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WHEN INNOVATION REQUIRES MORE: DYADIC LEADERSHIP

AND THE ISSUE OF ROLE CONFLICT

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ABSTRACT

Leaders of innovative endeavors face complex demands and must balance a range of leadership activities throughout the creativity process. These leaders are more likely to experience feelings of role conflict. This study presents an experimental test of using dyadic leadership structure to increase innovative production within groups. We hypothesized that dyadic leaders would lead more creative groups and experience less role conflict. The results provided some, albeit limited, support for these hypotheses. Exploratory analyses were performed to investigate other possible mechanisms through which dyadic leaders perform effectively.

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WHEN INNOVATION REQUIRES MORE: DYADIC LEADERSHIP AND THE ISSUE OF ROLE CONFLICT

INTRODUCTION

Leading for innovation is a complex and difficult task (Hunter and Cushenbery, 2011) that involves protecting and supporting a number of important creative processes during the life of any given project (Pinto and Prescott, 1988; Friedrich, Mumford, Vessey, Beeler, and Eubanks, 2010). As each of these creative processes is important for the overall creative output of the project (Mumford, Mobley, Uhlman, Reiter-Palmon, and Doares, 1991), effective leadership is needed (Hunter and Cushenbery, 2011; Friedrich et al., 2010).

The difficulty of leading for innovation stems, in part, from a need for the leader to perform a large number of leader behaviors at once or in quick succession. Hunter and Cushenbery (2011) discuss multiple direct and indirect roles that leaders can take when attempting to lead innovation. However, they also note that there is no single "right" answer, instead, there "is a system of activities, actions, and behaviors needed that often operate in concert with one another. The pursuit of innovative endeavors is not for the faint of heart" (Hunter and Cushenbery, 2011, p. 259). In fact, many researchers argue that the required roles are paradoxical, requiring the leader to support one process at one point in time while also supporting an opposing process (Hunter, Thoroughgood, Myer, and Ligon, 2011; Bledow, Frese, Erez, Anderson, and Farr, 2009; DeFillippi, Grabher, and Jones, 2007; Denison, Hooijberg, and Quinn, 1995). While some argue that one solution to the complexities of leading for innovation

is to find bigger, better, and more experienced leaders (Denison et al., 1995), others have

proposed that new leadership structures may be another solution.

In recent years, leadership researchers have been increasingly supportive of shared

leadership structures in organizations and teams. Some researchers argue that shared

leadership structures will offer respite for organizations struggling in a highly complex and fast-

paced business environment, in which a single leader is unlikely to be capable of effective

leadership alone (Day, Gronn and Salas, 2004; Yammarino, Salas, Serban, Shirreffs and Shuffler,

2012). These leadership structures are currently implemented in some organizations

organizations and show a break from the common conceptualization of organizations as highly

hierarchical structures (Yammarino et al., 2012). A number of leadership theories have been

proposed as alternatives to the one-leader model, including Team Leadership (Burke,

DiazGranados and Salas, 2011), Network Leadership (Balkundi, and Harrison, 2006; Balkundi

and Kilduff, 2006), Shared Leadership (Carson, Tesluk, and Marrone, 2007; Pearce, 2004; Pearce

and Conger, 2003), Complexity Leadership (Marion and Uhl-Bien, 2001; Uhl-Bien and Marion,

2009), and Collective Leadership (Friedrich, Vessey, Schuelke, Ruark, and Mumford, 2009) (for a

recent review of shared leadership theories, see Yammarino et al., 2012).

The differences between these shared leadership approaches are based on the

theoretical assumptions about where leadership resides in the team. For instance, complexity

leadership assumes that leadership is socially constructed and arises from relationships,

whereas network leadership assumes that leadership is emergent from social exchanges. While

these new leadership theories provide a foundation for which to study leadership that is

enacted by more than one person, we argue that they have overlooked and cannot be applied to another instance of shared leadership – dyadic leadership.

In this paper, we suggest that dyadic leadership is a special combination of shared leadership in which two leaders share the roles and task demands of a given leadership position. We begin by explaining the challenges of creativity and innovation. We then describe how leadership is a key component of managing innovative endeavors, but that effective innovation leadership is difficult and rare. We propose that dyadic leadership solves some problems associated with leading for innovation, especially the many paradoxes that arise from these innovation management processes. To develop our hypotheses for dyadic leadership effectiveness, we draw upon theory and research on roles, dual leadership, and behavioral complexity.

CREATIVITY AND INNOVATION

Many creativity and innovation scholars agree that creativity is best defined as the generation of ideas that are (a) novel and are (b) useful and serve a purpose (Amabile, Conti, Coon, Lazenby, and Herron, 1996). While creativity was originally theorized to be a process ending with an innovative "light bulb moment" (Dewey, 1910; Wallas, 1926), current research has built a strong case for creativity as a process. Mumford and colleagues (1991) argue that creativity is best modeled as a multi-stage process and that each stage is equally important for the ultimate production of a creative idea. Support for this model has been found in several areas of research. Pinto and Prescott (1988) found that a project life cycle demands successful implementation of eight critical factors, with variable importance of each factor at different

stages of the project. Further, Friedrich and colleagues (2010) linked several leader characteristics to creative endeavors in a multi-level business, arguing that leaders provide stability during a long, difficult creative process.

An important outcome of creative performance is innovation: the implementation or instantiation of creative ideas (Amabile, Schatzel, Moneta, and Kramer, 2004; Mumford and Gustafson, 1988). Innovation adds complexity to the generation of creative ideas, as organizations and creative individuals must implement their ideas effectively to have a lasting impact. The relationship between creativity and innovation involves creativity as an important and necessary first step that must be achieved before innovation can be made possible (Scott, 1995). Successful implementation of ideas requires that the organization, especially its leaders, has a strong understanding of the business climate surrounding the industry in which it operates (Bledow et al., 2009; Hunter et al., 2011). Further, the operations of the organization must be managed effectively throughout the implementation process if the organization wishes to maintain influence within the industry (Pinto and Prescott, 1988; Friedrich et al., 2010).

In sum, the goal of innovation is to implement creative ideas in an effective way. For organizations, innovation allows competitive advantage within an industry, but this takes effort to achieve and strong management to sustain. For individuals or groups working to develop creative solutions or ideas, innovation involves bringing these ideas to a larger audience effectively. The following section describes how leadership is a critical element in the success of any innovative endeavor and lends support to our argument for dyadic leadership.

LEADING FOR INNOVATION – CHALLENGES AND PARADOXES

Innovation is demanding for organizations. In particular, creation and implementation represent different sets of activities, which are assumed to require different antecedents and conditions to be successful (Axtell, Holman, and Wall, 2006; Farr and Ford, 1990; West, 2002). Gong, Zhou, and Chang (2013) describe this challenge as the creation-implementation tension. Scholars have noted that these goals are paradoxical in nature, requiring the organization to promote two opposing paths at once (Bledow, Frese, Erez, Anderson, and Farr, 2009; DeFillippi, Grabher, and Jones, 2007; Miron, Erez, and Naveh, 2004).

These opposing elements of innovation have been discussed in other disciplines. In the organizational learning literature, the exploration-exploitation tension is closely related to the creation-implementation tension. Exploration includes activities such as searching, experimenting, and discovering whereas exploitation refers to activities such as selection, implementation, and execution (March, 1991). Exploration and exploitation tension forms the basis of an argument for the organizational ambidexterity hypothesis (Gupta, Smith, and Shalley, 2006; March, 1991; O'Reilly and Tushman, 2004), which states that innovative organizations must balance two fundamentally different sets of activities: the exploration of new ideas with the exploitation of past ideas in the market. Organizations that focus too heavily on one side of the exploration-exploitation tension risk losing ground to competitors who balance the tension more effectively. Empirical evidence suggests that pursuing both sets of activities generates superior firm performance (He and Wong, 2004).

However, a comparison of these tensions reveals that they are, in fact, more similar than is readily apparent. Exploration and exploitation have typically been examined at the organizational level, while creation and implementation are usually examined at lower levels, such as individuals and teams (Bledow et al., 2009; Gilson, Mathieu, Shalley, and Ruddy, 2005; Gong et al., 2013). Linking the activities of each arm of the two tensions, Bledow and colleagues (2009) argue that "exploration and creation on the one hand and exploitation and implementation on the other also share similarity" (p. 447). Exploration includes activities such as search and discovery (March, 1991), which is similar to creative idea generation. Exploitation includes selection and implementation, activities similar to idea implementation. Thus, by critical examination, the organizational levels of tension among exploration and exploitation are linked with the lower levels of creation and implementation (Bledow et al., 2009).

The main force acting to link these competing demands together is the leader of the organization or team. However, leadership is not an easy fix – all of these competing demands fall upon the leader to balance them effectively. This can become increasingly difficult as the stakes and complexities of the organization rise. Hunter and colleagues (2011) argue that leading for innovation presents a new series of seemingly paradoxical requirements and that strong leadership is needed to be successful.

Three paradoxes that are critical issues in leading innovative endeavors are the feedback paradox, the autonomy paradox, and the motivation paradox (Hunter et al., 2011). To further demonstrate the difficulty of balancing these paradoxical concerns as a leader and support a need for dyadic leadership, these three paradoxes will be examined in detail and direct

challenges for leaders will be discussed. These are provided as illustrations of individual mechanisms that operate paradoxically in these situations and which leaders of innovation should be cognizant.

First, the feedback paradox requires the leader to listen to the feedback of customers and consumers but also not allow themselves to be dictated by such feedback (Hunter et al., 2011). Feedback from customers and clients can be a meaningful way for a company to evaluate a possibly innovative project. Through input from these groups, leaders can receive insightful feedback on current projects (Kao, 2007). However, many innovative successes have developed with little or no input from customers, instead being driven by several intrinsic factors (Gilson and Madjar, 2011). Thus, one important paradox is that innovation can be achieved either with or without constructive feedback and the effects of feedback may vary from project to project. This makes deciding whether to seek or respond to feedback a difficult decision. An organization needs to be able to protect and support innovative endeavors of all types, either in terms of internal development or external growth, which makes this paradox particularly difficult for leaders.

The feedback paradox is manifested in management literature as the "ambidextrous organization," coined by Tushman and O'Reilly (1996), which is capable of pursuing both incremental and radical innovation separately. Incremental innovation is the process of making an existing product better, faster, or cheaper (Nelson and Winter, 1982) and, at the organization level, the pursuit of incremental process adoption or the introduction of a new service (Ettlie, Bridges, and O'Keefe, 1984) both of which would require feedback about the

current product or service. Radical innovation is characterized by the pursuit of new products with groundbreaking innovations (Tushman and Anderson, 1986) or the radical adoption of new organizational processes (Tushman and Anderson, 1986; Tushman and O'Reilly, 1996) which may be limited by feedback. An ambidextrous organization is one that can manage both of these processes effectively, working towards radical innovation while also developing incremental innovation (Tushman and O'Reilly, 1996). This type of organization illustrates the paradox in leadership and provides an understanding of how two leaders may be more effective at managing these processes. A dyad of leaders could provide leadership for these two split processes in an organization.

Second, the autonomy paradox demonstrates that creativity occurs under conditions of autonomy or control, but that these have different effects for different projects, stages, or organizations. Leaders need to provide a vision and direction to team members but also allow for high levels of team autonomy (Hunter et al., 2011). The purpose of leadership is to provide direction or vision for subordinates, with empirical support demonstrating the important of vision (Avolio, 1999; Bass, 1985; Burns, 1978). Pinto and Prescott (1988) showed that this is also important for innovative endeavors, even over the course of an entire project life cycle. Mumford (2000) argues that vision is important because of the autonomous nature of creative individuals, citing anecdotal studies of research and development teams in Hounshell (1992). In more recent literature, Hunter, Bedell, and Mumford (2007) found that work climate variables, including mission definition and support for creativity, influence creativity and innovation at the group level. Finally, in the management literature, a number of authors argue that control within an organization increases innovation (Thompson, 1967; Normann, 1971; Hage and

Dewar, 1973; Hambrick and Mason, 1984), with Pearce and Ensley (2004) providing empirical evidence that shared vision at the team level positively affected team innovation performance. These works contribute to the argument that innovation requires some amount of control, either from the organizational level on organizational processes or from the team-level on the vision of the team.

