97****	**0.12**	**32.64**	**.00**	**3.73**	**4.21**
ICAR score (cognitive ability)	-0.11	0.08	-1.48	.14	-0.27	0.05
Perceived leader effectiveness	**0.45****	**0.12**	**3.71**	**.00**	**0.21**	**0.69**
Initiating Structure condition	**-0.57****	**0.19**	**-3.02**	**.00**	**-0.95**	**-0.19**
Both Consideration and Initiating Structure condition	**-0.58****	**0.17**	**-3.47**	**.00**	**-0.92**	**-0.24**
Interaction (Consideration condition*Perceived leader effectiveness)	-0.09	0.19	-0.46	.65	-0.47	0.29
Interaction (Initiating Structure condition*Perceived leader effectiveness)	**0.32***	**0.17**	**1.93**	**.05**	**-0.02**	**0.66**
R²	**0.34****	**0.07**	**5.12**	**.00**	**0.20**	**0.48**

Note. Results shown are unstandardized. N = 165. Confidence intervals computed with standard errors; LL = lower limit; UL = upper limit; $^{**}p \leq .01$; $^{*}p \leq .05$. The Consideration condition is represented by the intercept in this analysis.

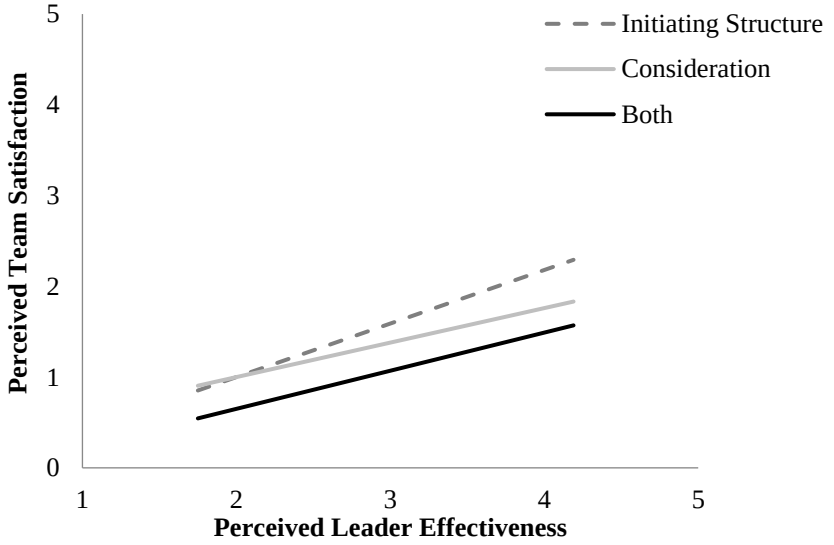

Figure 4. Perceived leader effectiveness on perceived team satisfaction by condition.

Table 10

Hypothesis 8 Results of Perceived Leader Effectiveness Moderating Leader Behaviors-Team Potency Relationship

Variable	*β*	*SE*	*t*	*p*	*Confidence Interval (CI)*	
					LL 95% CI	*UL 95% CI*
Intercept	**3.81****	**0.09**	**42.17**	**.00**	**3.63**	**3.99**
Perceived leader effectiveness	**0.45****	**0.12**	**3.71**	**.00**	**0.21**	**0.69**
Initiating Structure condition	**-0.44****	**0.15**	**-2.88**	**.00**	**-0.74**	**-0.14**
Both Consideration and Initiating Structure condition	**-0.54****	**0.13**	**-4.05**	**.00**	**-0.80**	**-0.28**
Interaction (Consideration condition*Perceived leader effectiveness)	0.02	0.17	0.14	.89	-0.32	0.36
Interaction (Initiating Structure condition*Perceived leader effectiveness)	0.28	0.17	1.65	.10	-0.06	0.62
R^2	**0.39****	**0.07**	**5.67**	**.00**	**0.25**	**0.53**

Note. Results shown are unstandardized. N = 165. Confidence intervals computed with standard errors; LL = lower limit; UL = upper limit; $^{**}p \leq .01$; $^{*}p \leq .05$. The Consideration condition is represented by the intercept in this analysis.

CHAPTER FOUR:

DISCUSSION

Examining leader behaviors used in virtual teams, Consideration behaviors appear to be the most important for the type of task employed in this experiment. Specifically, when working on a decision-making task with a limited time frame, teams whose leaders used Consideration behaviors performed better and reporter higher levels of both perceived team member satisfaction and team potency on average than those teams whose leaders used either Initiating Structure behaviors or both types of behaviors together. These findings are especially important to both theory (e.g., behavioral complexity theory), as well as practice (e.g., leaders overseeing virtual teams tasks with decision-making responsibilities).

First, examining the individual outcomes studied, the best observed performance on average was produced by the teams whose leaders used *only* Consideration behaviors, followed by only Initiating Structure behaviors (although not statistically significant), and lastly, both types of leader behaviors. Interpreting these results, leaders engaged in decision-making tasks with their teams aiming to make the best decision should use Consideration behaviors. Although using both types of leader behaviors is predictive of performance, as the use of Consideration behaviors still results in greater levels of performance.

In addition to determining the importance of Consideration behaviors to virtual team success within the context of a decision-making task, results from the current study also provide information regarding the subjective outcomes of perceived team member satisfaction and team potency. These variables have required further research, and thereby, this study has expanded work

into virtual teams and the area of virtual leadership specifically. Significant differences were found between the Consideration condition and the condition with both types of behaviors in terms of perceived team member satisfaction. Participants who experienced only Consideration behaviors reported being more satisfied with their team on average than did participants experiencing both types of leader behaviors. Further, these participants in the Consideration condition who reported higher levels of team member satisfaction also indicated higher levels of perceived team potency.

