PERCEPTUAL DISCONNECTS IN LEADERSHIP EMERGENCE: AN INTEGRATED EXAMINATION OF THE ROLE OF TRAIT CONFIGURATIONS, DYADIC RELATIONSHIPS, AND SOCIAL INFLUENCE

by

Samantha Jean Holland

A Dissertation
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Doctor of Philosophy
Psychology

Committee:

_____ Director

_____

_____

_____ Department Chairperson

_____ Program Director

_____ Dean, College of Humanities and Social Sciences

Date: _____ Summer Semester 2015
George Mason University
Fairfax, VA

Perceptual Disconnects in Leadership Emergence: An Integrated Examination of the Role of Trait Configurations, Dyadic Relationships, and Social Influence

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at George Mason University

by

Samantha J. Holland
Master of Arts
George Mason University, 2013
Bachelor of Arts
Northwestern University, 2008

Director: Stephen J. Zaccaro, Professor
Department of Psychology

Summer Semester 2015
George Mason University
Fairfax, VA

DEDICATION

To my family, for everything.

ACKNOWLEDGEMENTS

I would first like to thank my advisor, Dr. Stephen Zaccaro, for guiding me through this process and always challenging me to expand my thinking. I enjoyed our frequent, energetic conversations about pushing the boundaries of leadership research; the passion you have for your field truly inspirational. I also want to thank my other committee members, Dr. Seth Kaplan and Dr. Patrick McKnight, for providing their unique pespectives on my work that greatly improved the dissertation as a whole. Finally, this work would not have been possible without the National Science Foundation grant funding the data collection effort.

To all my friends during grad school, both classmates and "laypeople," I'm not sure I would have made it through the past four years without your humor and support. The same goes for you, parents, but extend the time frame a decade (or two). Last, but not least: Misha. I'm lucky to have found you along this journey, and cannot wait to see what's next.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

PERCEPTUAL DISCONNECTS IN LEADERSHIP EMERGENCE: AN INTEGRATED EXAMINATION OF THE ROLE OF TRAIT CONFIGURATIONS, DYADIC RELATIONSHIPS, AND SOCIAL INFLUENCE

Samantha J. Holland, Ph.D.

George Mason University, 2015

Dissertation Director: Dr. Stephen J. Zaccaro

The purpose of the present study is to examine the phenomenon of perceptual disconnects in informal leadership emergence and explore their antecedents and group-level consequences. Although leadership is typically recognized to be a dyadic relationship dependent on the beliefs and perspectives of both leaders and followers, informal leadership emergence is traditionally measured solely from follower perceptions. This practice effectively obscures the opportunity to detect disconnects in leadership perceptions and assess the possible ramifications of these misalignments on group outcomes. I use a social network framework to distinguish among three possible types of leadership by the type of perceptual alignment between leaders and followers: connected, unrequited, and unrecognized leadership. I use exponential random graph models

(ERGMs) to simultaneously examine predictors of these alignments – or misalignments – across multiple levels of influence. Results from a sample of student project teams indicate between- and within-person trait patterns, existing non-leadership relationships, and social influences within teams each contribute uniquely to predicting connected versus unrequited leadership relationships amongst members. Discussion focuses on the need for more dyadic study of leadership phenomenon and the role of complex trait patterns in leadership.

INTRODUCTION

The evolution of modern organizations towards flatter, horizontal hierarchies and project team-based work (Kozlowski & Bell, 2003; Lawler, Mohrman, & Ledford, 1995; Yukl, 2012) requires a better understanding of the nature of informal leader emergence. Though formally appointed leaders typically exist within these groups, informal leadership relationships may also get negotiated amongst team members Shared leadership (e.g., Carson, Tesluk, & Marrone, 2007; Pearce & Conger, 2003), for example, focuses specifically on how networks of informal leadership benefit team or organizational effectiveness (e.g., Friedrich, Vessey, Schuelke, Ruark, & Mumford, 2009; Nicolaides, et al., 2015; Pearce & Sims, 2002; Wang, Waldman, & Zhang, 2014). While this work has done much to improve our understanding of shared systems of leadership, a potentially important aspect has been ignored: the possibility of fundamental disconnects between emergent leader and follower perceptions of the leadership relationships developing between group members.

Implicit leadership theory (Lord, Foti, & De Vader, 1984; Lord & Maher, 1991) and leader member exchange (LMX; Graen, 1976, Graen & Uhl-Bien, 1995) are two theories acknowledging the interplay of leader and follower attributes and perceptions in determining leader effectiveness. LMX in particular emphasizes the relationship aspect of leadership. However, when researches apply these dyadic and followership theories, they

are typically presupposing clarity in which members are leaders and followers via formally appointed roles. However, leader role occupancy also derives from the informal influence relationships formed among leader candidates and potential followers. DeRue and Ashford (2010) conceptualize this process of establishing leader (and follower) identities as a series of claims and grants of members' respective roles. Leader identities are fully constructed only when individuals' claims of leadership within a group are granted by others who then take on the reciprocal follower identities. This framework suggests that whether a leadership relationship exists between two members is only fully understood by taking both parties' perspectives into account.

This raises an interesting question for emergent leadership: do the members recognized by the group as its informal leaders actually accept this new role? Almost all prior studies of emergent leadership measure leadership solely from the follower's perspective (e.g., Carson et al., 2007; Keller, 1999; Mehra, Smith, Dixon, & Robertson, 2006; ; Vecchio & Boatwright, 2002; Zaccaro, Foti, & Kenny, 1991). Though this approach identifies individuals people are relying on for leadership, whether nominated leaders actually recognize these nominations and adopt fully constructed leader identities has generally been left unexamined. Meta-analytic evidence in the LMX literature indicating significant, pervasive discrepancies between leader and follower relationship perceptions (Gerstner & Day, 1997; Sin, Nahrgang, & Morgeson, 2009) suggests that complete agreement on these emergent leader and follower roles is similarly unlikely. Thus, one cannot safely assume that members typically agree on who is adopting leader versus follower roles within a group.