However, autonomy at the individual level is also important for the development of innovative ideas and projects. Amabile (1998) argues that controlling an individual and stifling their autonomy "kills" their creative ability. This was demonstrated in an earlier study, which found that a controlling context hindered creative performance for individuals (Amabile, 1996). Further, evidence suggests that autonomy is important for innovation processes. Kanter (1983) argues that autonomy is more important during the early, formulation phase of innovation, while control is needed during the implementation phase. Further, Puranam, Singh, and Zollo (2006) argue and show that the effects of autonomy on innovation or the lack of autonomy on innovation may vary in importance over time. At the organizational level, cultures that stress autonomy appear more likely to produce innovative products (Arad, Hanson, and Schneider, 1997; Mumford and Simonton, 1997; Mumford, 2000). This argument is supported by a number of management researchers (Burns and Stalker, 1961; Thompson, 1965; Hage and Aiken, 1970; Kimberly and Evanisko, 1981). For example, Kimberly and Evanisko (1981) examined innovations in hospitals and found a significant negative relationship between hospital administrator participation in an innovation committee and both adoption of technological innovation and adoption of administrative innovation. Summarizing the research on personality and creativity, Feist (1999) concludes that creative people desire and need autonomy.

Therefore, the autonomy paradox is that both control and autonomy seem to be influential in innovative endeavors (Hunter et al., 2011). This autonomy paradox is firmly demonstrated by the results of Kimberly and Evanisko (1981), as the strong negative relationship between hospital administrator involvement in committees and technological and administrative innovations (β = -.27, β = -.10) are in contrast to a positive relationship between administrator involvement in medical activities for both innovation types (β = .16, β = .13). Thus, leaders need to promote the autonomy of their subordinates to maximize their creative potential, while also providing vision and control within certain stages of the creative process and levels of the organization. Dyadic leaders may be able to balance these paradoxical requirements more effectively than a single leader is able to.

Finally, the motivation paradox is that leaders need to promote passion, or intrinsic motivation, for projects but also maintain a long-term strategic orientation (Hunter et al., 2011). For example, a project team needs to be passionate about a particular project that is currently being pursued, but also have the adaptability to change focus of the project to adapt to changing demands or goals. The need for leaders of innovative pursuits to continually scan the environment for potential changes has been demonstrated by Mumford and colleagues (2003; 2008). As Hunter and colleagues (2011) explain, the paradox is witnessed when the team is asked to capitalize on a new opportunity by dropping a project that they are passionate about, passion which was instilled in the team by the leader (Eisenhardt and Brown, 1998; Tushman and O'Reilly, 1996; Van de Ven, Polly, Garud, and Venkataraman, 1999). While a single leader may have difficulty balancing a long-term strategic orientation while also motivating

followers directly, a leadership dyad may be able to perform both roles simultaneously and effectively.

These three paradoxes are only a sampling of the paradoxical issues faced by leaders who are leading for innovation (for a more detailed examination of these paradoxes and others, see Hunter et al., 2011). In many of these instances, leaders are seemingly pulled in multiple different directions and are asked to support or perform competing tasks. In the following section, we explore role theory and its relationship to the paradoxes of leading for innovation. Specifically, we discuss the applicability of role theory to dyadic leadership as an opportunity to manage these paradoxes.

ROLE THEORY AND THE THEORY OF BEHAVIORAL COMPLEXITY

Role theory segments groups and organizations by the role groupings performed by individuals and not simply by individuals (Pearsall and Ellis, 2008; Stewart, Fulmer, and Barrick, 2005; Barry and Stewart, 1997). Within this conceptualization, roles are defined as fluid constructs that individuals can take on and off with relative ease (Goffman, 1959). Using this paradigm, researchers examine the behaviors and tasks that are performed by a collective of individuals, which may be more indicative of team performance than looking at the individuals themselves (Kozlowski and Klein, 2000). An important assertion is that roles can be holistically performed by more than one person. Thus, roles enable individuals within a team to separate tasks and responsibilities into pieces that are manageable by the collective effort of the individuals involved, providing the justification for hierarchical organizational structures (Katz and Kahn, 1978).When one person attempts to perform two paradoxical roles, he or she will

experience role strain, the felt difficulty in fulfilling role obligations (Goode, 1960). The paradoxical nature of leading for innovation requires leaders to perform multiple roles with often conflicting demands. Thus, leaders of innovative organizations often experience role strain, or role conflict (Mumford, Scott, Gaddis, and Strange, 2002). Several scholars have explored the role of stress and strain in leadership (e.g., Byrne et al., 2014; Courtright, Colbert, and Choi, 2014). Moreover, research in neuroscience indicates that it may be particularly challenging for a single individual to simultaneously engage in discrete components of the innovative process such as idea generation and idea evaluation (Ellamil, Dobson, Beeman, and Christoff, 2011; Fink et al., 2009).

Quinn and Rohrbaugh (1983) and Quinn (1984) examined how leadership can be understood through role definitions. Denison and colleagues (1995) went on to develop a theory of behavioral complexity which discussed the fact that there are many leadership behaviors, with leaders who have a large repertoire more effective managers than those who do not. Thus, behavioral complexity theory further extends the conceptualization of leadership as roles. The important contribution of this extensions is the explanation that effective leadership is "the ability to both conceive and perform multiple and contradictory roles" (Denison, et al., 1995, p. 525). While other leadership theories had concentrated on the cognitive demands for effective leadership (Weick, 1979; Kiesler and Sproull, 1982; Bartunek, Gordon, and Weathersby, 1983; Streufert and Swezey, 1986; Jacques, 1986), behavioral complexity theory focuses on the excessive behavioral demands of effective leadership.

To test their theory, Denison and colleagues (1995) collected data on 176 middle-level managers, including effectiveness ratings from 222 supervisors above the managers and 670 subordinates of the managers. They found that highly effective leaders were less defined by any individual factor of leadership from Quinn's (1984) 8-factor model, whereas less effective leaders were more easily defined by just one or two of those factors. Thus, there is support for the idea that leaders who are rated as being more effective also fulfill more leadership roles for their subordinates.

A resource-based view of leadership and organizational performance argues that leader skills are key resources that impact firm performance (Castanias and Helfat, 1991). A recent study of CEO succession events, specifically limited to turnaround situations in which firm performance is poor, demonstrated that replacing a CEO with a lack of "throughput" skills with one that is "output oriented" can improve firm performance (Chen and Hambrick, 2012). In a dyadic leadership structure, these firms may have been able to operate with ambidexterity and avoided negative firm performance from having only one type of skill manifested in top-level leadership. This idea is well illustrated by the Steve Jobs and Tim Cook, who provided two skillsets. Steve Jobs provided a marketing and consumer-oriented output skillset, while Tim Cook was a master of throughput functions, such as supply chain management. This perspective draws from the notion that managers have finite, bounded repertoires (Henderson, Miller, and Hambrick, 2006; Miller and Shamsie, 2001).

The theory of behavioral complexity helps define the issues of leading for innovation in terms of roles. By segmenting the behavioral requirements of leading for innovation into

separate roles, the paradoxical nature of the different leadership elements can be parsed into roles that have fewer competing demands within themselves. Thus, the resource-based perspective and the theory of behavioral complexity support the idea that ambidextrous organizations may be possible through the use of dyadic leadership. These complex behaviors can be split amongst different team members if we adopt a role perspective of leadership behaviors. Below, we discuss the application of role theory to leadership research.

Role Theory Leadership Research

While behavioral complexity theory provided an initial extension of role theory and its application to leadership, more recent research has returned to a direct measurement of roles. For instance, Humphrey, Morgeson, and Manor (2009) argued that team performance may be better understood by examining teams using roles as the level of analysis. The results of their analysis of 778 teams from Major League Baseball supported the hypothesis that the characteristics of a few "core" team members may be more important for team performance than other members of the team.

In the leadership literature, Hiller, Day, and Vance (2006) theorized that leadership roles can be enacted by an entire group through collective leadership. The results of their examination of 52 teams found that mean team collective leadership predicted supervisor-rated team performance using a four-factor leadership model. Thus, in this work on collective leadership, role theory was shown to have important implications for group performance, given that roles can be enacted by separate people.

Therefore, by examining leadership using role theory, the innovation paradox can be seen as a series of role requirements that may be completed by several people. Through this view, the paradoxical behaviors of leading for innovation may be sub-managed by different individuals to reduce the role strain experiences by attempting to perform these paradoxical requirements alone. We propose that dyadic leadership is an effective application of these arguments and should be used to lead innovative efforts. The following section discusses how dyadic leadership and role theory can solve the problems associated with leading for innovation.

DYADIC LEADERSHIP

Early Theory

Bales and Slater first commented on what they termed *dual leadership* in 1955, stating that small groups typically saw the emergence of two leaders. One leader, they argued, was task-oriented (interactive leadership) in leadership behavior, while the other leader was relationship-oriented (expressive leadership) (Bales andSlater, 1955). Bales and Slater criticized leadership theory for pursuing the great men leadership paradigm, which focuses on the idea that leadership should be enacted by one individual. They argued that as long as the two roles, task and relationship, are performed, then the structure of leadership does not matter (Bales and Slater, 1955).

Bales and Slater's discussion of dual leadership built off of Gibb's (1954) discussion of, what he coined, "distributed leadership." Gibb built the theoretical assumptions about shared leadership and Bales observed the sharing of leadership roles in small group interactions. More

specifically, Gibb (1954) argued that leadership was a role with multiple behaviors. Further, he stated that "leadership is probably best conceived as a group quality, as a set of functions which must be carried out by the group" (884).

Popular Accounts of Dyadic Leadership

Dyadic leadership can be seen in many modern day examples. Perhaps the most notable, recent example is the partnership of Steve Jobs and Steve Wozniak and, later, Jobs and Tim Cook. In the beginnings of their partnership, Wozniak and Jobs split the roles of working on computer hardware development and contributing to sales and marketing. The pair worked effectively as a leadership dyad, fulfilling the role obligations of leading an innovative company and developing a strong product and marketing scheme. Later, after a split with Wozniak, Jobs began working with Tim Cook during the growth period of Apple. The two of them have been described as "near polar opposites with regard to personality and working style, although their relationship was one of mutual respect and intensive collaboration" (Hunter, Cushenbery, Fairchild, and Boatman, 2012). Again, the two worked effectively while splitting the leadership into separate roles, with Jobs as the visionary and Cook working on logistics.

Another notable example, discussed in detail by Gronn (1999), is the partnership of J.R. Darling and E.H. Montgomery, leaders of the famous Geelong Grammar School in Victoria, Australia. During a difficult period of growth in the 1940's and 1950's, Darling elected to start a fourth campus for the Geelong Grammar School in the Australian wilderness, the Timbertop campus. Electing Montgomery as the head of Timbertop, the two worked together to build a new, innovative value system around the Timbertop campus and led the entirety of the

Grammar School through a renaissance-like period of growth and popularity. The two were known for their close working relationship (Gronn, 1999) and Montgomery even noted that he "once told the Headmaster [Darling] that I was never sure whether he had engaged me as a master or a labourer" (Montgomery and Darling, 1967, p.19). Further, while they worked together closely, Darling and Montgomery were strong contrasts in both temperament and operational style (Gronn, 1999). Together, through the use of dyadic leadership, Darling and Montgomery led the Geelong Grammar School in a dramatic rise to being one of the best private grammar schools in the world.