Further, this study examined the effects of perceived leader effectiveness as outcomes of team interactions within a virtual team context. Specifically, this work was able to study perceived leader effectiveness as an outcome of team interactions. Although this variable did not significantly predict virtual team performance, it did positively predict both perceived team member satisfaction and team potency.

To expand upon the interactive effect of perceived leader effectiveness, this construct was tested as a moderator on the relationships between the three conditions and the outcomes of perceived team member satisfaction and perceived team potency. Out of the interactions tested, only the interaction between the Initiating Structure condition and perceived leader effectiveness was significant for predicting perceived team member satisfaction. As predicted, when leaders were perceived as effective, participants in the Initiating Structure condition reported similar levels of satisfaction to those participants in the Consideration condition. This finding underscores the importance of perceptions within a team environment.

Theoretical Implications

The study makes several contributions to the virtual team leadership literature. First, this work applies the behavioral complexity theory of leadership to the study of virtual teams

completing a decision-making task. By doing so, this research tested current theory (e.g., behavioral complexity theory) to determine the effectiveness of sets of diverse leader behaviors. In this case, a boundary condition to the theory was discovered. Although in some cases teams whose leaders possess a diverse and complex set of behaviors perform better, within the context of a virtual team performing a decision-making task with a time limit, the more diverse and complex set of behaviors (e.g., the condition with both types of behaviors) did not lead to better performance compared to teams whose leaders only used one type of behavior (e.g., Consideration or Initiating Structure behaviors). However, this may be a result of the alignment or lack thereof between leader behaviors and the task. In this case, where a decision-making task was the focus, perhaps leader behaviors focused on structuring the task are not as necessary as those behaviors that allow the team members to comfortably share opinions and discuss options regarding the decision to be made.

Further, the time allowed for a task may be a driver of this boundary condition. Perhaps multiple, diverse leader behaviors are only effective for performance when there is no time limit imposed on the team or the time allotted allows for more behaviors to be enacted and perceived. Considering the job-demands-resources (JD-R) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001), too many leader behaviors may cognitively overwhelm team members. With limited time to work on the task (i.e., a resource drain), team members may not have sufficient cognitive resources to perceive and internalize the behaviors being enacted by leaders as an additional resource, but rather may perceive it as an additional drain (i.e., need to take time off the task to address the leader). Thus, the team members may not be able to appreciate leader behaviors as a positive resource addition.

Additionally, the JD-R model states that perceptions of autonomy is a critical resource to employees and act as a mediator between resources and exhaustion or burnout (Fernet, Austin, & Vallerand, 2012). In the context of this study, participants in the Consideration condition may have experienced more autonomy compared to participants in other conditions. Possibly by having the ability to impose their own structure on their task, these teams reported more favorable levels of the subjective outcomes of interest (e.g., perceived team member satisfaction and team potency) and experienced better performance. Measuring participants' perceptions of autonomy (as well as other related constructs in the JD-R, such as competence and relatedness) is a future research direction to be explored.

Overall, the findings may represent both an issue of alignment between leader behaviors and the task plus a cognitive load issue. In this study, Consideration leader behaviors likely aligned better with the task than did Initiating Structure behaviors. Further, in addition to the alignment of behaviors with the task, increased cognitive load in the condition with both leader behaviors and increased autonomy in the Consideration condition are equally likely explanations for the results.

Also, this research extends current leadership theory by considering the context of virtual decision-making teams to discover whether the effective leader behaviors in traditional, face-to-face teams hold when the team's operational environment is instead virtual. The results discovered by C. S. Burke and colleagues (e.g., task-focused behaviors (r = .20) and person-focused behaviors (r = .28) were related to team productivity; 2006) only partially held in this study as only the Consideration behaviors were significantly predictive of virtual team performance. This indicates the possible transportability of some, but not all, leader behaviors from a face-to-face context to a virtual one. Thus, theories of leader behavior must incorporate the nuances associated with the team's environment to effectively continue moving team and leadership research forward.

Practical Implications

Equipped with an understanding of which behaviors need to be incorporated into the training of leaders, practitioners will be able to improve the leadership functions of virtual work teams, enhancing team effectiveness. The findings of this research can be used in an interdisciplinary manner; the results can be applied across domains by any discipline employing virtual decision-making teams to achieve outcomes. Essentially, leader behaviors focused on Consideration rather than Initiating Structure are most beneficial across a variety of outcomes of interest, including virtual team performance. Thus, rather than training leaders on skills related to Initiating Structure (e.g., constructing and maintaining schedules for the team and assigning team members to particular tasks), trainers should instead focus their efforts on those skills related to Consideration (e.g., encouraging and building trust among team members and giving advanced notices of changes) when preparing leaders of virtual decision-making teams.

Limitations

One limitation of the current work is the lack of a leaderless condition for comparison to the three conditions. Scholars have discussed whether it is more beneficial for a team to have an established leader or to share leadership among the individuals in the team, thus making the team "leaderless" (Boss, 2000; Choi & Schnurr, 2014; Sagie, 1996). Significant differences exist between teams with leaders and leaderless teams, driving the decision to not include leaderless teams in the current study. First, dissimilarities in performance due to the structures of the team have been observed between these two types (e.g., Boss, 2000; Sagie, 1996). Second, without the presence of a formal leader, a team member may emerge as a leader, changing the dynamics of the

team (Lichtenstein et al., 2006). Further, leaderless teams and teams with leaders differ in the level of directiveness within the team (Sagie, 1996) and the methods used for resolving interpersonal issues (Boss, 2000). Due to these issues, and most importantly, the inability to control for team members spontaneously engaging in one type of leader behavior, it was not possible to have a control condition in this study.