Socio-cognitive theories of identity construction suggest that such inconsistencies in leadership emergence perceptions may be associated with meaningful variance in subsequent leader effectiveness and group outcomes (e.g., DeRue & Ashford, 2010). People's identities are heavily shaped by interactions and judgments of others: self-concepts that are not reinforced through congruent interactions with others are unlikely to endure (DeRue, Ashford, & Cotton, 2009; DeRue & Ashford, 2010; Goffman, 1959). More specifically for leadership, De Rue and Ashford (2010) posit that leader and follower identities are formed through a reciprocal process of claims and grants of members' respective identities. If either a) the prospective follower does not grant the leadership claim or b) a prospective follower issues a claim for following a prospective leader that is not acknowledged by that member, leader (and follower) identities are not established. When leadership is "unconnected," leader effectiveness is expected to suffer (DeRue & Ashford, 2010).

This paper explores the existence and impact of perceptual disconnects in informal leadership emergence within groups. I begin by presenting a classification of leadership types that differentiate among relationships of varying degrees of leader-follower perceptual connection. Second, I offer three sets of hypotheses for antecedents of connected versus unconnected leadership. In doing so, I draw upon previous trait pattern approaches and extend these principles to the dyadic level. I also take other interpersonal dynamics into consideration as unique influencers of leadership perception. I simultaneously test these multiple levels of influence by utilizing a social network analytic framework. Finally, I offer hypotheses on consequences of perceptual

disconnects in leadership at the group level to explore the effect of these disconnects on member efficacy and satisfaction with the group.

Classifying leadership perceptual disconnects

I borrow from network terminology for my leadership classifications because of its suitability for describing dyadic-level phenomenon. The majority of terminology and methods in traditional psychology research, including leadership research, uses individuals as the basic unit of focus and measurement. This reflects the dominance of person-centric theories (e.g., internal psychological processes, reactions to external factors, individual traits) in early psychological research that required individual-level analyses (Dionne et al., 2014; Wasserman & Robins, 2012). In contrast, network theories and terminologies were developed to accurately capture interpersonal relationships; accordingly, network theorists uses dyads as the fundamental building block of their models (e.g. Borgatti & Foster, 2003; Brass, Galaskiewicz, Greve, & Tsai, 2004). Relationships between individuals are represented as ties. Ties can be directed (i.e., flowing from one node to another) or undirected (i.e., bidirectionalty) as well as valued (i.e., Likert-type evaluation) or binary (Borgatti & Foster, 2003). The decisions of which type of ties to use depend on the conceptual fit of these features with the relationship being measured.

A dyadic view of leadership emergence suggests leadership is most effectively captured using two types of directed ties: leader relationships from both the leader- and follower-perspectives. Agreement on leader-follower roles is indicated by the presence of both ties between dyad members (i.e., one member, member A, recognizes the other,

member B, as a leader, and member B recognizes his or her role of providing leadership to member A). If only the leader or follower- perspective leadership tie exists, there is some type of perceptual disconnect. Though assessments of leader and follower roles may exist on a spectrum rather than in the dichotomous fashion described above, I adopted binary measurement of leadership ties in this present study for both the sake of conceptual clarity and to align my approach with the ways others have construed leader and follower identity construction (i.e., DeRue & Ashford, 2010).

With this framework in mind, I now describe the different possible configurations of convergence or divergence in leadership ties from the leader and follower perspectives (Figure 1).

Connected leadership. Connected leadership describes instances of perceptual alignment within a dyad on who is occupying a leader or follower role. Both members agree that one member has taken on a leader role and the other has taken on a follower role, with all the responsibilities and duties implied by those respective roles. In network terms, connected leadership ties result from the complete overlap of leader- and follower-perceived leadership ties (i.e., Member A indicates reliance on Member B for leadership, and Member B indicates providing leadership to Member A). Connected leadership is not restricted to vertical leadership relationships: shared, connected leadership would describe instances in which both member of a dyad simultaneously indicate providing leadership to and relying on each other for leadership.

Unconnected leadership. Unconnected leadership refers to instances in which there is some type of perceptual disconnect within a given dyad on who is occupying a leader or

follower role. In network terms, this manifests as a leadership tie from one perspective (i.e, from a leader or follower perspective) that is not reciprocated by the other. There are two possible types of unconnected leadership. *Unrequited leadership* denotes dyadic relationships in which one member believes he or she is leader for another member who in turn does not grant that person the leadership role. On the other hand, *unrecognized leadership* describes dyadic relationships in which one member is relying on someone for leadership who either does not recognize he or she is expected to serve as a leader for that person, or actively refuses to acknowledge the leader role. Though the interpersonal dynamics that may cause unrequited versus unrecognized leadership to emerge, both forms unconnected leadership represent failures of leader identity construction (DeRue & Ashford, 2010).

When considering these forms of connected and unconnected leadership in relation to the extant emergent leadership literature, an important point is that this literature typically assumes all emergent leadership is connected leadership. Leader emergence is almost universally assessed from only the follower's perspective (e.g., Carson et al., 2007; Mayo, Meindl, & Pastor, 2003; Small, 2008). By failing to capture views of group leadership from the leader-perspective, connected versus unrecognized leaders are indistinguishable from one another. Furthermore, the presence of unrequited leaders is completely obscured. In short, by measuring leader emergence from only one perspective, researchers are incompletely capturing the dyadic leadership phenomenon in a way similar to the single-perspective issues already recognized in the LMX literature (Gooty, Serban, Thomas, Gavin, & Yammarino, 2012; Sin et al., 2009). By exploring

possible antecedents and consequences of either connected or unconnected leadership, I begin to uncover the nature and impact of perceptual disconnects in leadership.