In the examples discussed above, the dyadic relationships were characterized by combinations of leaders with strong differences in personalities and work styles. One commentator (Powell, 1987, p. 185) has argued that a successful leadership dyad may best be comprised of an "odd couple" instead of a highly similar couple in both operational style and temperament. This may be explained by the division of labor within a leadership dyad. Qualitative data from management literature shows that successful co-heads (dyadic leaders of a major company) "developed a clear understanding of their distinct roles and responsibilities" and that roles were "typically divided by personal style, distinctive competencies, and specifics of the situation" (Arnone and Stumpf, 2010, p. 17). Disparities in expertise and temperament may be a requisite condition for effective dyadic leadership and would be a valuable question to explore in future research. However, for the purposes of this paper, the importance of these arguments is that dyadic leaders, at least the dyads of historical note, have split the leadership position into manageable sub-roles, rather than working to complete the same tasks together. We believe that the prevalence of disparate personalities in popular accounts of dyadic leaders

is more likely due to higher public interest in these dramatic partnerships than their actual prevalence.

Research on Dyadic Leadership

Research on dyadic leadership has been of particular interest in the business and management literatures. Dyadic leadership can occur in organizations during mergers or as organizations phase out one leader and replace the leader with another. A quantitative examination of CEO duality/plurality conducted by Dennis, Ramsey, and Turner (2009) which examined 68 firms using a Co-CEO structure and found that Co-CEO structures differ significantly from other dualities, including CEO-COO and CEO-Chairman relationships (for CEO-COO structural forms, see Hambrick and Cannella, 2004). In an attempt to explain these differences, they argued that other dualities are marked by senior-junior relationship styles, rather than the shared power relationships of Co-CEO structure. They also found that the only significant determinant of Co-CEO management structure is having a CEO that is also Chairman of the Board and that forming a Co-CEOship increased stock prices weakly, while dissolving of a Co-CEOship decreased the stock prices (Dennis et al., 2009). These co-executive "dualities" provide an apt example of dyadic leadership in large organizations and high stakes environments.

A qualitative study of 19 co-heads, conducted to provide best-practices for leadership partners, conducted by Arnone and Stumpf (2010) describes the difficulties of creating a successful co-leadership structure. In particular, co-heads discussed the challenge switching from relying on their own personal judgments of risk and confidence to working with a partner.

Sharing a leadership position that was usually characterized by sole leadership worked best when "co-heads developed a clear understanding of their distinct roles and responsibilities – distinctions which then were easily seen by those inside and outside the organization" (Arnone and Stumpf, 2010, p. 17). Thus, co-heads need to have a well-developed conceptualization of how they share roles and responsibilities. However, as dyadic leadership is not seen as a typical leadership structure, it is probable that the leaders will see their dyadic leadership as a unique leadership challenge, with few examples to model after. Further, little is known about how dyadic leaders go about forming their leadership partnerships or dividing important tasks and roles.

In a quantitative study of co-CEOs, Arena and colleagues (2011) examined 118 leadership pairs of major public firms. Dyadic leadership was found to be positively associated with firm value and positive market reactions, utilizing a financial-focused methodology. At the time of the publication of the study it was the first quantitative examination of dyadic leadership in the academic literature.

While the most notable examples of dyadic leadership, including those discussed above, are cases of powerful leaders who are in charge of large companies or organizations, it is important to remember that dyadic leaders may also be effective in smaller groups. In fact, Bales and Slater (1955) discussion of dual leadership was based off of qualitative and quantitative research performed with small groups. While dyadic leadership may be a helpful structure for large companies striving for innovation and competitive advantage, it may also be helpful for small group work, especially in research and development teams. This is an

important justification for our arguments made in this paper and our use of a lab study in our methodology. Namely, we seek to justify the use of dyadic leadership for small groups charged with producing creative products. In the following section we discuss possible mechanisms through which dyadic leadership leads to innovative performance.

DYADIC LEADERSHIP EFFECTIVENESS

Dyadic leadership may be effective for a number of reasons. First, innovation and the complexity of the tasks associated with balancing the innovation process may be too demanding for one leader alone. These tasks work to reduce the cognitive resources of the leader and limit his or her ability to contribute to team innovation processes, but would have a reduced effect on the joint cognitive resources of dyadic leaders. Further, dyadic leaders have a partner to share the hardships of the innovation process with. Single leaders must bear the burden of stress alone, while dyadic leaders can split the demands for high performance and behavioral complexity. Finally, followers will perform poorly when a leader experiences role conflict. As the leader struggles and experiences role strain, followers will similarly experience these effects through emotional contagion processes. To the extent that these experiences are diminished by the use of a dyadic leadership structure, followers will also experience less role strain.

First, leader role conflict will hamper innovative achievement directly (i.e., impact the leader's ability to contribute creative ideas) by causing stress and strain to the leader themselves. This effect of leader role conflict will have a more indirect impact on innovative achievement by placing strain and stress on subordinates as well as producing a lack of clarity

regarding project direction and predictability in interacting with the leader. However, dyadic leadership provides the opportunity for the reduction of leader role conflict by the splitting of role demands. Thus, role conflict experienced by leaders will be lessened for dyadic leadership pairs.

Second, a dyadic structure may provide a unique form of social and emotional support from the demands that innovation places on a leader (Shaw and Weekley, 1985). Single leaders can often feel that they are unable to share their concerns for fear they will be seen as weak. A second leader can reduce stress directly, as a confidant and a resource, and indirectly, as a buffer for negative experiences (Cohen and Wills, 1985).

Finally, leader stress and strain will have a harmful influence on subordinates. As leaders feel stress it will be transferred to subordinates through emotional contagion effects (Gump and Kulik, 1997; Johnson, 2008; Hatfield, Cacioppo, and Rapson, 1994). By contributing these cognitive demands upon followers, this process hampers team innovative achievement. Followers who are required to experience these effects because their leader cannot will have less resources to contribute to innovation tasks.

Furthering the ideas of Hunter and colleagues (2012), dyadic leadership is theorized as a way to combat the paradoxical nature of leading for innovation. Leadership demands associated with a task can be divided between the leaders and this help split an overly cumbersome workload required by complex tasks. A dyad of leaders will respond to the complexities and demands of innovative endeavors and lead teams through task demands more effectively. By reducing the personal demands of each leader, both leaders will be better

equipped to respond to followers and to focus on the task. As a result, the team's performance on creativity and innovation tasks will increase, culminating in the production and implementation of ideas with higher quality and originality than those produced by single leader teams.

H1: Leader dyads will outperform single leaders on complex creative problem solving tasks such that team ideas will be higher in quality and originality when a dyadic leadership structure is used.

Based on the theory of role conflict, we propose that leading teams through innovation tasks will create less role conflict for dyadic leaders. Role conflict arises from the complexity of the innovation process, as the leader must work to effectively balance demands that may be in conflict with one another. These demands put stress and strain on the leader, causing him or her to feel overwhelmed by the paradoxical demands and constraints on his or her personal ability. However, as dyadic leaders are able to distribute the demands of a task between two decision-makers, they will experience less role conflict during difficult tasks.

H2: Leader dyads will experience less role conflict than single leaders. Dyadic leadership allows for the complex demands of the team tasks to be split as separate roles, thus allowing leaders the ability to lessen their role conflict.

As a leader experiences role conflict, he or she is more likely to report feeling that the demands of the position require more than is possible or that the task is too difficult. A leader who feels this way about a task is less capable of leading teams through the creative process and towards the completion of task demands. Further, a leader who is struggling with the stress

of a burdensome leadership role will make poor decisions and model less effective behavior for followers. Thus, role conflict experienced by the leader decreases the effectiveness of a team in the completion of creative tasks. Therefore, we propose a main effect of role conflict on the quality and originality of team ideas.

> H3: Role conflict experienced by leaders will be negatively associated with performance on creativity tasks, such that leaders who experience more role conflict will have teams that produce ideas lower in quality and originality.

Dyadic leadership structure provides a way for leaders to share the role responsibilities that are inherent in innovative endeavors. Splitting the tasks required of the leadership position can help reduce the role conflict experienced by the leaders. In this way, dyadic leaders can effectively manage teams attempting to accomplish complex tasks. Leaders will make better decisions and model behavior more effectively for their followers in a dyadic leadership structure. These teams will produce more creative ideas and implement creative ideas more effectively than teams that are led by one leader who is experiencing role conflict associated with his or her leadership demands.

> H4: Role conflict will mediate the relationship between dyadic leadership and the quality and originality of ideas. A dyadic leadership structure will place fewer demands on the leader and will lead ideas what are higher in quality and originality because the leaders experiencing will be more capable of balancing task demands.

METHODS

Design and Participants

Participants for this proposed study were drawn from the SONA research subject pool system at The Pennsylvania State University. The study sample included 588 participants between the ages of 18 and 24 years old. The mean age of participants was 19.05 years of age. The participants were 65% female and 35% male. The ethnicity of the participant sample was 77% Caucasian, 10% Asian, 7.5% African American, and 4% Hispanic, and 1.5% Pacific Islander. Upon arrival, participants signed a consent form that acknowledged their agreement to participate in the research study.

The study invited participants to engage in leadership roles from the subject pool that had two years of leadership experience in real-world settings. The screening process aimed to improve the generalizability of our results to organizational settings. The participants were assigned to lead 3-4 person team composed of randomly selected subjects that had no leadership experience. There were 170 participants assigned to be leaders in the study and 418 participants assigned to be followers.

Experimental Manipulations

In this study we manipulated the type of leadership structure between subjects. To manipulate Leadership Structure, we randomly assigned participants to one of two leadership conditions: a single leader condition or a dyadic leader condition. All participants were randomly assigned to Leadership Structure, including the participants engaging in the task as followers and the participants engaging as leaders.

The second manipulation in this study was the type of task that the group worked to complete. This manipulation did not vary between subjects. Instead, this was a manipulation that occurred for each team, but teams engaged in both tasks at different times during the study. The Task Types used to evaluate creative performance included a brainstorming task and a planning task. These task types are commonly used in creativity research (De Dreu et al., 2008; De Dreu et al., 2011). The broad deliverables for these two tasks were a list of creative ideas and a plan for implementing ideas.

In the brainstorming task, participants were asked to design a strategy for the effective acculturation of a new class of freshmen college students (for similar tasks, see Hunter, Bedell-Avers, Hunsicker, Mumford, and Ligon, 2008 or Scott, Lonergan, and Mumford, 2005). The participants were told that the strategy should make considerations for student well-being, adjustment, and academic performance. The strategy was to be used for the student class that would arrived in the fall of 2014. These instructions were meant to be complex and without a single, clear solution. Thus, participants were required to be creative to effectively accomplish the task. The deliverable for the creative brainstorming task was a list of ideas.

In the planning task, participants were asked to outline the resources and steps that they would need to effectively administer the interventions involved in their strategy. This task is also adapted from the work of Hunter and colleagues (2008). The task required participants to outline ways in which their brainstorming ideas could be made into a plan. This plan was to take real-world constraints into consideration. In doing so, participants developed an innovative application of these ideas. For both tasks, the deliverables were collected at the team level.

Individuals collaborate to develop ideas and teams worked together to choose the ideas they felt were most creative or original.

Procedures

The participant(s) that engaged in leadership tasks had a separate "leader room" in which to decide ways to manage the follower group effectively. The leader(s) were given the list of objectives and tasks that the follower group needed to complete and had time to sort out how to present the tasks and objectives to the follower group. The followers remained in a separate lab room for the duration of the study. When each task began, researchers brought the leaders into the follower room to conduct the task.

Upon arriving to the study session, participants were greeted by a trained researcher and instructed to fill out a consent form and several demographic surveys. The experimenter then brought the leader(s) into the room and gave a general introduction about the task. The experimenter made it clear that the leader(s) were in charge of the group and that they had reviewed the task prompt before entering the room. This was done to establish the leader(s) as in charge of the task and provide some credibility to the position.

The brainstorming task lasted 25 minutes and the planning task lasted 15 minutes. Between tasks, the leader(s) exited the room and spent 5 minutes preparing for the planning task. Followers spent 5 minutes completing surveys about the task and their creative performance during this time. After completing the planning task, both the followers and the leader(s) completed surveys measuring their perceptions of the task, their role, their personal

performance, the team and team processes, and the leadership during the entire session. After completing these measures, participants were debriefed and thanked for their participation.