Additionally, because the current research design utilized confederates as the leaders of the teams, leadership emergence was not able to be examined, a second limitation of the current work. When a team member emerges as a leader of the team, this particular individual begins to actively take part in leading tasks, and over time, becomes recognized as the informal leader of the team (Taggar, Hackett, & Saha, 1999). Work conducted by Bales (1962) found that two informal leaders tend emerge in leaderless groups: one focused on the task and another focused on relational issues. If leaderless teams had been used in the current study, it is likely this trend would have been observed, muddling the results associated with the leader behavior conditions.

A third limitation of this study is the performance operationalized used. There are numerous ways to conceptualize performance, and this study focused on an overall global team score of performance. However, when discussing team performance, one would be remiss to not acknowledge the multiple components of performance that can be measured. Two important components of performance often examined in the context of teams is the speed in which tasks are completed, as well as the accuracy to which teams complete their objectives (Beersma et al., 2003). However, these two elements of task performance can exist in contradiction of one another, also known as the speed-accuracy tradeoff (Garrett, 1922; Woodworth, 1899), a well-known, highly studied function of performance. The speed of task completion has been studied with decision-making tasks, finding a cost associated with increasing the speed at which decisions were reached,

namely, a reduction in accuracy (Crocoll & Coury, 1990). Additionally, by emphasizing and rewarding accuracy, teams can experience a reduction in the speed of completion (Beersma et al., 2003; Jenkins Jr, Mitra, Gupta, & Shaw, 1998). Both performance components are important, but the degree of importance of each depends on the specific task of the team. For example, a team tasked with assembling widgets may be more interested in the speed of production. On the other hand, a medical team tasked with saving a patient's life could be more concerned with the accuracy at which the surgical task is completed. Future research should conceptualize and measure performance in other ways (e.g., accuracy/quality, speed, dynamic outcomes) to expand upon the findings of this work.

Further, although the results obtained in this work can be linked to various organizational theories, some of the conclusions reached require future rigorous testing. For example, the participants' perceptions of autonomy in the various conditions may have affected study outcomes. However, because the necessary data to test this relationship was not captured, a solid conclusion cannot be reached on this regard. Therefore, future research should consider the JD-R model and how various components can operate within a virtual team setting (e.g., differing levels of leader resources available, differing levels of autonomy experienced by team members, differing levels of demands placed on team members by the task and time allotted, etc.).

Future Directions

In addition to the aforementioned research avenues worth exploring, a few other directions should be noted. Mainly, with regard to decision-making tasks within virtual teams, research is needed on potential explanatory mechanisms that may drive the current findings. For example, team member trust may have played a role in the relationships observed in this study. Previous

research has shown team member trust can affect a host of outcomes, especially in virtual teams (Jarvenpaa, Shaw, & Staples, 2004), and should be explored at different levels. Additionally, various types of tasks should be explored. Decision-making tasks may differ in the opportunities they present to the team to enact certain processes and to interact with one another, and as such, these results should be tested across other task types to determine their robustness. Further, as commonly called for in teams and leadership literatures (e.g., Bell & Kozlowski, 2002), time must be considered as a crucial element in these relationships. Determining how the length of a task or the lifespan of a team contributes to virtual team outcomes would greatly move research forward.

Considering other team variables that can be influential, team size should be considered as a possible research endeavor. Understanding how the number of team members may affect the ability of leaders to impact team outcomes could drive staffing and human resource decisions when it comes to project management. Also, these results should be tested in a face-to-face team setting. Understanding how a team's virtuality impacts leader-outcome relationships would be useful and prescriptive as the world of work continues to move more and more towards utilizing this type of team.

Another avenue of important future work could examine the effects of other individual difference variables in addition to those studied. For instance, the personality traits of team members are considered important inputs into team processes (Barrick, Stewart, Neubert, & Mount, 1998). Future research should examine if personality traits, specifically agreeableness and conscientiousness, predict the extent to which the participants perceive leader behaviors as higher in quantity and if these input variables have an impact on team functioning and performance.

Similar to measuring the quantity of leader behaviors, which was completed in the current work, the perceptions of quality of those behaviors may also need to be examined, an effort not

covered in this work. Using the similarity attraction paradigm (Byrne, 1971), research has discovered that followers who perceive leaders to be similar to themselves provide more favorable evaluations for those leaders (Engle & Lord, 1997; Liden, Wayne, & Stilwell, 1993). As such, an individual who is high in agreeableness will likely appreciate Consideration behaviors of leaders, perceiving the leaders as similar to themselves through the use of these behaviors. Further, previous research has discovered that followers high in the trait of agreeableness tend to perceive more transformational leadership than others (Felfe & Schyns, 2010). Transformational leadership often includes an element of leadership Consideration (Seltzer & Bass, 1990), and Felfe and Schyns (2010) also conclude that because agreeableness is associated with social interaction and communication, it understandably affects one's perceptions of leadership, specifically transformational components.