Identifying antecedents of leader emergence

An assessment of the body of leadership research reveals four broad types of factors or sources relevant to leadership phenomenon: leader factors (i.e., leader traits and behaviors; Bray, Campbell, & Grant, 1974; Galton, 1869; Hong, Catano, Liao, 2011; Judge, Bono, Ilies, & Gerhardt, 2002), follower factors (i.e., follower traits and prototypes; Epitropaki & Martin, 2004; Lord et al., 1984), dyadic factors (i.e., LMX; Graen, 1976), and environmental factors (i.e., characteristics of the task or situation). Though these sources are typically studied independently from one another, in part due to the analytical challenges in combining individual, dyadic, and group level variables (Thomas, Martin, Epitropaki, Guillaume, & Lee, 2013), there are clear advantages for considering multiple sources in a comprehensive model (e.g., Kenny & Livi, 2009; Livi, Kenny, Albright, & Pierro, 2008). In doing so, I study the unique contribution of multiple factors to differentiate whether or not each significantly contributes to variance over and above the other factors at play.

I organized my antecedent hypotheses according to three levels of influence. First, I present a set of hypotheses suggesting particular dyadic trait configurations promoting either connected or unconnected leadership. These hypotheses build upon trait and trait pattern literature, suggesting that between-person patterns (i.e., dyadic) also influence leadership emergence. Second, I utilize principles of cognitive dissonance (Festinger, 1957) in a second set of hypotheses that suggest the valence of non-leadership

relationships amongst members also influences leadership perceptual alignment. This set of hypotheses posits that non-leadership relationships may uniquely contribute to leadership perspectives beyond individual-level factors. Third, I offer hypotheses examining what features of the network environment (i.e., the group structure in which each dyad is embedded in) may influence leadership perceptions. This third set benefits from the higher level of specificity made through a social network analysis (SNA) approach to examine the role of the social context. SNA is an ideal method for studying dyadic relationship dynamics within a broader social context (Sparrowe & Liden, 1997) because it is able to analyze how structural configurations can impact member behavior and perceptions, and vice versa. In short, SNA techniques can specifically break down how and why the surrounding context influences leadership phenomenon.

Finally, to link perceptual disconnects in leadership to organizationally relevant outcomes, my last set of hypotheses suggests the degree to which emergent leadership is connected influences several proximal leadership outcomes at the group level.

Antecedents of connected and unconnected leadership emergence

Trait patterns predicting leadership emergence. An extensive body of empirical studies and meta-analytic evidence link traits such as extraversion (Judge et al., 2002), motivation to lead (Hong et al., 2011; Oh, 2012; Luria & Benson, 2013), and social skills (e.g., Bray et al., 1974; Connelly et al., 2000; Mumford, O'Connor, Clifton, Connelly, & Zaccaro, 1993) to leadership emergence. Extraversion and motivation to lead are traits assessing a member's desire to assume the leader role, whereas social skills

indicate the extent to which an individual can successfully establish influence (i.e., leadership) relationships with others. Recent research specifically on perceptions and beliefs about leadership has expanded this work by taking a pattern-based approach to understanding leadership phenomenon (Foti & Hauenstein, 2007; Zaccaro, 2007). Instead of focusing on specific traits relevant to leader schemas, this approach considers networks of attributes. Evaluation of leadership relationships is a process governed by input from multiple systems (Dinh, Lord, & Hoffman, 2014; Lord & Shondrick, 2011), suggesting that it may be overly simplistic to predict leadership perceptions by individual traits alone. Indeed, recent research using pattern approaches to predict leadership perceptions have proven able to predict variance in perceptions over and above studies considering traits individually (Dinh & Lord, 2013; Foti & Hauenstein, 2007; Trichas, Schyns, & Lord, 2013).

In line with previous research, I expect that constellations of leader traits are more predictive of leadership than individual traits. However, I extend the concept of trait patterns to include both within-person (i.e., leader profiles) and between-person (i.e., dyadic configuration of trait profiles) considerations. A successful leadership emergence process requires a negotiation of leader and follower roles such one individual offers leadership influence, while at least one other person accepts such influence (DeRue & Ashford, 2010). This successful emergence reflects a connected leadership relationship. Such a connected relationship requires individuals motivated enough to want to exert such influence. However, it also requires sufficient social skill from leaders, who must be sensitive to the needs and motives of the potential followers and able to use that

knowledge to help control the social situation between them. Accordingly, I expect a member's motivation to lead (MTL; Chen & Drasgow, 2001) is a necessary but not sufficient condition for connected emergence: the member must have the ability to successfully navigate the social process of leadership establishment as well. The successful establishment of the leader identity is unlikely if either component of this leader trait pattern is missing.

However, even if potential leaders possess high MTL and social skills, they require members who are receptive to their leadership claims in order to emerge as connected leaders (Chen, 2014). From the follower's perspective, the probability of granting another's leadership claim improves if that prospective follower is averse to personally taking on leadership roles (i.e., low in MTL). The probability is further improved if prospective followers are either predisposed towards being agreeable, such that they are unlikely to create conflict by rejecting leadership claims from others, or sufficiently dutiful (i.e., conscientious) to comply with whatever is necessary to get a group project done. Thus, I propose two types of ideal follower trait patterns (i.e., profiles): members who are low in MTL yet high in either agreeableness or conscientiousness. People with the former trait pattern are ideal followers because not only are they themselves uninterested in leading, but they also are inclined to agree with other's opinions and, in this case, claim to a leadership role. When in a group context, people with the latter trait pattern are also predisposed to followership because they are highly motivated to dutifully complete the task at hand (Goldberg et al., 2006) yet are

uninterested in leading the group's efforts. In both cases, a leadership claim made by another faces few barriers for acceptance.