Measures

Creative Performance. We assessed creative performance using an open-ended problem-solving task to measure creative performance as an outcome. Asking participants to complete a free-form response task allowed us to capture multiple aspects of creativity (Sternberg, 2006). Further, having participants work on an open-ended task that has no single and obvious solution is one of the best ways to capture many aspects of creativity (Amabile and Mueller, 2008).

The two dependent variables were ratings of *quality* and *originality* made on the outputs of the two creative tasks. Specifically, the products generated by participant teams were coded on a 1–5 scale with separate ratings for quality and originality using benchmarks established prior to coding. This modified Q-sort technique is based on the work of Redmond and colleagues (1993). Two groups of four coders were trained for a minimum of 20 hr to evaluate the participants' products and highly trained graduate students provided oversight and direction (ICCs of quality and originality across each of the tasks were above .81).

Role Conflict. To test the effects of role conflict and differences in role conflict between leadership structures, we used five separate measures of role conflict. First, we used a scale of *general role conflict* adapted from the work of Rizzo, House, and Lirtzman (1970). Rizzo et al.'s (1970) scale has been thoroughly scrutinized and has been determined to have satisfactory psychometric properties (Schuler, Aldag, and Brief, 1977) and item response characteristics

(House, Schuler, and Levanoni, 1983). Second, we included a sub-scale from the general role conflict scale developed by Rizzo and colleagues (1970) that measures *role ambiguity.* Third, we adapted and used a measurement of *role overload* created by Bolino and Turnley (2005). We adapted these scales for the lab setting and tasks that participants encountered, using pilot testing to make further refinements.

Fourth, we created a measure of *leader role conflict* from our understanding of the interactive effects of role theory and leadership demands. Finally, we created a measure of *role paradox* from our understanding of leader perceptions of paradoxical task requirements, especially those in innovative tasks. We felt that previous research on conflicting leadership demands did not fully capture our conceptualization of the experiences a dyadic leader was likely to have. Therefore, we sought to develop these new scales to better understand these experiences. Each of these new scales was selected from a large list of generated items through the use of a scale-item sort task completed by graduate students studying leadership. Items with a high number of endorsements were selected for use in the final scales.

These scales were administered to the participants engaging in leadership roles to assess the amount of role conflict that they felt when performing their role. A multi-measure approach was used because of the exploratory nature of the research question within this methodological framework. We sought to apply scales that are typically used in organizational research (i.e. Rizzo et al., 1970 and Bolino and Turnley, 2005) to study role conflict, while also applying our theoretical conceptualizations of conflict and paradox as they relate to brief, complex innovation tasks. The scales are presented in full in Appendix 1.

Follower Perceptions of Leaders. We also included several measures of follower perceptions of leader(s) for exploratory analysis. Our theoretical argumentation about dyadic leadership and its impact on leadership does not address the perceptions that a follower will have of the leader. However, we feel that too little is known about this phenomena to propose formal hypotheses and, thus, we have not developed theoretical claims. Instead, we include these measures and perform analyses as a strictly exploratory endeavor.

We measured follower perceptions of team collective efficacy, team satisfaction, leader liking, willingness to follow, leader task competence, and leader relationship competence. *Team collective efficacy* was measured using a four-item scale developed by Salanova, Llorens, Cifre, Martinez, and Schaufeli, (2003). *Team satisfaction* was measured using a six-item scale developed by Behfar and colleagues (2008). *Leader liking* was measured using a three-item scale developed by Wayne, Shore, and Liden (2008). *Willingness to follow* was measured using a six-item scale developed by Cushenbery, Thoroughgood, & Hunter (2009). *Leader task competence* was measured using a nine-item scale developed by Cushenbery and colleagues (2009). *Leader relationship competence* was measured using an 11-item scale by Cushenbery and colleagues (2009). These measures were chosen to represent a range of follower perceptions and afford us the opportunity to examine both the followers' feelings about the team (team collective efficacy, team satisfaction) as well as the followers' feelings about the leader (willingness to follow, leader liking, leader task competence, leader relationship competence). Thus, these measures served an exploratory purpose – capturing a wide range of perceptions with which we were able to build our understanding of the phenomena of dyadic leadership.

We included several covariate measures to control for effects on our dependent variables. These variables were chosen to allow for the removal of commonly observed relationships in creativity research, including cognitive ability, personality traits, and demographic variables. Creativity researchers suggest the use of these controls in experimental studies to increase the control provided by the lab study (Mumford, Hester, and Robledo, 2012). The rest of this section discusses these covariate measures in detail.

Cognitive Ability. Cognitive ability and intelligence have been found to be significantly related to the prediction of creative ability (Glynn, 1996; Gardner, 1993; Basadur, Graen, and Green, 1982). In our study, we collected SAT scores and college GPA as proxies of these constructs. Creativity research including SAT and GPA as predictor variables have examined the creative ability of participants. In these studies, GPA and SAT scores have been employed as proxies of convergent thinking (Runco, Dow, and Smith, 2006), which is a predictor of creative talent (Acar and Runco, 2012). The general argument for this association is that school exams assess students' ability to determine a correct answer from several answers, which requires students to form connections between ideas. Thus, GPA reflects convergent thinking, much like the evaluation of creative ideas.

Personality Traits. The Ten-Item Personality Inventory will be used to measure the Big 5 personality variables (Gosling, Rentfrow, and Swann, 2003). Personality factors were included as control factors because observed relationships in prior research (Feist, 1998; Eysenck, 1995; Barron and Harrington, 1981; Singh, 1986). Most notably, high scores on openness to experience and low scores on conscientiousness have been associated with creativity

consistently across many studies (Batey, Chamorro-Premuzic, and Furnham, 2010). Each scale item asked participants to rate the degree to which they believed that each personality description matched their own personality. Ratings were made on a five point scale where 1="Not at all descriptive of me" and 5="Extremely descriptive of me." The scale has an established Cronbach's alpha ≥ .79 for all five subscales.

Demographic Variables. Participants completed a demographic questionnaire which allowed us to control for possible effects from these variables. Specifically, demographic variables such as gender, age, and race have been linked to the prediction of creative outcomes in past research (Bassett-Jones, 2005; Furnham and Nederstrom, 2010).

RESULTS

Means and standard deviations of variables are in Table 1. We note that the *general* role conflict measure developed by Rizzo and colleagues (1970) had a much lower standard deviation (.57) than the other role conflict scales (ranging from .83 to 1.31). This was surprising, as this measure has been used in much of the role conflict literature and we expected that it would be much more convergent with the other role conflict measures. The *role overload* measure by Bolino and Turnley (2005) had the lowest correlation with other role conflict measures, though it was also the only role conflict measure to also be correlated with team size (r = -.26). This suggests role overload may capture task demands ameliorated by larger teams above other role conflict measures, though perhaps these task demands are less descriptive of role conflict. The significant correlations between several role conflict measures and the quality and originality of ideas for both the brainstorming and planning tasks are negative, as expected.

Finally, another important result is the insignificant correlations between team size and the quality and originality of ideas for both tasks. Thus, the creativity of ideas are not a function of the size of the team, such that the increase of team size by having a dyad of leaders is not related to team creative output.

We tested our hypotheses at the group-level of analysis. Measures of role conflict were aggregated within session when there was a dyad of leaders. The creative output of each team was at the group-level, such that the ratings of quality and originality were attached to each group.

Insert Table 1 About Here

As a way to test Hypothesis 1, we performed a repeated measures multivariate ANOVA to assess whether there were differences in the performance of teams on creative outcomes between leadership structures and across task type. This analysis included ratings of the quality and originality of team ideas during the brainstorming task and during the planning task. The results of this analysis revealed significant differences in task type (F (1, 81) = 6.78, p = .01, η^2 = .07), the interaction between task type and leadership structure (F (1, 81) = 23.81, p = .00, η^2 = .22), in the combination of quality and originality of ideas (F (1, 81) = 15.96, p = .00, η^2 = .16), and marginal significance in the interaction between the combination of quality and originality of ideas and leadership structure (F (1, 81) = 2.84, p = .09, η^2 = .03). The interaction between task type and leadership structure is presented in Table 2 and are plotted in Figure 1. Although

our analyses provided values for several tests of between-subject effects, we only include the

values for Wilk's Lambda, as this is the most commonly reported value and all other values

were identical. An examination of the means plot for this relationship revealed that while

dyadic leaders were more likely to have led teams that had ideas higher in quality and

originality for the brainstorming task, they were more likely to have led teams that had ideas

higher in quality and originality for the planning task. Therefore, our tests provide mixed

support for Hypothesis 1. Plots of the three-way interactions, although not significant (F (1, 81)

= 2.26, p = .13, η^2 = .02), are provided in Figures 2 and 3. These are provided as a reference of

the direction of the relationships.

Insert Table 2 About Here

Insert Figure 1 About Here

Summarizing the test of Hypothesis 1, we found that teams led by dyads produced more

creative ideas during the brainstorming task but were less creative than single leader teams

during the planning task. This finding demonstrates that teams with dyad leaders perform

better than teams with single leaders in creativity tasks with pressure for generating ideas.

Thus, dyadic leadership structure enhances the creative production of teams as compared to a

single leader structure. However, we also note that our theoretical understanding does not fully

explain the performance of dyad leader teams relative to single leader teams. In particular, the analyses show that single leader teams perform higher on tasks that involve the application of creative ideas. Thus, we find support for the utilization of single leader teams for less generative tasks, but dyad leader teams for more generative tasks. These findings are intriguing and provide partial support for Hypothesis 1.

Insert Figure 2 About Here

Insert Figure 3 About Here

Turning to Hypothesis 2, we predicted that there would be a main effect of leadership structure on role conflict. This hypothesis was tested using a MANOVA procedure with all role conflict scale as outcome variables and using leadership structure as the independent variable for each analysis. A multivariate test of these models was not significant (F (5, 103) = .90, p=.48, η^2 = .03). Within this model, the between-subjects effects of leadership structure on each of the role conflict scales revealed no significant differences (p > .05). Thus, Hypothesis 2 was not supported. This finding demonstrates that a dyadic leadership structure does not differ from a single leader structure in the amount of role conflict that the leader(s) experience, contrary to our expectations.

Hypotheses 3 and 4 were tested using the PROCESS SPSS macro to test for mediation. First, recall that Hypotheses 3 predicted a main effect of role conflict on team idea quality and originality. The results of these analyses are presented in Table 3 alongside tests for mediation presented below. An examination of these results reveals that several of the role conflict variables are significant predictors of quality or originality for brainstorming or planning. In particular, two measures of role conflict, general role conflict (Rizzo et al., 1970) and role paradox, showed consistency in the prediction of quality and originality for the brainstorming task, both indicating a negative relationship (general role conflict (Rizzo et al., 1970) quality β = -.26, originality β = -.33; role paradox quality β = -.13, originality β = -.16). These results suggest that the relationships between role conflict variables and idea quality and originality are negative, as expected. Thus, leaders who reported higher levels of role conflict also led teams that had ideas lower in quality and originality during the brainstorming task.

However, in a more in-depth examination of the results, the pattern of significant relationships between many of the role conflict variables and the creative performance tasks did not show consistency across task types and quality and originality for any of the variables. Thus, while we find that role conflict was a significant predictor of team creative performance, these relationships were only stable across facets for two measures for brainstorming. Therefore, Hypothesis 3 was only partially supported. The implications of these results are discussed in further detail below.

Hypothesis 4, which predicted that leader role conflict would mediate the relationship between leadership structure and the quality and originality of ideas, was tested using

mediated regression analyses in PROCESS with 1000 bias-corrected bootstrap resamples, and

using a Sobel test. Results suggested that none of the five role conflict measures mediated the

relationship between leadership structure and the quality and originality of ideas. The Sobel

test of mediation represents a robust test of mediated regression (Sobel, 1982). In our analyses,

none of the Sobel tests approached significance (p > .05). These analyses utilized a Monte Carlo

simulation with 1000 bootstrap resamples in an effort to further increase the statistical rigor of

the analysis (Gentle, 1985). Thus, the results of the mediation analyses do not support

Hypothesis 4. Table 3 displays the results of every PROCESS mediation analysis.