Conscientiousness could also be used to predict the participants' perception of the quality of leaders, specifically the set of Initiating Structure leader behaviors. Previous research has shown that when leaders set goals that are related to defining roles and responsibilities and closely resemble Initiating Structure behaviors, team members high in conscientiousness respond with improved levels of performance (Colbert & Witt, 2009). Further, Emery, Calvard, and Pierce (2013) conclude that conscientious followers are very likely to be receptive to displays of task leadership (e.g., Initiating Structure). As such, future research should examine the interplay of personality variables, leader behaviors, and perceptions in predicting team outcomes.

Further, future research should consider team members' implicit leadership theories (ILTs). Implicit leadership theories are preconceived notions about which characteristics are associated with different categories of leaders (Hogan, Curphy, & Hogan, 1994). Followers may have specific cognitive categorizations for "ideal" leaders, and when a leader demonstrates the

follower's predetermined expectations, the leader can be influential (Kenney, Schwartz-Kenney, & Blascovich, 1996). Followers' ILTs can have direct consequences in team settings. For instance, the greater the number of discrepancies between an individual's ideal leadership framework and his or her leader, the more adverse their leader membership exchange will be (Epitropaki & Martin, 2005). Implicit leadership theories also impact the appraisals of leaders. Followers' may not be objective in their appraisals of a leader, as an individual's implicit notions of leadership can affect the way he or she responds to questions regarding the leader. Therefore, an individual's appraisal of a leader can be a product of the follower's cognitive beliefs of how an effective leader should behave and not the actual behavior of the leader (Schyns, 2006). Again, personality variables may have a hand in these relationships. According to Keller (2000), implicit leadership theories are influenced by personality in terms of the similarity between the follower's personality traits and the leader's style. For example, individuals categorized as agreeable value leader sensitivity, while conscientious individuals appreciate leader dedication. Overall, both ILTs and individual differences of followers need to be taken into consideration when exploring these relationships in future work.

Conclusion

Moving forward, the next step in this line of work is to examine productive ways to train leaders and teams operating in virtual, decision-making contexts. Future research should dive deeper into the training and implementation of Consideration behaviors found to be linked to successful virtual teams with positive outcomes. These results can be used to inform training, while also focusing research on the various boundary conditions that may exist to understand the

complexities of virtual teams and which leader behaviors are most beneficial for outcomes in various contexts.

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APPENDICES

Appendix A: Study Measures

Collective Orientation[1]

Note: (R) indicates items that will be reverse-scored.

Instructions: Working as part of a team can have positive as well as negative aspects. We are interested in how you feel about working in team settings. Below are a number of statements regarding teams. There are no right or wrong answers; however you may agree more or less strongly with each statement. Please indicate the degree to which you agree with the following statements, using the following scale:

1	2	3	4	5
Strongly Disagree		**Neither Agree nor Disagree**		**Strongly Agree**

1. When solving a problem, it is very important to make your own decision and stick by it. (R)
2. When I disagree with other team members, I tend to go with my own gut feelings. (R)
3. I find working on team projects to be very satisfying.
4. I would rather take action on my own than to wait around for others' input. (R)
5. I find that it is often more productive to work on my own than with others. (R)
6. I find it easy to negotiate with others who hold a different viewpoint than I hold.
7. When I have a different opinion than another group member, I usually try to stick with my own opinion. (R)
8. I think it is usually better to take the bull by the horns and do something yourself, rather than wait to get input from others. (R)
9. For most tasks, I would rather work alone than as part of a group. (R)
10. I always ask for information from others before making any important decision.
11. I can usually perform better when I work on my own. (R)
12. It is important to stick to your own decisions, even when others around you are trying to get you to change. (R)
13. Teams usually work very effectively.
14. I prefer to complete a task from beginning to end with no assistance from others. (R)
15. When others disagree, it is important to hold one's ground and not give in. (R)

[1] This scale was published in Driskell, Salas, and Hughes (2010). The article can be found at http://journals.sagepub.com/doi/abs/10.1177/0018720809359522.

Attitudes to Teamwork[2]

Instructions: Please indicate the degree to which you agree with the following statements, using the following scale:

1	2	3	4	5
Strongly Disagree		**Neither Agree nor Disagree**		**Strongly Agree**

1. I believe a team leader's responsibilities include coordination between team members.
2. I believe a team member's responsibilities include coordination between other team members.
3. I consider it better to agree with other team members than to voice a different opinion.
4. The culture of a team makes it easy to ask questions when there is something I do not understand.
5. In general, I can get the support I need from other team members to carry out my job.

Familiarity with Technology

Instructions: Please indicate the degree to which you agree with the following statement, using the following scale:

1	2	3	4	5
Strongly Disagree		**Neither Agree nor Disagree**		**Strongly Agree**

1. I am comfortable with technology, specifically computers.

Demographics

Instructions: Please report the following demographics about yourself:

1. Age: ____ or Choose not to disclose
2. Gender: Female, Male, or Choose not to disclose
3. Ethnicity: ____ or Choose not to disclose
4. Educational status (year in college): Freshman, sophomore, junior, senior, higher than senior, or N/A
5. Current job title: ____
6. Length of time at current job: ____

[2] This scale was adapted from the work of Crichton (2005). The article can be found at http://www.sciencedirect.com.ezproxy.lib.usf.edu/science/article/pii/S0925753505000767.

7. Level of education required by current job: ____
8. Average number of work hours per week: ____
9. Which degrees do you currently hold (e.g., Bachelor's, Master's, etc.)? ____

Cognitive Ability
SAT and ACT

1. Please report your SAT score (composite score of math and critical reading scores): _____
2. If you cannot remember your SAT score, please list your ACT score: _____

ICAR16
The items used for the ICAR measure can be found at the resource's website:
The International Cognitive Ability Resource Team (2014). http://icar-project.com/.