By combining these leader and follower trait patterns into dyadic trait configurations (i.e., leadership trait patterns) most conducive for connected leadership, I hypothesize the following:

H1a: The emergence of a connected leadership relationship between a leader high in both motivation to lead and social skills and a follower high in agreeableness and low in motivation to lead is more likely than would be expected by chance alone.

H1b: The emergence of a connected leadership relationship between a leader high in both motivation to lead and social skills and a follower high in conscientiousness and low in motivation to lead is more likely than would be expected by chance alone.

As discussed previously, the key difference between connected and unconnected leadership emergence stems from failures on the leader's part to navigate the claiming and granting process (i.e., due to low social skills) or resistance from the follower on granting leadership claims. When either of these instances occur, members may experience disconnects between the roles they perceive themselves as holding and the roles that others perceive for them. This lack of alignment results in unconnected leadership relationships emerging between members. More specifically:

H2a: The emergence of an unconnected leadership relationship between a leader high in motivation to lead yet low in social skills and a follower low in motivation to lead and agreeableness is more likely than would be expected by chance alone.

H2b: The emergence of an unconnected leadership relationship between a leader high in motivation to lead yet low in social skills and a follower low in motivation to lead and conscientiousness is more likely than would be expected by chance alone.

H2c: The emergence of an unconnected leadership relationship between a leader high in motivation to lead yet low in social skills and a follower high in motivation to lead and low in agreeableness is more likely than would be expected by chance alone.

H2d: The emergence of an unconnected leadership relationship between a leader high in motivation to lead yet low in social skills and a follower high in motivation to lead and low in conscientiousness is more likely than would be expected by chance alone.

Relationships within the dyad. I also expect the existence of positive or negative interpersonal relationships between members to influence the probability of leadership perceptual disconnects in accordance with the principles of cognitive dissonance. Cognitive dissonance theory (Festinger, 1957) states that people are constantly striving for internal consistency in the beliefs, ideas, and values they hold about others and the world at large. When people notice inconsistencies (i.e., dissonance) across these thoughts, they are motivated to find ways to reconcile them via rationalization or revisions of the ones misaligned with the others.

Principles of cognitive dissonance play a role in leadership emergence when dyad members have positively or negatively valenced relationships (i.e., ties) because those relationships influence how one member's leadership claim is perceived by the other. If the members are connected via positive ties, such as trust or friendship, a leadership

claim is likely to be accepted by the follower because accepting the request from a trusted friend is aligned with the follower's pre-existing perceptions of that person. Similarly, members are unlikely to be receptive to leadership claims if their relationship is contentious, even if their dispositions would suggest otherwise. This is attributable to the dissonance created by agreeing to follow someone one does not like. In other words, holding everything else constant, positive or negative valence ties between dyad members serve as a distinct source of leadership perceptual variance.

I expect this need to avoid cognitive dissonance is a significant source of leadership perceptual variance, over and above what is accounted for by individual differences. Members are more likely to be receptive of others' claims of leadership when they have other positively-valenced relationships, and are more likely to disagree on leadership roles when members have negative interpersonal relationships. Though there may be a possibility for an interaction between this source and the contribution of the dyad's trait configurations, I adopt independent assessments of each because my focus is to understand the specific contribution of each source.

H3: The presence of a friendship relationship between two members positively predicts the presence of a connected leadership relationship between them.

H4: The presence of an adversarial relationship between two members positively predicts the presence of an unconnected leadership relationship between them.

Dyad as embedded in the broader social context. The third type of consideration is the way the members of the dyad are connected within the larger

network. Leadership researchers have long noted that leaders do not exist in a vacuum: the way in which leaders and their followers are connected to others within the group or organization can influence leadership perceptions and effectiveness within a given leader-member dyad (Balkundi & Kilduff, 2006; Boal & Hooijberg, 2000; Sparrowe & Liden, 2005; Yukl, 2012). While a few researchers have used social network methods to provide empirical evidence in support of such embeddedness influences (for an example of how network position influences LMX outcomes, see Sparrow & Liden, 2005), this factor is more commonly ignored, or examined in a relatively coarse manner in the literature. I attempt to more explicitly test how the leadership perceptions of team members other than the focal dyad members may affect leadership perceptions within the dyad by considering the embeddedness of leader-follower dyads within the social context of the broader network.

According to social comparison theory (Festinger, 1954), people's perceptions of others can be influenced by how their peers judge those others. All other factors being equal, we are more likely to view member A as a leader if we know our friends rely on that person as a leader. Thus, for a given dyad of member A and B, if member B is connected to member C and member C has nominated A as a leader, there is a greater chance that member B will rate A as a leader than if A had received no other leader nominations. This type of transitive relationship is also suggested by balance theory (Heider, 1958). The central premise of balance theory is that the pattern of an individual's positive and negative relationships with others must be balanced such that there are no inconsistencies in their patterns. In other words, if Members A and B both have positive

relationships with Member C, it would be more incongruous for Members A and B to have a negative versus a positive relationship, because they both relate positively to a common other.

Balance theory has more commonly been used to justify triadic phenomenon such as the one just described (e.g., Tse, Lam, Lawrence, & Huang, 2013) than transitive relationships. However, balance theory can easily apply to transitive relationship by virtue of the fact that people are generally aware of the patterns of surrounding social ties (Freeman, Freeman, & Michaelson, 1988; Heider, 1958), and this extends to transitive relationships just as easily as it does for triadic. When Member A is considering whether or not to perceive Member C as a leader, this perception will be influenced by how other members connected positively to Member A perceive Member C. Therefore, if Member A view Member B as a leader, and Member B views Member C as a leader, it follows that it is more congruous for Member A to perceive C as a leader than as anything else.