Insert Table 3 About Here

The results of the mediation analyses demonstrate that role conflict does not mediate

the relationship between dyadic leadership structure and the quality and originality of team

ideas for our sample. Thus, differences of idea quality and originality for our study are not due

to a mediated effect of leadership structure through leader role conflict. We note that the

mediation mechanism described is theoretically driven and that our findings may point to a

need for better measurement. In light of these findings, the novelty of our investigation of

dyadic leadership is highlighted, encouraging exploration of other possible mechanisms.

Therefore, below we perform several exploratory analyses in an effort to provide more

information about these relationships. We then conclude with our discussion, including the

implications of our findings and possible future directions.

Exploratory Analyses

The inconsistent findings described above highlighted the utility of conducting a post hoc examination of the data for other meaningful relationships. By conducting these analyses, we hoped to find relationships between our variables that would help determine ways in which dyad leadership structure impacts teams or creative outcomes. Any significant relationships found in these analyses would provide avenues for future research and contribute to our understanding of dyadic leadership. In particular, we were interested in the possible relationship between dyad leaders' personality and follower perceptions of the team and the leaders. A team composition hypothesis would lead us to hypothesize that differences in personality amongst dyadic leaders may lead to increased role conflict or decreased follower perceptions of team cohesion, among other outcomes. We examined these relationships using multivariate ANOVAs.

As a way in which to parse out our dyad sub-sample, we split the dyad teams based on whether or not they outperformed single leader teams at in each task. These were dummy coded, with a '0' representing teams that did not outperform the median performance of single leader teams and '1' representing teams that did. We felt that this approach was warranted because of our findings for Hypothesis 1. Namely, we were interested in examining variables that may be associated with a dyad team's effectiveness above and beyond a single leader team. Thus, these exploratory analyses probe further into this research area by leaning on our finding that dyad leaders *can* outperform single leader teams.

The dummy-coding of idea quality and originality between dyad teams was effective in forming near-equal sample sizes for our analyses for brainstorming (quality = 30, 28; originality = 30, 28), but was less effective for planning (quality = 52, 6; originality = 44, 14). Therefore, we focus our attention on the examination of possible factors that influence the ability of dyad teams to outperform single leader teams during the brainstorming phase of our study. We also provide tests for relationships for the planning task variables, but acknowledge that the statistical power of these tests is limited severely by the group sizes available.

High-Performing Dyads and Role Conflict

First, we utilized the MANOVA procedure to test whether there were group differences in perceived role conflict among high and low performing dyad teams - providing an alternative test of Hypothesis 3. We chose to use this analysis because it allowed us to use continuous predictors to examine our categorical outcome. These models were performed individually with overperformance on quality and originality of ideas for each task type predicted by the values of role conflict. Further, due to the nature of our analyses and the partitioning of dyad groups based on performance, we conducted a one-tailed test for significance. Finally, we note that the level of analysis for this test is the leader-level. Thus, the role conflict ratings of each leader are taken as an indicator of whether a team performed above or below average.

The results provided significance for one model, but only in between-subject effects (none of the models were supported by multivariate tests). More specifically, for planning originality, the overall model was not significant (F (5, 50) = 1.02, p=.41, η^2 = .09), but between-subjects tests of general role conflict (Rizzo et al., 1970; F (1, 55) = 3.41, p = .07, η^2 = .05) and

role paradox (F (1, 55) = 2.94, *p* = .09, η^2 = .05) were significant. The means of planning

originality demonstrate that high performing dyads have higher feelings of general role conflict

(M=3.27, SD=.62) and role paradox (M=3.28, SD=.1.21) than dyads that performed below the

median of single leader teams (M=2.87, SD=.72; M=2.65, SD=1.19).[1] For reference, we note that

the means for single leader teams: general role conflict =3.01, role paradox = 3.04. Thus, on

average, high performing dyad leaders reported experiencing more role conflict and paradox

than even single leaders.

Insert Figure 4 About Here

In Figure 4, we provide an illustration of role conflict means for our original groupings:

dyad and single leaders. In Figure 5, we make the distinction between high and low performing

dyads and single leaders, illustrating the finding that dyad leaders experience more role

conflict. Overall, these exploratory analyses provide evidence that dyad leaders who perform

well on planning tasks actually experience *more* role conflict than single leaders and low

performing dyads. We further discuss these implications in the discussion section. In the

remainder of this section, we continue an exploration of other relationships in the data.

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[1] Additionally, we ran the analyses while including a number of controls into the models performed in the

previous analysis, including Big Five personality factors either as the average of leader scores or as differences

among dyad leaders. When these are entered into the analysis, none of the overall models are significant. Further,

none of the between-subjects effects differed appreciably than initial tests.

Insert Figure 5 About Here

High Performing Dyads and Leader Personality

Second, we performed a MANOVA to test for team differences in the outperformance of single leader teams using the composition of dyad personalities. This analysis was chosen to examine whether the personality traits of the leaders were related to the performance of the dyad. Personality may act as a strong unifying force between dyad members, requiring a level of similarity or difference to be present for dyad leaders to work effectively together. Thus, we calculated the difference between dyad leaders' scores on each of the Big Five personality facets and used these values to predict overperformance. This test was performed at the leader-level of analysis. The difference score of the dyad was assigned to each leader. We used this approach to maximize the sample size afforded by the partitioning of dyads by performance.

A full, one-tailed multivariate model examining the differences between dyad leaders in all factors of the Big Five was significant when examining outperformance of single leader teams in quality for brainstorming (F (5, 52) = 2.35, p = .05, η^2 = .18). An examination of between-subjects tests revealed that these differences were primarily in dyad leader extraversion (F (1, 56) = 4.12, p = .04, η^2 = .06) and conscientiousness (F (1, 56) = 4.27, p = .04, η^2 = .07), with agreeableness approaching significance (F (1, 56) = 1.92, p = .17, η^2 = .03). A more liberal model including only extraversion and conscientiousness was significant (F (2, 55) =

5.57, p = .01, η^2 = .16). In this model, extraversion was significant (F (1, 56) = 6.87, p = .01, η^2 =

.10) and conscientiousness was significant (F (1, 56) = 4.27, p = .04, η^2 = .07). Leaders of dyad

teams that outperformed single leader teams in quality for brainstorming had lower differences

between their extraversion (M = .43, SD = .58) and conscientiousness (M = .19, SD = .20) than

dyad teams that did not outperform single leader teams (M = 1.10, SD = .1.20; M = .35, SD =

.36). These results are presented in Table 4, with Wilk's Lambda provided as the test for

between-subject effects. Thus, the magnitude of difference in dyad leaders' extraversion and

conscientiousness is a meaningful predictor of whether a dyad team will outperform the

median performance of single leader teams in the quality of ideas in brainstorming tasks.

Insert Table 4 About Here

A model predicting outperformance of single leader teams in originality for

brainstorming was significant when including all Big Five personality factors and using a one-

tailed test for significance (F (5, 52) = 2.13, p = .07, η^2 = .17). These differences were primarily in

dyad leader extraversion (F (1, 56) = 4.12, p = .04, η^2 = .06) and conscientiousness (F (1, 56) =

4.27, p = .04, η^2 = .07). Differences between leaders on openness, agreeableness, and

neuroticism were not significant. When a more liberal model is run including only extraversion

and conscientiousness, the model was significant (F (2, 55) = 4.11, p = .02, η^2 = .13). In this

model, extraversion was significant (F (1, 56) = 4.12, p = .04, η^2 = .06) and conscientiousness

was significant (F (1, 56) = 4.27, p = .04, η^2 = .07). Leaders of dyad teams that outperformed

single leader teams had lower differences in extraversion (M = .50, SD = .69) and

consciousness (M = .19, SD = .20) than dyad teams that did not outperform single leader teams (M = 1.03, SD = 1.19; M = .35, SD = .36). These results are presented in Table 4. Thus, the magnitude of difference in dyad leaders' extraversion and conscientiousness is a variable that helps differentiate between high and low performing dyad teams in brainstorming tasks, specifically in the originality of ideas.

When examining these personality effects on the quality and originality of ideas for planning, neither model was significant. This could be due to a sample size issue, as there were very few dyad teams that outperformed single teams for these sectional analyses.

Thus, a summary of analyses involving leader personality demonstrates that there are meaningful differences in the personality characteristics of dyad leaders that lead high performing teams in brainstorming tasks. This is interesting, as we did not predict dyad leader performance to be related to the personality differences of the leaders. Further, these differences were related to performance in the brainstorming task, but not in the planning task. These opposing results could be due to a small sample size for the planning task analyses. However, any real difference in the personality-performance relationship across task type would be a very interesting area for future research and would provide meaningful information about the relationships between dyads and small groups.

Follower Perceptions of Leaders

Now, we turn our attention to follower perceptions of leader competence, willingness to follow, and likability. Our goal in conducting these analyses was to determine the impact that dyadic leadership structure had on follower perceptions of the leaders. Following our formal

hypotheses about role conflict and performance, we sought to explore the extent to which the

splitting of leader role demands might cause leaders to appear more competent, followable,

and likable. We examined these exploratory relationships using the same MANOVA procedure

outlined above in tests of personality differences. The level of analysis for these tests is the

leader-level. Follower ratings of the leaders were aggregated to the leader-level. Each leader

was rated individually on each of our follower perceptions variables. Thus, each leader has a

different aggregated score, but leaders within each dyad have an identical performance score.

In the results of the tests including brainstorming quality, none of our four follower

perception variables explained significant variance in the model. Follower perceptions of leader

task competence, leader relationship competence, willingness to follow, and leader liking were

not significantly related to the dyad overperformance.

For dyad teams that outperformed single leader teams in the originality of output for

brainstorming, one of our four follower perception variables was significantly related to

performance. The aggregate of follower perceptions of leader relationship competence was

significantly related to the outperformance of single leader teams in originality of ideas for

brainstorming (F (1, 56) = 5.45, p = .02, η^2 = .08). Follower perceptions of leader task

competence was also significantly related to performance (F (1, 56) = 3.84, p = .05, η^2 = .06).

Moreover, the overall model showed significant differences based on outperformance when all

four follower variables were included in the multivariate model (F (4, 53) = 2.23, p = .07, η^2 =

.14). A more liberal test of this model was performed by dropping the two variables that did not

approach significance (willingness to follow and leader liking). This more liberal test of the

model using was significant (F (2, 55) = 2.84, p = .06, η^2 = .09). The results from this analysis are

presented in Table 5, with Wilk's Lambda provided as the test for between-subject effects.

Followers of outperforming dyad teams rated their leaders higher in task competence (M =

5.95, SD = .57) and relationship competence (M = 6.00, SD = .58) than low performing dyads (M

= 5.68, SD = .46; M = 5.66, SD = .55).

Insert Table 5 About Here

For follower perceptions for planning, none of the four follower variables were

significant when entered in multivariate models for either quality or originality

outperformance. Again, this may have been due to sample size issues. Future studies with

higher sample sizes may be able to detect differences in these follower variables.

Thus, a summary of analyses involving follower perceptions of leaders demonstrates

that there are meaningful differences in the perceived task and relationship competence of

dyad leaders that lead high performing teams in brainstorming tasks. This provides important

information regarding the use of dyadic leadership for the creation of novel ideas. These

relationships can be explored and developed further in future research.

In total, these exploratory findings contribute to our understanding of the relationship

between dyadic leadership structure and team performance. Most notably, these results

indicate that there are meaningful differences between the role conflict experiences,

personality characteristics, and follower perceptions of dyad leaders. This indicates that the

experience of leadership, for both leaders and followers, may be different within a dyadic context as opposed to a more normative single leader context. We expand on these ideas in our discussion in the following section.

DISCUSSION

This study examined the use of a dyadic leadership structure during innovative task completion. We hypothesized that dyad leaders would produce more creative ideas and experience less conflict over paradoxical role requirements. We tested these hypotheses in a lab study by manipulating leadership structure and giving teams a series of creative tasks to complete. We also proposed and tested a number of exploratory relationships.