Perceptions of Leader Behavior Quantity

Instructions: Please indicate **the extent to which your team leader** engaged in each of the following behaviors, using the following scale:

1	**2**	**3**	**4**	**5**
Not at All		**A Moderate Amount of Time**		**All of the Time**

1. Encouraging communication among the team members
2. Creating structures and routines for the team
3. Offering developmental opportunities to the team members
4. Designing backup plans or contingencies for the team
5. Identifying or clarifying time commitments for members of the team
6. Creating a means of tracking the progress of team members
7. Facilitating the development of complex workflow arrangements
8. Building team culture and developing bonds of mutual respect among team members
9. Encouraging and building trust among team members
10. Encouraging and building obligation and accountability into the team's culture
11. Understanding relevant individual differences (such as cultural differences or personal values)
12. Engaging in perspective-taking, actively relating to the worldview of team members
13. Choosing or recommending appropriate communication media based on team requirements
14. Facilitating opportunities for team members to bond
15. Establishing and clarifying team norms and standards
16. Helping members self-regulate by incorporating reviews and other feedback mechanisms
17. Providing clear direction and goals for team members
18. Enabling team members to adapt to changing conditions within the work environment
19. Differentiating and clarifying roles of team members

20. Establishing and clarifying individual responsibilities of team members
21. Providing a clear, engaging direction or vision for the team members
22. Developing appropriate routines and schedules for the team members
23. Specifying appropriate and inappropriate computer-mediated communication procedures
24. Creating and maintaining schedules for the team
25. Creating, revising, and updating team goals
26. Being aware of changing conditions of the organization or the individual team members
27. Distributing leadership functions to members of the team
28. Creating and implementing self-monitoring procedures that allow for more self-regulated management

Perceived Leader Effectiveness[3]

Instructions: Please answer the following questions regarding **your virtual team leader**, using the scale below:

1	2	3	4	5
Poor				**Excellent**

1. My virtual team leader's performance was:
2. Compared to other leaders under whom I have worked, my virtual team leader's performance was:
3. My virtual team's leader's performance as a role model was:
4. My assessment of my virtual team's leader's managerial success is:
5. I would rate the overall leadership effectiveness of my virtual team leader as:

Team Member Satisfaction[4]

Instructions: Think about **the team you just worked with** when responding to the following questions regarding your satisfaction with the team. Please use the scale below to respond.

1	2	3	4	5
Strongly Disagree		**Neither Agree nor Disagree**		**Strongly Agree**

1. I am satisfied with my present team members.
2. I am pleased with the way my team members and I work together.
3. I am very satisfied with working in this team.

[3] This scale was adapted from the work of Denison, Hooijberg, and Quinn (1995). The article can be found at http://dx.doi.org/10.1287/orsc.6.5.524.
[4] This scale was adapted from the work of Van Der Vegt, Emans, and Van De Vliert (2001). The article can be found at http://onlinelibrary.wiley.com/doi/10.1111/j.1744-6570.2001.tb00085.x/abstract.

Team Potency[5]

Note: (R) indicates items that will be reverse-scored.

Instructions: Think about **the team you just worked with** when responding to the following questions regarding the team's work-related ability. Please use the scale below to respond.

1	2	3	4	5
Strongly Disagree		**Neither Agree nor Disagree**		**Strongly Agree**

1. The team I work with has above average ability.
2. This team is poor compared to other teams doing similar work. (R)
3. This team is not able to perform as well as it should. (R)
4. The members of this team have excellent job skills.
5. Some members of this team should be fired due to lack of ability. (R)
6. This team is not very effective. (R)
7. Some members of this team cannot do their jobs very well. (R)

[5] This scale was adapted from the work of Riggs and Knight (1994). The article can be found at http://psycnet.apa.org/journals/apl/79/5/755/.

Appendix B: Study Scenario[6]

Archaeological Dig in Egypt: The Scenario

It is approximately 10:00 a.m. in mid-July and you have just crash landed in the Arabian Desert in eastern Egypt. Your team of archaeologists, yourself and two others, were headed to conduct a research dig in the desert. Your light twin-engine plane containing the bodies of the pilot and co-pilot has completely burned out with only the frame remaining. None of you have been injured. The pilot was unable to notify anyone of your position before the crash. However, he had indicated before impact that you were 50 miles from a mining camp, which is the nearest known settlement, and approximately 65 miles off the course that was filed in your Flight Plan. The immediate area is quite flat, except for occasional cacti, and appears to be rather barren. The last weather report indicated that the temperature would reach 110 F today, which means that the temperature at ground level will be 130 F. You are dressed in lightweight clothing-short-sleeved shirts, pants, socks, and street shoes. Everyone has a handkerchief and collectively, you have 3 packs of cigarettes and a ballpoint pen. Before your plane caught fire, your group was able to salvage the 15 items listed on the next page. Your task is to rank these items according to their importance to your survival, starting with a "1" for the most important, to a "15" for the least important.

Item	Team Ranking
Torch with 4 battery-cells	
Folding knife	
Air map of the area	
Plastic raincoat (large size)	
Magnetic compass	
First-aid kit	
45 caliber pistol (loaded)	
Parachute (red & white)	
Bottle of 1000 salt tablets	
2 liters of water per person	
A book entitled 'Desert Animals That Can Be Eaten'	
Sunglasses (for everyone)	
2 liters of 180 proof liquor	
Overcoat (for everyone)	
A cosmetic mirror	

[6] Task instructions and content can be found at https://www.thepdcafe.com/images/stories/Desert_Survival.pdf.