By explicitly considering embeddedness, I address the calls from researchers to stop measuring leadership as though it exists in isolation (e.g., Contractor, DeChurch, Carson, Carter, & Keegan, 2012; Yukl, 2012). Leader perceptions are influenced not just by proximal factors (e.g., individual differences, leader-follower exchanges) because people's interactions with each other are shaped by the influences of third parties. While the phenomenon of social comparison theory in this emergent leadership context is relatively obvious, the primary interest here is identifying whether this social influence contributes meaningful variance in leadership perceptual disconnects over and above the more proximal trait configuration- and pre-existing connection- based influencers.

H5a: Holding all other variables constant, connected leadership is more likely to emerge within a dyad if the leader has connected leadership relationships with one or more others in the group.

The extent to which connected leadership emergence at the dyadic level is influenced by leadership perceptions of other group members likely depends in part on the group's cohesion levels. Festinger's (1950) theory of group influences on member opinion asserts that there is a direct relationship between the cohesion of a group and the pressure that group members feel to ensure all members share the same opinions. By extension to leadership perceptions, one dyad member's perceptions of the other member's leadership status is more influenced by the perceptions of the other group members when the group is close-knit. The less connected group members are overall, the less the opinions of others will influence the leadership perceptions established within a given dyad.

H5b: The extent to which connected leadership emergence between dyad members is influenced by external group member perceptions is moderated by the group's cohesion. The higher the group's cohesion, the stronger the influence of the external perceptions on the likelihood of connected leader emergence within a dyad.

Consequences of connected versus unconnected leadership

According to the basis tenants of leader identity construction put forth by DeRue and Ashford (2010), one consequence of failed identity construction is decreased leadership effectiveness. When leader and follower identities are not agreed upon and

therefore not fully constructed, members have less role clarity on who is expected to fulfill which roles within the group. Therefore, not only will unconnected leaders be less likely to engage in the range of leadership behaviors required for successful group functioning (Morgeson et al., 2009), the unconnected followers will similarly be less clear in their responsibilities for completing the assigned tasks. This ambiguity can lead to both decreased member confidence that the group will be successful as well as a desire to work with that group in the future. I focus on efficacy and viability as proximal leadership outcomes because both are closely tied to *leadership*, versus leader quality. When members experience discord in perceptions of the relationships between them, belief in the effectiveness of the group as well as the desire to continue in those group relationships suffer. To the extent that the degree of successful leader identity within a group is captured by the proportion of connected to unconnected leadership ties within the group's network, I hypothesize the following:

H6: Higher proportions of connected versus unconnected emergent leadership within a group is positively related to perceptions of the group's efficacy.

H7: Higher proportions of connected versus unconnected emergent leadership within a group is positively related to future group viability.

METHOD

Participants

Approximately 260 undergraduates from two American universities and 90 graduate students from a French business school were randomly assigned into workgroups tasked with developing an interdisciplinary, innovative solution to an environmental issue. Because these workgroups consisted of component teams from different disciplines that must work interdependently towards a common goal, these groups were effectively multiteam systems (MTSs; Mathieu, Marks, & Zaccaro, 2001). While students worked on this project and responded to related surveys as part of their course requirements, they had to provide consent in order for their data to be used in my research. Half of the MTSs, the Science MTSs, were comprised of an equal mix of undergraduate psychology and ecology students co-located within one university, while the second half of MTSs were Translational MTSs consisting of undergraduate psychology and graduate business students dispersed across two universities. MTSs with more than one member failing to complete the survey at any time point were removed from the dataset. Due to missing data and nonconsenting students, my total sample was 322 students across 55 MTSs, with an average of 6 students per MTS (M=5.8, SD=0.9).

Though the nature of the project was similar across MTS types, the schedule of deliverables differed such that Science MTS members primarily worked within their

component teams early on (T1) then interdependently as an MTS later on (T2), whereas the reverse was true for Translational MTSs. Regardless of these differences in MTS composition and work schedule, all Science and Translational MTSs had to submit a final group deliverable 6 weeks after the start of the project. The differences between Science and Translational samples were built into this data collection due to a separate set of research questions for a separate study. Here, I attempt to control or otherwise account for these differences in all analyses when testing my hypotheses.

Procedure

After participants were assigned their workgroups, each member was given access to video-conferencing, project management sites, and email accounts to be used to communicate with their group throughout the project. Members were required to have at least one virtual meeting at the beginning of the project in order to complete a group charter task, but were otherwise free to interact however they choose (e.g., over email, via videoconference, in person, etc.). The project task required workgroup members to share knowledge and work interdependently in order to produce one joint MTS deliverable that will count towards each member's class grade as well as complete other minor deliverables throughout the project duration.

Participants completed surveys at three points throughout the project. T0 captured individual differences, demographics, and initial friendship networks prior to workgroup assignments. The second (T1) and third (T2) surveys, administered at the midpoint and end of the six-week project, measured the development of a number of expressive and

instrumental networks in addition to psychometric assessment of individual- and group-level emergent states.

Measures

Individual difference measures. Prior to the start of group work, participants completed the T0 survey that included a large number of individual differences and demographic variables, but I report here only the subset of variables pertaining to the present study.

Motivation to lead. Motivation to lead (MTL; Chan & Drasgow, 2001) is one construct specifically developed to capture the motivational element of the leader trait profile. MTL is conceptualized as more immediate mediator of the well-established relationship between the broader personality trait of extraversion and leader emergence (Hong et al., 2011; Judge et al., 2002). I assessed MTL using Chan and Drasgow's (2001) 6-item scale in which participants used a 5-point Likert scale (1=strong disagree, 5= strongly agree) to respond to a prompt asking them to indicate how well each statement in the scale describes themselves. A sample item is "I usually want to be the leader in the groups that I work in" ($\alpha = .85$).