The results of our study demonstrated that dyadic leadership structure has an impact on teams and team creative performance. First, teams led by dyadic leaders produced more creative ideas during brainstorming tasks. The ideas that these teams produced were rated higher in quality and originality than the ideas produced by single leader teams. We also found that dyadic leadership was not significantly related to role conflict. Differences between single and dyad leader experiences of role conflict were not significant in our tests, contrary to our hypotheses. However, the direction of the means for these relationships appear to be trending in the hypothesized direction, with dyad leaders experiencing less role conflict than single leaders. Further, role conflict experienced by leaders was related to creative performance. Two measures of role conflict were predictive of both the quality and originality of ideas produced during the brainstorming task. For leaders who experienced more role conflict, the ideas produced by their teams were lower in quality and originality. Finally, we did not find empirical

support for the mediating effect of role conflict between dyadic leadership and team creative performance. These findings provide support for our suggestion of using dyadic leadership for creative production teams.

We also performed a number of exploratory analyses that yielded valuable information about dyadic leadership. The analyses were conducted to explore possible mechanisms to explain how high performing dyad teams achieved creative outcomes. First, the differences between dyad leader personalities on two factors of the Big Five, extraversion and conscientiousness, were significant factors in whether or not dyad teams performed well in the brainstorming task. This suggests that personality may play an important role in dyadic leadership structures. The quality and originality of ideas generated during the brainstorming tasks are explained, in part, by the personality composition of the dyad leaders. These findings are similar to the interpretation of successful dyadic leadership structures portrayed in popular press outlets. Our initial assertion was that personality would not be related to team performance in a lab setting because the limited time working together as leaders would not allow for personality differences to impact leader effectiveness. However, our findings support the importance of personality in dyadic leadership, especially in the generative stages of creativity. Thus, noting that the viability of a leadership dyad is likely to be dictated by performance on early tasks performed together, leader personality is an important area for future research.

Second, followers in successful dyad teams reported higher perceptions of leader relationship competence and task competence. This finding provides evidence that dyad

leaders who outperform single leader teams are viewed as more competent in task and relationship competence than dyad leaders who led poor performing teams. Thus, dyadic leadership structure affects follower perceptions of leaders during creativity tasks. However, we note that this finding should be interpreted with caution, as the causality of the relationship was not readily testable through our methodology. Thus, it could be that teams produced less creative output and this influenced follower ratings of leader competence at the end of the study, perhaps representing over attribution of leader impact or a romantic view of leadership (Meindl, Ehrlich, and Dukerich, 1985).

An alternative explanation of the performance differences between dyadic and single leader teams across brainstorming and planning tasks is that the *time* involved on the task is more important than the task type. We provided participants with 25 minutes to work on the brainstorming task and 15 minutes to work on the planning task. Thus, our results may demonstrate that a dyadic leadership structure leads to higher creative performance for teams working on tasks with more time, but leads to lower creative performance for teams working on tasks with less time. The combination of differences in both the type of task and the time given to work on the task make this difficult to interpret ad hoc. We are unable to determine the extent that differences in creative outcomes are attributable to each of these factors. Thus, this portion of our findings may be further developed in future studies as to rule out this alternative explanation.

Overall, our results suggest that dyadic leadership structures may be effective for small teams. Further, we note that current theory does not fully explain the outcomes and processes

of dyadic leadership. Based on role theory and drawing from empirical work utilizing role theory in the examination of leadership, we developed and tested our hypotheses. The results of our study demonstrate that dyadic leadership is an effective means of improving creative outcomes. However, our results also reveal that the specification of these relationships needs to be refined, particularly in terms of the impact on followers, teams, and creative outcomes. The need for theory and empirical research in this area is not entirely surprising, as investigation into dyadic leadership is in its infancy. For instance, perhaps the most influential work to-date has been primarily qualitative in nature, including many anecdotal (e.g., Eisner, 2010) and interview (e.g., Arnone and Stumpf, 2010) based publications across both the practitioner and academic communities. Rigorous empirical research on this topic is beginning to emerge in academic outlets, including analysis of dyadic leadership at the highest levels of an organization, the use of co-CEOs (Arena et al., 2011). One important aspect seen across these studies is the lack of strong, well-supported theory. In this paper, we developed and tested a model of dyadic leadership in an effort to extend this research stream. We discuss the implications of these developments in the following section.

IMPLICATIONS

Our study has several theoretical and practical implications. First, our study provides support for the practical use of dyadic leadership structure in organizations. Dyadic leadership structures are currently used in a number of organizations and in top positions, including co-CEO structures (Arena et al., 2011). While these approaches are not entirely novel, the media often portrays them as such. We sought to understand the use of dyadic leadership and provide

an avenue for further study of dyadic leadership. Our lab study and empirical test of dyadic leadership provided an examination of the utility of these leadership structures. Our findings show that dyad leaders can outperform single leaders in certain task types and demonstrate that dyadic leadership is indeed a useful leadership structure for organizations. However, our understanding of these phenomena are still underdeveloped. Thus, these tests of dyadic leadership should be considered carefully and later evaluated in the context of future studies.

Second, our research sought to examine the experience of leading for innovation. In particular, we highlighted the demands of innovation leadership, an area of research with a broad impact on organizations (Tushman and O'Reilley, 1996; Mumford, 2000). In doing so, we combined research from several fields, including management, teams, leadership, and creativity. Thus, our study contributes to an understanding of leadership during innovative endeavors.

One way that our research contributes to these research areas is through the conceptualization of leadership as leadership roles. This bridges a gap between management research, which stresses that leading innovation is a difficult organizational process (Tushman and O'Reilly, 1996), and psychological research, which focuses on the cognitive demands placed on individuals engaging in complex and demanding roles (Hunter et al., 2011). Importantly, our empirical tests demonstrate that the relationship between leadership roles and demands of the task are complex. In particular, our findings provide an indication that leader role conflict experiences are negatively related to the quality and originality of ideas produced by teams, but not across all task types and, for high performing dyad teams, leaders actually experience more

role conflict. This indicates that our operationalization of role sharing might be poorly suited to measurement by reports of role conflict. That is, cognitive resource theories of leadership (e.g., Fiedler and Garcia, 1987; Byrne et al., 2014), which act as a foundation for current conceptualizations of dyadic and shared leadership, may not be fully captured by measures of role conflict used in this study. The cognitive foundations of dyad leadership theory may be more readily examined through the use of more appropriate, non-survey measures of leader cognition (Lord and Emrich, 2001) – a debate and difficulty that is well acknowledged in leadership research (for a summary of this methodological critique, see Hunter et al., 2007). Measures more suited to cognitive research may help explain the relationship between perceived role conflict, leadership structure, and performance. Below, we discuss the limitations of our study and propose ways in which these future studies may overcome them.

LIMITATIONS

Our study has several important limitations. First, we were unable to assess leader experiences of role conflict until the end of the study. Our initial conceptualization of role conflict was rooted in the leader experiencing the difficulty of transitioning from one complex task to another, including the behaviors associated with leading followers in these situations. However, studying leader experiences of role conflict *during* each task or separating measurement of role conflict across both task types would provide more internal validity to our study. Our analyses in this study were limited in that we could not determine whether leader perceptions of their role conflict varied throughout the study session. This methodological limitation may have masked the effects of role conflict on performance by averaging out any

felt effects for brainstorming, as leaders' ratings could have regressed to the mean by the planning task. An interesting research question would be to examine the impact of role conflict assessed immediately after brainstorming on leader behaviors, style, or perceptions of the planning task.

Second, although the measurement of role conflict at one time point limited our analyses, the use of a global measure of role conflict aligned with prior research (e.g. Rizzo et al., 1970) and its application to organizational settings. Thus, what can be considered an internal validity flaw also acted to increase generalizability to other research and settings. This provides a starting place for researching dyadic leadership because of the ability to make strong comparisons between other role conflict findings in previous literature.

Third, our methodology may have benefited from the use of an alternative form of measuring role conflict, such as heart rate (e.g., Caplan, and Jones, 1975) or adrenaline (e.g., Anderson and Summers, 2007), paired with the survey measures used. As noted above, the role conflict findings in this study do not converge with the theory we used to explain dyadic leadership processes. Thus, utilizing a more direct, cognitive measure of role conflict or cognitive resource depletion would have allowed us to examine convergent validity and describe role conflict more appropriately. This will be a very helpful approach in future research, as the current study demonstrates that role conflict measures, created to measure individual's experiences at a global level (Rizzo et al., 1970), do not adequately describe leadership demands in this context.

Building from these limitations, we suggest that future research build from our initial approach. One study could examine separate conditions in which teams perform only one of the tasks, with a third condition in which teams complete both tasks. This would allow researchers to examine the impact of task complexity more closely, as well as the possible effects of burnout on task performance. Teams may perform more strongly on planning tasks if it is the only task that they work to complete. Similarly, this design would allow for the examination of team familiarity on task performance. Teams may have had increased performance on the planning task due to having worked together towards the completion of the brainstorming task. These research ideas and methodologies are not exhaustive, but should provide a direction for future research.

CONCLUSION

Our research is an initial step towards examining how to use a dyadic leadership structure to combat the complex nature of leading innovative endeavors. We hope that researchers will continue to examine this phenomenon and determine the conditions under which a dyadic leadership structure is more effective than a single leader structure. We believe that dyadic leadership can provide unique benefits to organizations dealing with complex demands and relief for leaders trying to fulfill them.

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APPENDIX

Leader Role Conflict (new scale - Cronbach's alpha = .913)

1. My role required conflicting tasks
2. I had difficulty fulfilling the leadership needs for these tasks
3. I struggled to lead in two separate directions

Role Paradox (new scale; Cronbach's alpha = .751

1. I felt conflicted about how to lead the group
2. I felt uncomfortable with my leadership role demands
3. I had a hard time making my leadership two-sided
4. My leadership style was conflicted
5. I felt pulled apart by differing leadership expectations

Role Overload (Adapted from Bolino and Turnley, 2005) (Cronbach's alpha = .852)

1. I felt like I had too much to do
2. I had too much to do to get everything done well
3. I didn't have enough time to get everything done

General Role Conflict (Adapted from Rizzo et al., 1970) (Cronbach's alpha = .728)

1. I have enough time to complete my work. R
2. I perform tasks that are too easy or boring.
3. I have to do things that should be done differently.
4. I am able to act the same regardless of the group I am with. R
5. I work under incompatible policies and guidelines.
6. I receive an assignment without the manpower to complete it.
7. I have to break a rule or policy in order to carry out an assignment.
8. I receive assignments that are within my training and capability. R
9. I have just the right amount of work to do. R
10. I work with two or more groups who operate quite differently.
11. I receive incompatible requests from two or more people.
12. I do things that are apt to be accepted by one person and not accepted by others.
13. I receive an assignment without adequate resources and materials to execute it.
14. I work on unnecessary things.

Role Ambiguity (Adapted from Rizzo et al., 1970) (Cronbach's alpha = .757)

1. I know that I have divided my time properly. R
2. I knew exactly what was expected of me. R
3. Clear, planned goals and objectives did not exist for my task.
4. Explanation was clear of what had to be done (on the task). R
5. I was not sure what my responsibilities were.
6. I felt uncertain about how much authority I had.

Satisfaction (Behfar et al., 2008) (Cronbach's alpha = .883)

1. I am satisfied with working with the team
2. I like other team members

3. The other people on the team were generally friendly
4. I would like to work with their team again in the future (note that this would be viability)
5. Fellow teammates were satisfied with being a member of the team

Perceived Collective Efficacy (Salanova, Llorens, Cifre, Martinez, and Schaufeli, 2003) (Cronbach's alpha = .926)

1. I feel confident about the capability of my group to perform the tasks very well.
2. My group is able to solve difficult tasks if we invest the necessary effort.
3. I feel confident that my group will be able to manage effectively unexpected trouble.
4. My group is totally competent to solve the task.