Appendix C: Study Scenario Correct Responses and Rationales[7]

Item	Rank	Rationale
Torch with 4 battery-cells	4	Essential for night time use
Folding knife	6	For cutting rope, food, etc.
Air map of the area	12	To have idea on present location
Plastic raincoat	7	To collect dew overnight
Magnet compass	11	Since awaiting rescue this isn't of much other use
First-aid kit	10	Everybody is safe at present
45 caliber pistol (loaded)	8	For defense. Three shots from a gun is also a recognized distress signal.
Parachute (red & white)	5	Use as tent
Bottle of 1000 salt tablets	15	Of no use in desert
2 liters of water per person	3	For drinking. A person actually requires a gallon of water a day in the desert.
A book entitled 'Desert Animals That Can Be Eaten'	13	Food is less important than water in the desert. Digestion consumes water
Sunglasses (for everyone)	9	Protection against glare
2 liters of 180 proof liquor	14	Useful as an antiseptic only as alcohol causes dehydration
Overcoat (for everyone)	2	Essential protection in desert – clothing helps ration sweat by slowing evaporation and prolonging the cooling effect
A cosmetic mirror	1	Means of visual signaling

[7] Task solution and rationale can be found at https://www.thepdcafe.com/images/stories/Desert_Survival.pdf.

Appendix D: Scripts of Confederates

Confederate Script #1
Consideration Condition

Notes
Consideration behaviors:
(C#1) – Encouraging and building trust among team members
(C#2) – Acting after consulting the team beforehand
(C#3) – Giving advanced notice of changes

Italics text: Instructions for the confederate
Bolded text: Dialogue to send to team via group chat
[Text in brackets]: Fill in the blank with the appropriate choice for the conversation
Underlined text: Back-up dialogue in case team member ask questions, etc.

Confederate/Leader: **Hi. I'm VTleader[team number]. The researcher said that I'm the leader of our team and that I had to join the chat and help out when you guys need it. I guess we are not gonna be in the same place. Should we share majors and year in school to get to know everyone then? I can go first – Im a senior psych major**. (C#1)

Wait for the three participants to answer. If someone doesn't answer, say:

[Team Member A, B, or C], are you online?

Wait for the participants to answer. **Great. Seems like we have a good team. Feel free to speak up during the study. I want to make sure we do well and help each other out.** (C#1) **Alright I was told to open the instructions on Google – do you all have that?**

Wait for the participants to answer.

If one or more participants say no: Hmmm. Can someone help you maybe –like a researcher?

If they answer yes, wait for them to get help; do this for all questions unless otherwise indicated.

If all participants say yes or once the questions have been answered: **Awesome. We've got 20 minutes, so I think we should plan how we are gonna use our time. How do you guys think we should tackle this**? (C#2)

Wait for the participants to answer. If they create a complete schedule for the task, move on. If not: **How many minutes should we spend on [missing task]?**

If the team does not plan for 9 minutes for the decision making, say: **The researcher in my room told me the decision part of the task normally takes about 9 min. should we plan for that then?**

Once everyone answers: **K – Thanks for helping make our plan. Should we read the directions now?**

Wait [ ] minutes. Unless they have told you they are done – then move on – say: **K – I think time is up right? is everyone done?** *Wait for the participants to answer. If they say yes, move on. If any of the participants say no, say:* Okay, that's fine. Let us know when youre done.

After reading the instructions and the task: **It's telling me to oversee the team, so I'll do that. How should we split up the materials among the 3 of you here?** (C#2)

Wait for participants to respond. Let the team decide how to split up the provided resources. If one isn't assigned: Who should take resource number [number]?

Once everyone understands their tasks: **K time to read the materials then?** (C#2) **So we planned for** *[ ]* **ish minutes to read and then we can check back with each other. Good?**

If any questions arise during this time period from the participants, tell them: I'm not sure about that. Maybe ask the experimenter?

With one minute left before the next subtask, say: **As I look at the materials, Im thinking we might need more time to make decisions. I think we should give ourselves an extra min for the decision once we get there** (C#3). **Sound good to you guys?** (C#2)

After [ ] minutes have passed: **K, let's check back in. Did everyone finish? Should we jot some notes down from what you read like we said?**

After [ ] minutes have passed: **The notes look good so lets move on. I guess we should start working on the task. The researcher tells me I can't participate in actually making the decision but I can try to help if needed I guess. Just let me know if you have questions.**

Let the participants discuss the task and with one minute for the subtask say: **Hows it looking?**

Make sure the participants have ranked the items. Each item should have a number ranking listed next to it. If there are items without a ranking, say: We need to make a decision on [item names]. I think we have less than a minute. Whatcha think?

If the team finishes early, before the 20 minutes for the task are up, write the number of minutes below.