Social skills. I assessed social skills with an abridged versions of Riggio's (1984) Social Skills Inventory (SSI) social skill facets of emotional sensitivity (ES) and social control (SC), as developed by Oldmeadow, Quinn and Kowert (2013). Participants responded to each 4-item scale using a 5-point Likert scale indicating the extent to which the statements related to them (1=not at all like me, 5= exactly like me). Sample items

include “I can accurately tell what a person’s character is upon first meeting him or her” (ES) and “I am usually very good at leading group discussions” (SC) (α = .80).

Followership traits. In addition to low MTL, I measured agreeableness and conscientiousness using 10-item IPIP scales (Goldberg et al., 2006) in which participants responded to the same prompt with the same 5-point Likert scale response options as used for MTL. Sample items for these scales are “Have a good word for everyone” (α = .85) and “Am always prepared” (α = .88), respectively.

Dyadic trait configurations. I created dyadic trait configuration variables to assess the specific leadership trait patterns specified in H1-H2. These variables required both within-person patterns (i.e., leader or follower trait patterns) and dyadic patterns (i.e., combination of leader and follower patterns into leadership patterns). Because of the complexity of these configurations, I chose to make dichotomous configuration scores indicating whether or not the configuration of traits between a given dyad conformed to the hypothesized levels (e.g., for H1, that the potential leader was high in MTL and social skills and the potential follower was low in MTL and high in agreeableness). For these variables, all trait scale scores above the sample mean were categorized as high, and all below the mean were categorized as low.

For each MTS, I created binary matrices such that the cells within the lower diagonals indicated whether or not traits within a given dyad were aligned with the hypothesized patterns when considering the member along the rows as the potential leader and the member across the columns as the potential follower. Similarly, cells

within the upper diagonal indicated whether or not traits within a given dyad were aligned with the hypothesized patterns when considering the member across the columns as the potential leader and the member along the rows as the potential follower. Appendix A provides additional explanation for how I constructed these matrices.

Network measures. Sociometric items were administered at T1 and T2 in order to measure the emergent networks within project groups. Unlike traditional measures, sociometric measures are single items used to establish ties between members (i.e., nodes) by asking participants which members of their network they feel a given item applies to. These data are formatted in matrices such that the upper and lower diagonals are symmetric if the networks are not directed, and unique if directed. All networks in this study were directed.

***Leadership emergence*.** Leadership emergence as assessed from both leader and follow perspectives in order to construct connected and unconnected leadership networks as discussed earlier in the paper. For the follower perspective, which is the perspective commonly used in leadership emergence research (e.g., Carson et al., 2007; Small & Rentsch, 2010), I used the item "Who you rely on for leadership?" This is a modified version of the measure used by Carson and colleagues ("To what degree does your team rely on this individual for leadership"; 2007) that shifts the referent from the team to the dyadic level and also more clearly delineates leaders from non-leaders due to the binary measurement. I assessed the leader perspective using a complementary item, "Who do you provide leadership to?".

Connected leadership. Connected leadership requires that both members of a dyad agree on the leader and follower roles between them. Therefore, each tie in a connected leadership network represents a dyadic relationship in which the member who believes he or she is leading the other is also recognize by the other member as a leader. To create this tie from the leader- and follower-leadership ties described above, I transposed the leader-perspective sociometric data matrix such that ties are directed into the leader, not the follower, and identified the ties that overlapped with the follower-perspective matrix. See Appendix B for more details on how this variable was constructed.

Unconnected leadership. Unconnected leadership describes ties in which a leadership relationship between two members is only perceived by one of the members. If only the leader perceives the relationship, the leadership is referred to as unrequited; if only the follower perceives the leadership relationship, leadership is referred to as unrecognized. I constructed both networks in a similar fashion as connected leadership, except that these networks are the result of non-overlapping, rather than overlapping, ties. Unrequited leadership networks were created using all leader-perspective ties that are not overlapping with (transposed) follower-perspective ties, with the opposite being true for unrecognized leadership networks. The overall unconnected leadership networks were created by combining those two networks. Appendix B offers more details on this process.

Proportion of connected to unconnected leadership. To assess the relative proportion of connected (i.e., leadership perceptual alignment) to unconnected (i.e.,

leadership perceptual disconnect) leadership within networks, I created a ratio of the density of the connected leadership network to the density of the unconnected leadership network. Using a ratio of densities is advantageous because it controls for differences in size or overall leadership density across MTSs. Because all leadership ties can be categorized as either connected or unconnected, and there is no overlap between connected and unconnected categories, a ratio equal to 1 means that there is as much alignment as disconnect in leadership perceptions within the network. The higher this value, the more leadership perceptual alignment there is within the network.

Non-leadership networks. To test hypotheses regarding the effects of non-leadership relationships (positively or negatively valenced)on emergent leadership, friendship and hindrance networks were measured at T1 and T2. Like leadership networks, these networks were measured using binary scales. I assessed friendship by asking "Who do you consider to be a friend?" and hindrance by "Who do you find difficult to work with?". For all sociometric items, participants were presented with their team roster and asked to select as many people from that list as they choose to.

Outcome measures. Group process efficacy and perceptions of group viability and satisfaction were assessed at both T1 and T2 as proximal measures of leadership outcomes. For process efficacy, I used the 3-item short form of Collins and Parker (2009) scale that asks members to rate their confidence in their group that they would be able to do various tasks using a 10-point scale (0=not at all confident, 10=confident) (average α across T1 and T2 = .85). A sample item is "Adapt to changing situations/demands". For group viability and satisfaction, I used the Resick, Dickson, and Mitchelson (2010) 4-

item scale requiring members to describe their perceptions of their group using a 5-point Likert scale of agreement (1=strongly disagree, 5=strongly agree) with items pertaining to past enjoyment of the team and future willingness to work as part of that group (average α across T1 and T2 = .70). Sample items include "I really enjoyed being part of this group" and "I wouldn't hesitate to participate on another task with the same group".