Willingness to Follow (Cushenbery, Thoroughgood, & Hunter, 2009; Cronbach's alpha = .898)

1. I would like to work with this leader on future projects
2. I would be willing to serve under this leader
3. I would enjoy working with this leader
4. If given a choice, I would rather not work with this leader R
5. I would be unhappy if I was required to work with this leader R
6. I would request to work with this leader

Leader Liking (Wayne, Shore, and Liden, 1997; Cronbach's alpha = .926)

1. I think this leader would make a good friend
2. I get along well with this leader
3. I like this leader very much

Leader Task Competence (Cushenbery, Thoroughgood, & Hunter, 2009; Cronbach's alpha = .920)

1. Organizing work activities to improve efficiency
2. Planning short-term operations
3. Set specific goals and standards for task performance
4. Direct and coordinate work activities
5. Monitor operations and performance

Leader Relationship Competence (Cushenbery, Thoroughgood, & Hunter, 2009; Cronbach's alpha = .900)

1. Providing support and encouragement to someone with a difficult task
2. Socializing with people to build relationships
3. Recognizing contributions and accomplishments
4. Providing coaching and mentoring when appropriate
5. Helping resolve conflicts in a constructive way

TABLE 1

Correlations

	Mean	*SD*	Leader GPA	Total Team Size	Role Ambiguity	General Role Conflict	Role Overload	Leader Role Conflict	Role Paradox	Brainstorm Quality	Brainstorm Originality	Implementation Quality	Implementation Originality
Leader GPA	3.24	0.42	1.00										
Total Team Size	0.05	0.09	**-0.20**	1.00									
Role Ambiguity	2.66	0.83	-0.03	-0.01	1.00								
General Role Conflict	2.99	0.57	-0.06	0.01	**0.49**	1.00							
Role Overload	3.03	1.31	0.11	**-0.26**	**0.29**	**0.40**	1.00						
Leader Role Conflict	2.71	1.12	0.11	0.08	**0.41**	**0.50**	**0.41**	1.00					
Role Paradox	2.92	0.98	0.08	-0.07	**0.32**	**0.42**	**0.52**	**0.75**	1.00				
Brainstorm Quality	2.93	0.60	0.12	-0.21	-0.15	**-0.30**	-0.07	**-0.20**	**-0.27**	1.00			
Brainstorm Originality	2.67	0.62	0.02	0.02	-0.21	**-0.37**	-0.16	**-0.31**	**-0.32**	0.75	1.00		
Implementation Quality	2.63	0.75	0.05	-0.05	**-0.23**	-0.10	-0.14	-0.19	-0.10	-0.03	-0.01	1.00	
Implementation Originality	2.47	0.93	0.00	-0.12	**-0.22**	**-0.20**	**-0.22**	**-0.23**	-0.09	-0.02	0.11	0.52	1.00

Table 1: Correlations between variables. Correlations in bold are significant at p < .05.

TABLE 2

Repeated Measures ANOVA

	Wilks' Lambda	df	F	η^2	p
Task Type	.923	1.00	6.78	0.08	**0.01**
Task Type * Leadership Structure	.773	1.00	23.81	0.23	**0.00**
Error(Task Type)		81.00			
Creativity Facet	.835	1.00	15.97	0.16	**0.00**
Creativity Facet * Leadership Structure	.966	1.00	2.84	0.03	0.10
Error(Creativity Facet)		81.00			
Task Type * Creativity Facet	.994	1.00	0.51	0.01	0.48
Task Type * Creativity Facet * Leadership Structure	.973	1.00	2.26	0.03	0.14
Error(Task Type*Creativity Facet)		81.00			

Table 2: Repeated measures model examining output creativity (quality and originality) across task type and leadership structure. Bolded values are significant at p < .05.

TABLE 3

Mediator Variables	Leadership Structure on DV		Leadership Structure on Mediator		Mediator on DV		Mediated Model				
	IV β to DV	R^2	IV β to Med	R^2	Med B to DV	R^2	IV β to DV	Med β to DV	R^2	ΔR^2	Sobel Z
DV: Generation Quality											
Role Ambiguity	**0.38**	**0.10**	0.17	0.01	-0.09	0.01	**0.40**	-0.11	**0.13**	0.02	-0.71
General Role Conflict			0.02	0	**-0.26**	0.07	**0.39**	**-0.27**	**0.18**	0.07	-0.15
Role Overload			-0.14	0	-0.02	0	**0.37**	-0.02	**0.10**	0	0.17
Leader Role Conflict			-0.02	0	-0.08	0.02	**0.37**	-0.08	**0.12**	0.02	0.08
Role Paradox			-0.21	0	**-0.13**	0.05	**0.36**	**-0.11**	**0.38**	0.28	0.74
DV: Generation Originality											
Role Ambiguity	**0.43**	**0.12**	0.17	0	-0.13	0.03	**0.46**	**-0.16**	**0.17**	0.05	-0.79
General Role Conflict			0.02	0	**-0.33**	0.10	**0.44**	**-0.34**	**0.23**	0.11	-0.16
Role Overload			-0.14	0	-0.06	0.02	**0.43**	-0.05	**0.14**	0.01	0.35
Leader Role Conflict			-0.02	0	**-0.14**	0.07	**0.42**	**-0.14**	**0.19**	0.06	0.09
Role Paradox			-0.21	0	**-0.16**	0.08	**0.40**	**-0.14**	**0.18**	0.06	0.78
DV: Implementation Quality											
Role Ambiguity	**-0.64**	**0.18**	0.20	0.01	**-0.16**	0.04	**-0.61**	-0.13	**0.21**	0.02	-0.82
General Role Conflict			0.06	0	-0.10	0	**-0.63**	-0.07	**0.19**	0	-0.25
Role Overload			-0.01	0	-0.07	0.01	**-0.66**	-0.07	**0.21**	0.02	0.03
Leader Role Conflict			0	0	-0.11	0.03	**-0.64**	**-0.11**	**0.21**	0.03	0.01
Role Paradox			-0.15	0	-0.05	0	**-0.65**	-0.07	**0.20**	0.01	0.48
DV: Implementation Originality											
Role Ambiguity	-0.33	0.03	0.20	0.01	-0.19	0.03	-0.29	-0.18	**0.06**	0.03	-0.83
General Role Conflict			0.06	0	-0.26	0.03	-0.31	-0.25	0.06	0.02	-0.39
Role Overload			-0.01	0	-0.13	0.04	-0.33	**-0.13**	**0.07**	0.04	0.04
Leader Role Conflict			0	0	**-0.17**	0.05	-0.32	**-0.17**	**0.08**	0.04	0.01
Role Paradox			-0.15	0	-0.06	0	-0.34	-0.07	0.04	0	0.40

Table 3: SPSS Process results for each mediation model. All creativity outcomes are predicted by leadership structure and by one of five role conflict mediators in turn. Bolded values are significant at p < .05.

TABLE 4

Tests of Between-Subjects Effects

		Wilks' Lambda	df	F	η²	p
Corrected Model	Extraversion.diff		1	6.88	0.11	0.01
	Conscientiousnes.diff		1	4.27	0.07	0.04
Intercept	Extraversion.diff	0.39	1	37.05	0.40	0.00
	Conscientiousnes.diff	0.39	1	50.18	0.47	0.00
Brainstorm Quality Above Single Leader Median	Extraversion.diff	0.83	1	6.88	0.11	0.01
	Conscientiousnes.diff	0.83	1	4.27	0.07	0.04
Error	Extraversion.diff		56			
	Conscientiousnes.diff		56			

Table 4. Between-subject effects of MANOVA with outcome as dummy-coded dyad outperformance of single leader median brainstorm quality.

TABLE 5

Tests of Between-Subjects Effects

		Wilks' Lambda	*df*	*F*	η^2	*p*
Corrected Model	Task Competence		1	3.841	0.064	0.055
	Relationship Competence		1	5.455	0.089	0.023
Intercept	Task Competence	0.007	1	7184.871	0.992	0.000
	Relationship Competence	0.007	1	6151.632	0.991	0.000
Brainstorm Originality Above Single Leader Median	Task Competence	0.906	1	3.841	0.064	0.055
	Relationship Competence	0.906	1	5.455	0.089	0.023
Error	Task Competence		56			
	Relationship Competence		56			

Table 5: Between-subject effects of MANOVA with outcome as dummy-coded dyad outperformance of single leader median brainstorm originality.

FIGURE 1
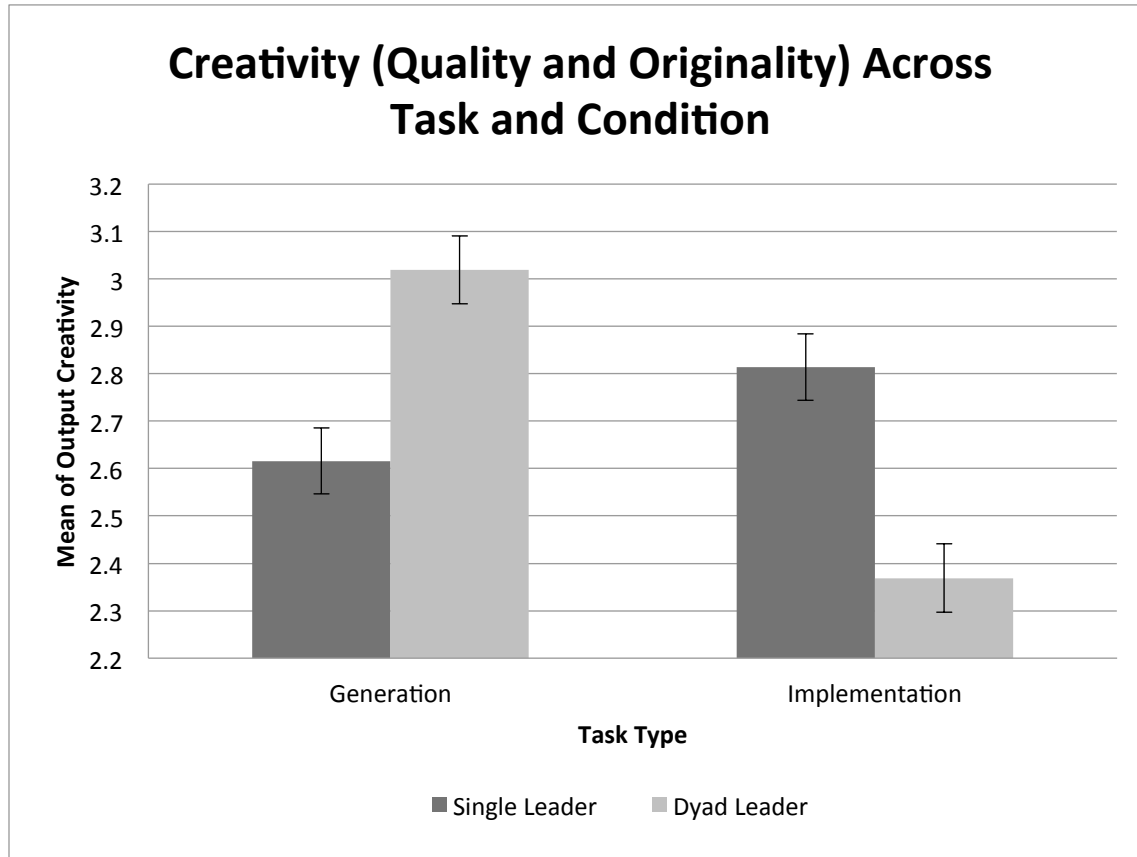
Figure 1: Results of a repeated measures model examining output creativity across task type and leadership structure.
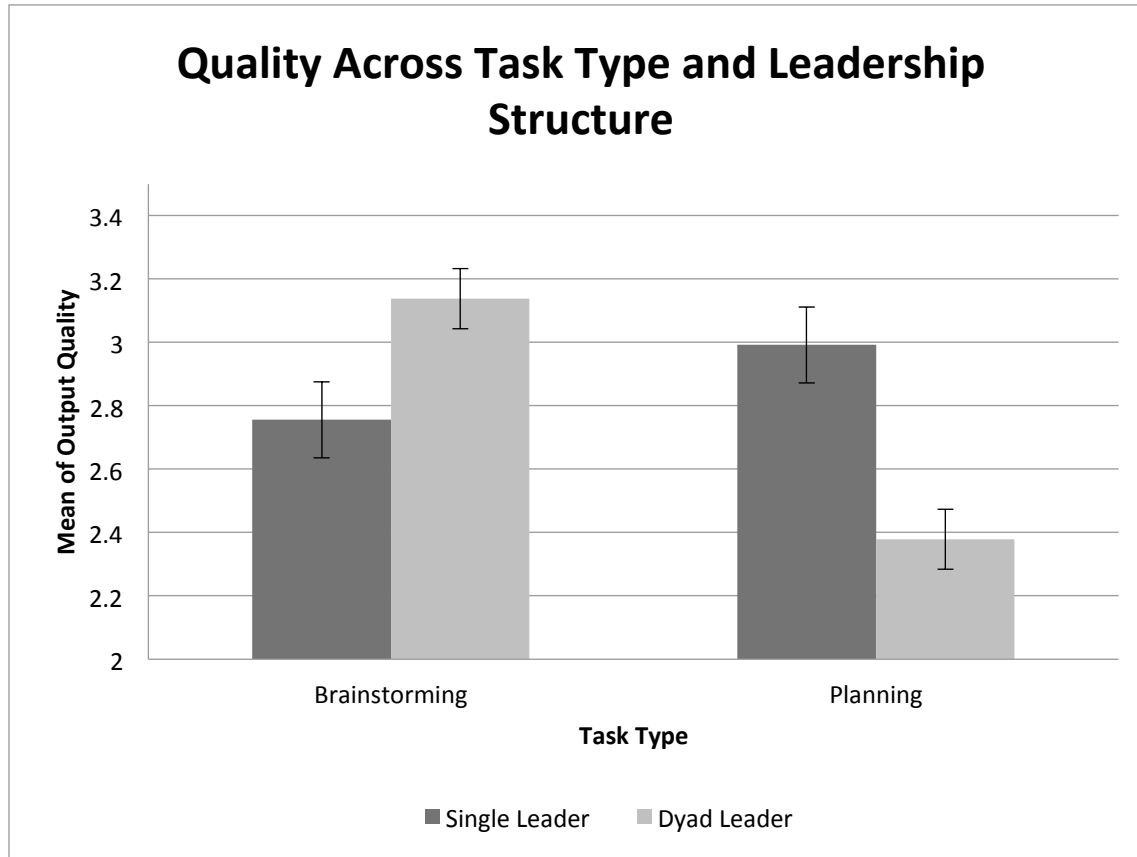
FIGURE 2