Let participants discuss among themselves. After the last minute has passed, or if the team is finished with the task say: **K, I think we're done. The experimenter in my room is telling me we need to answer some questions now.**

Confederate: Don't respond to anything after this. Don't close the chat. Copy and paste the chat into a Word document and add the title [Session #, Condition, Date, Team A, B, or C, your name]. Save the file as [Session #_Condition].
Example: *Title* – Session #1; Condition A; April 2, 2016; Team B; Sarah Frick

Document – Session#1_ConditionA
Time: _____ minutes

Task Schedule

(To be completed by confederate)

Task	*Minutes*
1. Reading and understanding the task and instructions	
2. Reading the resources	
3. Summarizing materials and taking notes	
4. Reaching a decision on the task	

Confederate Script #2
Initiating Structure Condition

Notes
Initiating Structure behaviors:
(IS#1) – Constructing and maintaining schedules for the team
(IS#2) – Assigning team members to particular tasks
(IS#3) – Creating structures and routines for the team

Italics text: Instructions for the confederate
Bolded text: Dialogue to send to team via group chat
[Text in brackets]: Fill in the blank with the appropriate choice for the conversation
Underlined text: Back-up dialogue in case team member ask questions, etc.

Confederate/Leader: **Hi. I'm VTleader[team number]. The researcher said that I'm the leader of our team and that I had to join the chat and help out when you guys need it. I guess we are not gonna be in the same place. Ready?**

Wait for the three participants to answer. If someone doesn't answer, say:

[**Team Member A, B, or C**], **are you online?**

Wait for the participants to answer.

K. I was told to open the instructions on Google – do you all have that?

Wait for the participants to answer.

If one or more participants say no: Hmmm. Can someone help you maybe –like a researcher? *If they answer yes, wait for them to get help; do this for all questions unless otherwise indicated.*

If all participants say yes or once the questions have been answered: **Awesome. We've got 20 minutes, so I think we should plan how we are gonna use our time. I've got a little timer here that the researcher said to use. We've got to make some kind of decision so let's do this:** (IS#1). **2 minutes figuring out what we're doing, 5 minutes reading the help stuff the researcher gave us, 3 minutes summarizing what we learned, and the last 10 minutes reaching a decision on the task. OK?**

Wait for the participants to answer. If they all agree with your suggestion, move on. If not: Well … I think this schedule is best, so lets go with it.

Next, say: **K – Let's read the directions now. I'll text when our time is about up – but chat me if you finish early.** (IS#1)

Wait 2 minutes and then say unless they have told you they are done – then move on: **K – time's up – everyone done?** *Wait for the participants to answer. If they say yes, move on. If any of the participants say no, say:* Okay, thats fine. We need to move on to our next task.

After reading the instructions and the task: **It's telling me to oversee the team, so I'll do that. Member A you should read resources number 1, Member B can do resources 2, leaving resources 3 for Member C**. (IS#2) **Good?**

Wait for participants to respond. If yes, move on. If no: What do you not understand? *If you cannot answer the question, tell them to ask the experimenter.*

Once everyone understands their tasks: **So let's work alone for 5 minutes, like we agreed, and check back with each other. I'll check back with you guys then.** (IS#1)

Wait 5 minutes. If any questions arise during this time period from the participants, tell them: I'm not sure about that. Maybe ask the experimenter?

After 5 minutes have passed: **K, let's check back in. If you didn't finish reading all of your stuff, that's ok. We need to move on with the agreed schedule** (IS#1). **Taking notes on what we read might be helpful for when we need to rank the items. Take your notes in the Google Drive doc, so we can use them for the task later.** (IS#3). **Let's spend the next 3 minutes on that.**

After 3 minutes have passed: **The notes look good so lets move on. I guess we should start working on the task. The researcher tells me I can't participate in actually making the decision but I can try to help if needed I guess. Like we decided you guys talk about these items listed here for 10 minutes. You have to make a final list you're your decision during these time too** (IS#1).

Let the participants discuss the task and items for 8 minutes. Then say: **K, I think about 8ish minutes are gone time is running out so lets wrap up now.**

Make sure the participants have ranked the items. Each item should have a number ranking listed next to it. If there are items without a ranking, say: We need to make a decision on [item names]. I think we have less than a minute. Whatcha think?

If the team finishes early, before the 20 minutes for the task are up, write the number of minutes below.

Let participants discuss among themselves. After the last minute has passed, or if the team is finished with the task say. **K, I think we're done. The experimenter in my room is telling me we need to answer some questions now.**

Confederate: Don't respond to anything after this. Don't close the chat. Copy and paste the chat into a Word document and add the title [Session #, Condition, Date, Team A, B, or C, your name]. Save the file as [Session #_Condition].
Example: *Title* – Session #1; Condition A; April 2, 2016; Team B; Sarah Frick
Document – Session#1_ConditionA
Time: _____ minutes

Confederate Script #3
Initiating Structure and Consideration Condition

Notes:
Consideration and Initiating Structure behaviors:
(IS#1) – Constructing and maintaining schedules for the team
(IS#2) – Assigning team members to particular tasks
(IS#3) – Creating structures and routines for the team
(C#1) – Encouraging and building trust among team members
(C#2) – Acting after consulting the team beforehand
(C#3) – Giving advanced notice of changes

Italics text: Instructions for the confederate
Bolded text: Dialogue to send to team via group chat
[Text in brackets]: Fill in the blank with the appropriate choice for the conversation
Underlined text: Back-up dialogue in case team member ask questions, etc.

Confederate/Leader: **Hi. I'm VTleader[team number]. The researcher said that I'm the leader of our team and that I had to join the chat and help out when you guys need it. I guess we are not gonna be in the same place. Should we share majors and year in school to get to know everyone then? I can go first – Im a senior psych major.** (C#1)

Wait for the three participants to answer. If someone doesn't answer, say:

[**Team Member A, B, or C**], **are you online?**

Wait for the participants to answer. **Great. Seems like we have a good team. Feel free to speak up during the study. I want to make sure we do well and help each other out.** (C#1) **Alright I was told to open the instructions on Google – do you all have that?**

Wait for the participants to answer.