Group cohesion as moderator. I assessed group cohesion using a 4-item measure (Powers, 2012) in which participants rated their perceptions of their group using a 5-point Likert scale of agreement (1=strongly disagree, 5=strongly agree) (average α across T1 and T2 = .75). A sample item is "Our task group is unified in its task focus".

Aggregation Tests

To support the aggregation of member cohesion (H5b), group process efficacy (H6) and group satisfaction and viability (H7) ratings, I calculated intermember reliability (ICC1 and ICC2) and tested whether average scores differed significantly across MTSs (i.e., using an *F* test from a one-way ANOVA). While there is a lack of consistency in the field regarding the level of evidence required to justify variable aggregation to higher levels (LeBreton & Senter, 2008), demonstrating ICC1's that are statistically different from zero is a method endorsed by others (e.g., Biemann, Cole, & Voelpel, 2012, Chen et al., 2007, Chen et al., 2009) that I adopted here as well. I found good support for aggregation for cohesion (r_{wg} = .80, ICC1= .13, ICC2 = .45, $F(55,319) = 1.82$, $p<.05$), process efficacy (r_{wg} = .83, ICC1= .26, ICC2 = .66, $F(55,317) = 2.92$, $p<.05$), and

viability/satisfaction (r_{wg} = .85, ICC1= .25, ICC2 = .46, $F(54, 297) = 2.69$, $p<.05$), allowing us to use these as MTS level variables in my focal analyses.

Analytic Approach: Social Network Analysis

The study of leadership perceptual disconnects in groups requires an analytic approach that can handle both dyadic data and incorporate social influences when empirically testing its models. I chose to use a social network analytic approach in the present study precisely because of the ability to handle non-independence of data and simultaneously incorporate multiple levels of influence (Borgatti & Foster, 2003; Brass et al., 2004; Wasserman & Robins, 2012). In particular, a class of social analytic statistical models called *p** or *exponential random graph models* (ERGMs) was developed specifically to model the antecedents of relationship emergence (e.g., Anderson, Wasserman, & Crouch, 1999; Contractor et al., 2013; Frank, 1981; Frank & Strauss, 1986; Pattison & Wasserman, 1999; Robins, Pattison, Kalish, & Lusher, 2007; Robins, Pattison, & Wasserman, 1999; Wasserman & Pattison, 1996; Wasserman & Robins, 2005). I used ERGMs to test all three levels of the proposed antecedents: dyadic configurations of traits (H1-H2), valence of non-leadership ties (H3-H4), and principles of social comparison/preferential affiliation (H5a-H5b). To examine the consequences of connected and unconnected leadership (H6-H7), I modeled group leadership structures using network density statistics and examined correlations between leadership density indicators and group outcomes.

ERGMs: a way to study the antecedents of network ties. Put simply, ERGMs are "tie-based models for understanding how and why social network ties arise" (Robins & Lusher, 2013, p.9). ERGMs estimate the likelihood that random network ties Yij will exist among every pair of actors i and j. Therefore, in ERGMs, every possible tie (present or absent) among actors in a focal network is a dependent variable. When network ties are binary, these models are roughly analogous to logistic regression models: researches choose a set of variables expected to influence the probability of tie formation, and the output can be converted into odds-ratios indicating the extent to which each variable influences that outcome. Importantly, ERGMs allow researchers to include both *endogenous* and *exogenous* parameters into a single model in order to simultaneously consider structural and node attribute factors, respectively. In the present research, exogenous factors included dyadic personality trait configurations (H1-H2) and non-leadership relationships (H3-H4) between members, and endogenous factors included core structural controls typically included in ERGM models as well as a parameter modeling the role of social influence on leadership perceptions (H5).

I conducted all ERGM analyses using the statnet package in R (Handcock, Hunter, Butts, Goodreau, & Morris, 2003) version 3.1-0 (Handcock, Hunter, Butts, Goodreau, & Morris, 2008). In order to use my entire set of MTSs as a single input network for these analyses, I used a structural zero approach to bind the networks together and restrict tie variance to only within, rather than between, MTSs (Kalish & Luria, 2013). All estimated models for H1-H5 included a set of endogenous controls

(*edges, mutual, isolates*) as well as an exogenous control for team membership within each MTS system (*nodematch*).

I used the *edgecov()* term in statnet to model the influence of dyadic trait patterns (H1 and H2) and the co-existence of friendship (H3) or adversarial relationships (H4) on connected or unconnected leadership emergent. This term adds a statistic to the model that captures the probability of a given type of tie's co-existence with the focal network (i.e., leadership networks). Though the influence of member traits on network emergence is more typically modeled using input of specific node attributes, my focus on dyadic pattern matching in the context of a directed network made *edgecov()* a more appropriate model term. Using the dyadic trait configuration matrices (as described in Appendix A), I was able to account for all possible pairings between network members from both perspectives: the lower matrix diagonal considering each member's suitability, given their trait levels compared to each other member, to emerge as a leader, and the upper portion considering each member's suitability to emerge as a follower. Dydads with trait configurations in alignment with the hypothesized patterns are marked as ties (i.e., 1s) and all dyads not in alignment as marked as not ties (i.e., 0s). When using these matrices as input for the *edgecov()* parameter, therefore, a significant and positive coefficient indicates that dyad alignment with the hypothesized trait patterns coexists with the focal leadership ties (i.e., connected or unconnected leadership) more often than chance.

Finally, I used the *idegreepopularity* parameter in statnet to model the influence of other members' leadership perceptions on dyadic-level leadership emergence (H5). From a high level perspective, a significant *idegreepopularity* parameter indicates that,

irrespective of all other influences, individuals who are connected leaders for more than one member exist within a network at a higher proportion than would be expected by chance.