Figure 2: Results of a repeated measures model examining output quality across task type and leadership structure.
Note: This three-way interaction is not significant. Interaction is graphed for illustration of mean direction.
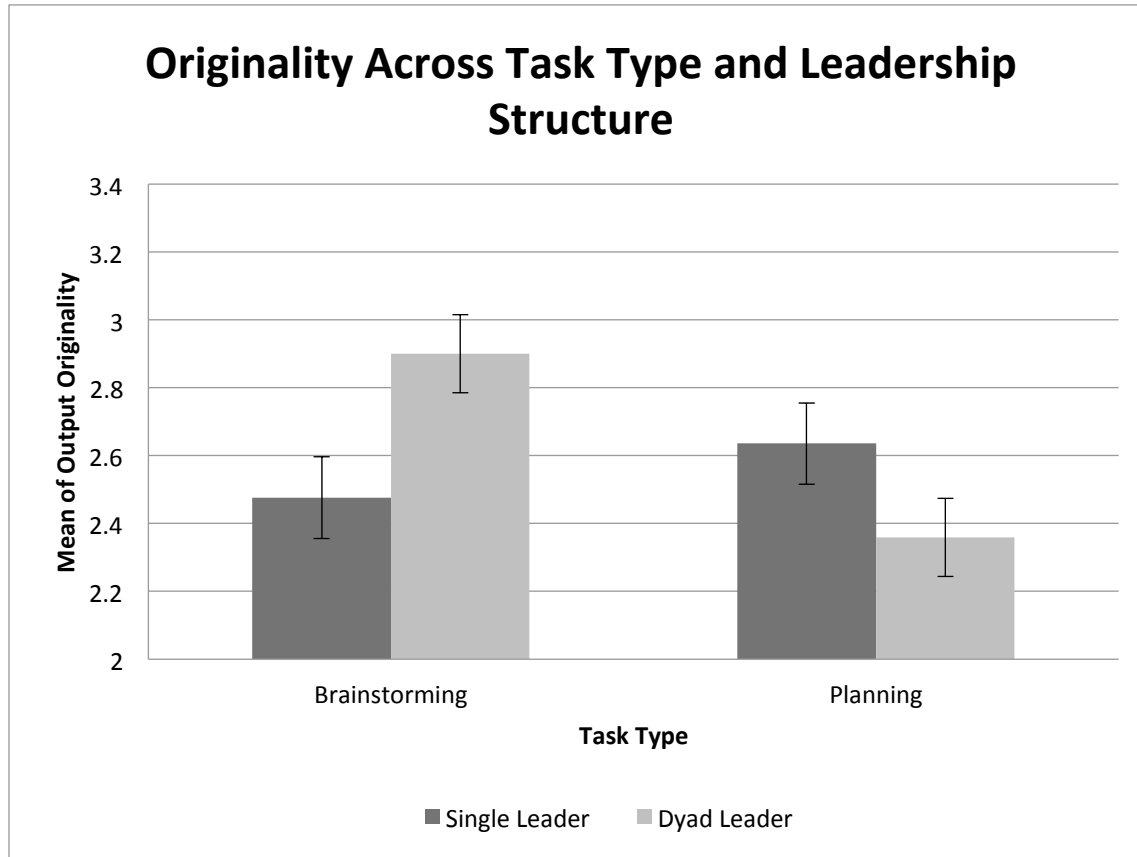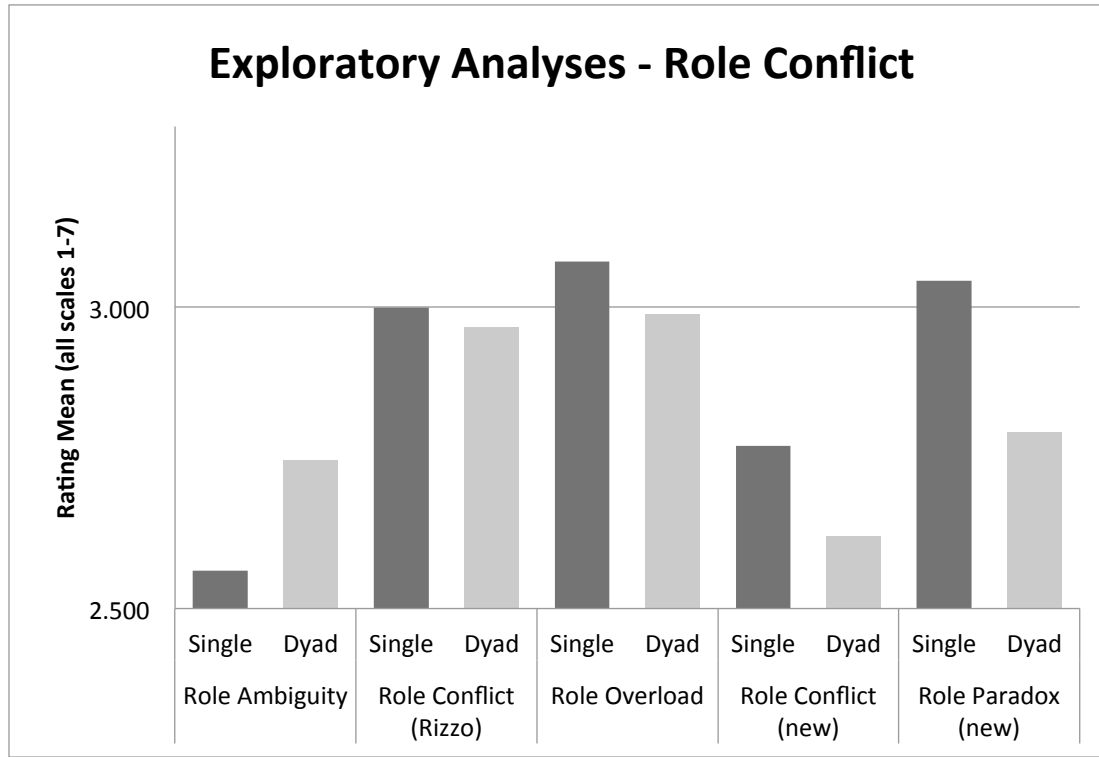
FIGURE 3

Originality Across Task Type and Leadership Structure

Figure 3: Results of a repeated measures model examining output originality across task type and leadership structure. Note: This three-way interaction is not significant. Interaction is graphed for illustration of mean direction.

FIGURE 4

Figure 4: Mean perceptions of role experiences by leaders across leadership structures.
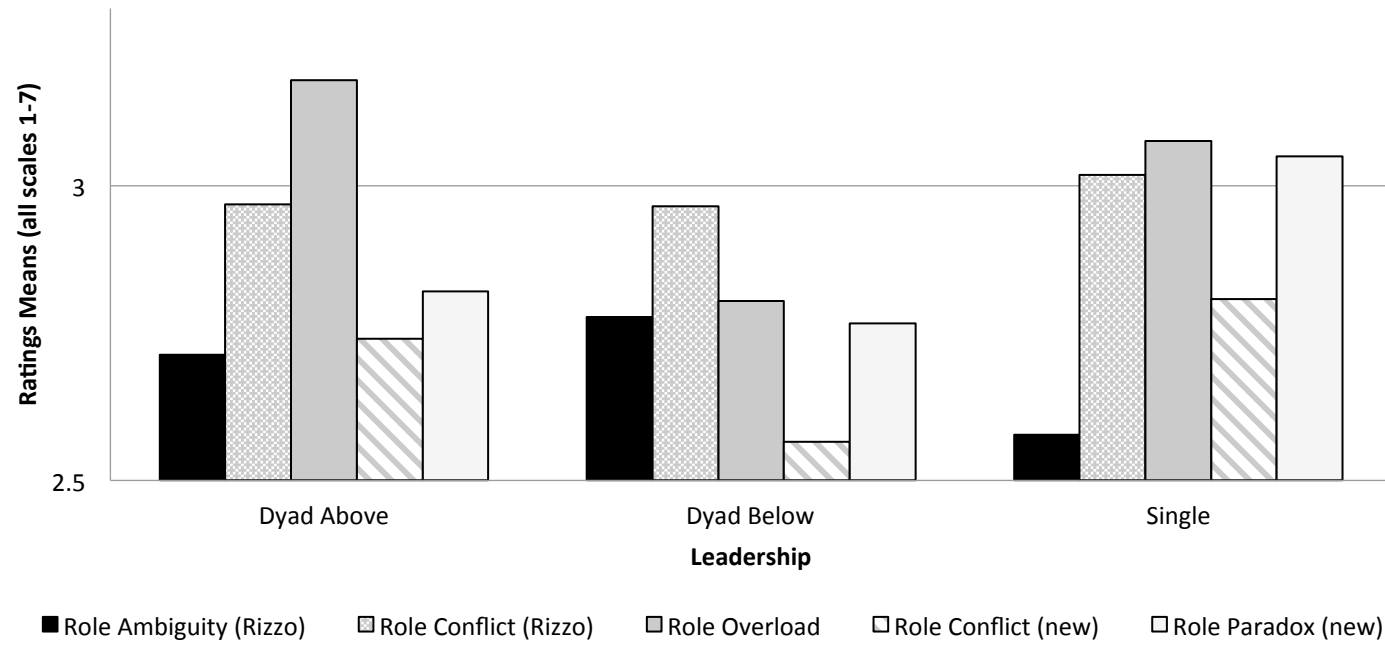
FIGURE 5

Figure 5: Role conflict scale means are compared across three groups based on leadership structure and performance.