If one or more participants say no: Hmmm. Can someone help you maybe –like a researcher? *If they answer yes, wait for them to get help; do this for all questions unless otherwise indicated.*

If all participants say yes or once the questions have been answered: **Awesome. We've got 20 minutes, so I think we should plan how we are gonna use our time. I've got a little timer here that the researcher said to use. We've got to make some kind of decision so what do you guys think of this:** (IS#1). **2 minutes figuring out what we're doing, 5 minutes reading the help stuff the researcher gave us, 3 minutes summarizing what we learned, and the last 10 minutes reaching a decision on the task. Or do any of you guys want to do it a different way?** (C#2)

Wait for the participants to answer. If they create or agree to the complete schedule for the task, move on. If not: How many minutes should we spend on [missing task]?

If the team does not plan for 9 minutes for the decision making, say: The researcher in my room told me the decision part of the task normally takes about 9 min. should we plan for that then?

Once everyone answers: **K – Thanks for helping make our plan. Should we read the directions now?**

Wait [ ] minutes. Unless they have told you they are done – then move on – say: **K – I think time is up. Is everyone done?** *Wait for the participants to answer. If they say yes, move on. If any of the participants say no, say:* Okay, that's fine. Let us know when youre done.

After reading the instructions and the task: **It's telling me to oversee the team, so I'll do that. I think Member A you should read resources number 1, Member B can do resources 2, leaving resources 3 for Member C.** (IS#2) **What do you 3 think?** (C#2)

Wait for participants to respond. Let the team decide how to split up the provided resources if they don't agree with the preassigned ones. If one isn't assigned: Who should take resource number [number]?

Once everyone understands their tasks: **K time to read the materials then?** (C#2) **So we planned for** [ ]**ish minutes to read and then we can check back with each other. So let's work alone for** [ ] **minutes, like we agreed, and check back with each other. I'll check back with you guys then.** (IS#1) **Good?**

If any questions arise during this time period from the participants, tell them: I'm not sure about that. Maybe ask the experimenter?

With one minute left before the next subtask, say: **As I look at the materials, Im thinking we might need more time to make decisions. I think we should give ourselves an extra min for the decision once we get there** (C#3). **Sound good to you guys?** (C#2)

After [ ] minutes have passed: **K, let's check back in. Did everyone finish? Should we jot some notes down from what you read like we said? Taking notes on what we read might be helpful for when we need to rank the items. Take your notes in the Google Drive doc, so we can use them for the task later.** (IS#3). **Let's spend the next** [ ] **minutes on that.**

After [ ] minutes have passed: **The notes look good so lets move on. I guess we should start working on the task. The researcher tells me I can't participate in actually making the decision but I can try to help if needed I guess. You have to make a final list you're your decision during these time too** (IS#1).

Let the participants discuss the task and with one minute for the subtask say: **Hows it looking?**

If the team finishes early, before the 20 minutes for the task are up, write the number of minutes below.

Make sure the participants have ranked the items. Each item should have a number ranking listed next to it. If there are items without a ranking, say: <u>We need to make a decision on</u> [item names]. <u>I think we have less than a minute. Whatcha think?</u>

Let participants discuss among themselves. After the last minute has passed, or if the team is finished with the task say: **K, I think we're done. The experimenter in my room is telling me we need to answer some questions now.**

Confederate: Don't respond to anything after this. Don't close the chat. Copy and paste the chat into a Word document and add the title [Session #, Condition, Date, Team A, B, or C, your name]. Save the file as [Session #_Condition].
Example: *Title* – Session #1; Condition A; April 2, 2016; Team B; Sarah Frick
Document – Session#1_ConditionA

Time: _____ minutes

Task Schedule

(To be completed by confederate)

Task	*Minutes*
1. Reading and understanding the task and instructions	
2. Reading the resources	
3. Summarizing materials and taking notes	
4. Reaching a decision on the task	

Appendix E: IRB Exemption Letter

RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX(813) 974-7091

June 16, 2015

Sarah Frick
Psychology
Tampa, FL 33612

RE: **Exempt Certification**
IRB#: Pro00022591
Title: Perceptions of Virtual Leader Behaviors

Dear Ms. Frick:

On 6/16/2015, the Institutional Review Board (IRB) determined that your research meets criteria for exemption from the federal regulations as outlined by 45CFR46.101(b):

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Approved Items:

Virtual Leader Behaviors Study Protocol

Virtual Leader Behaviors Survey Informed Consent

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF IRB policies and procedures.

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF IRB policies and procedures.

Please note, as per USF IRB Policy 303, "Once the Exempt determination is made, the application is closed in eIRB. Any proposed or anticipated changes to the study design that was previously

declared exempt from IRB review must be submitted to the IRB as a new study prior to initiation of the change."

If alterations are made to the study design that change the review category from Exempt (i.e., adding a focus group, access to identifying information, adding a vulnerable population, or an intervention), these changes require a new application. However, administrative changes, including changes in research personnel, do not warrant an amendment or new application.

Given the determination of exemption, this application is being closed in ARC. This does not limit your ability to conduct your research project. Again, your research may continue as planned; only a change in the study design that would affect the exempt determination requires a new submission to the IRB.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

John A Schinka, Ph.D.

John Schinka, Ph.D., Chairperson
USF Institutional Review Board