For all ERGM analyses (H1-H5), I ran a number of models varying in complexity. For each type of factor, I ran initial models examining the influence of only that factor alongside the basic control variables. Later, I included multiple factors shown independently significant into single models to examine the relative effects of each. Therefore, my final set of models included parameters from all three buckets of antecedents (trait pattern, non-leader relationships, social influence). However, because of the complexity and possible multicollinearity of the dyadic trait configuration variables, only one hypothesized configuration was included in any given model.

RESULTS

Checking ERGM assumptions

Comparing translational and science MTS networks. In order to use my sample for ERGM analyses, I had to first ensure that the sample met some basic assumptions required for network analyses and ERGM in particular. First, because each MTS was composed of two distinct component teams, I needed to ensure there was sufficient interdependence and interactions between members on different teams for the MTSs to be considered true networks. Second, a requirement for ERGM analyses is that, if individual networks are to be combined into one sample, such as I did when combining many MTSs into one dataset, there can be no systematic differences in interactions across individual networks (Kalish & Luria, 2013). Because my sample of MTSs consisted of two types of MTSs (Science and Translational) that differed in terms of type of students within the MTS as well as the time point during the project when the highest degree of interdependence was expected, this homogeneity issue was a particular concern.

To address both issues, I investigated the proportion of leadership ties within each MTS that were between-team (i.e., a leadership relationship between members on one component team to the other component team) versus within-team (i.e., a leadership relationship between members on the same component team. The proportion of total

MTS leadership ties occurring between versus within team is a proxy for how much component team membership influences interactions between MTS members. If the proportion of between versus within team ties is approximately equal, that implies a fully integrated MTS in which there is just as much chance for leadership to develop between members on different component teams as there is within a component team. In other words, component team membership does not influence leadership ties. Furthermore, by comparing these patterns of ties across time points, I examined whether this integration changed over time (Table 1).

These results indicate a notably different pattern of interdependence between the two subsamples, which influenced my focal analyses in two key ways. First, the Science and Translational MTSs exhibit different trends of interdependence over time: interdependence between component teams increases for Science MTSs, yet decreases for Translational MTSs. Part of the reason for the difference in trend may stem from differences in their project goal hierarchies: for Science MTSs, component teams had separate team assignments at the beginning and integrated their products at the end, whereas the Translational MTSs drew up their collective approach for completing the project at the beginning, then each them completed their respective parts in the latter part of the project. As a result of this fundamental difference in MTS dynamics that violated the ERGM requirement for homogeneity across networks included in a single sample, I made the decision to separate my sample into Science and Translational MTS subgroups and conduct all my focal analyses in parallel on each group. More specifically, I focused on each group's period of maximal interdependence (i.e., T2 for Science MTSs and T1

for Translational MTSs). Separating the sample was particularly important for all ERGM analyses, because known systematic differences in networks within a single sample violates a core assumption for ERGMs (Robins & Lusher, 2013).

Second, during each type of MTS's respective time point of maximal interdependence, there was still a higher proportion of within versus between team leadership ties. From this, I concluded that component team membership does influence tie formation, and therefore was included as a control variable in all focal analyses involving leadership emergence antecedents. More specifically, I used the *nodematch* term in the statnet package as a parameter in all ERGMs.

Antecedents of Connected and Unconnected Leadership

Although my hypotheses on the three sources leadership antecedents (trait patterns, dissonance with other relationships, social comparison principles) were tested in combined ERGMs, I discuss each set of factors in order of my hypotheses.

Dyadic trait configurations predicting connected leadership. Hypotheses 1a and 1b state that specific patterns of leader and follower trait profiles increase the probability of connected leadership emergence within a dyad. More specifically, connected leadership is more likely to occur between members when one member is high in both MTL and social skills and the other is low in MTL yet high in agreeableness (H1a) or conscientiousness (H1b). To test these hypotheses, I ran a series of ERGMs first testing each dyadic trait configuration variable independently (i.e., without additional trait variables in the models but including a set of endogenous and exogenous control

variables), then a second set of ERGMs that also included the individual traits making up each complex configuration to ensure that significance results were attributable primarily to individual elements of the dyadic trait configuration. I had to run a series of individual models with one component trait each instead of including all component traits with the configuration into a single model because I encountered issues with ERGM model stability. The use of the structural zero approach combined with the complexity of the dyadic trait configuration variable made significant constraints on the ability to generate stable random graph samples, which made us unable to reliably interpret results from the model including both the dyadic configuration parameter and all component traits.

Results for H1a and H1b are presented in the first two rows of Tables 2 and Models 1-7 in Table 3. Without controlling for the effect of the individual traits comprising the dyadic trait configuration (Table 2), I found no support for H1a and only partial support for H1b in that connected leadership was 120% more likely than chance to emerge within member dyads where the leader was high in MTL and social skills and the follower was low in MTL yet high in conscientiousness for the Translational sample. When controlling for the effects of individual traits for this trait pattern (Table 3), however, I found the inclusion of leader MTL in particular was seemingly responsible for the majority of its signficance (Table 3, Model 2). Thus, I failed to find support for H1a and H1b. However, because my hypothesized between and within-person trait configurations may have been overly complex and difficult to detect, I constructed matrices to represent the components of these dyadic trait configuration as well (e.g., two leader traits combined with one follower trait, one leader trait combined with one follower trait, etc.) to be used in

additional series of ERGMs examining their role in connected leadership emergence. I created these matrices in the same fashion as detailed in Appendix A.

Although the hypothesized dyadic trait pattern configurations for H1a and H1b were not supported, there were a number of significant parameter coefficients for the less complex trait configurations patterns (see remainder of Tables 2-4). Of the eight trait pattern parameters significant independently in the Translational sample, three remained significant after inclusion of the component trait variables. Members with high social skills were more likely to emerge as connected leaders when paired with followers who were low in MTL (Table 3, Models 31-33) or both low in MTL and highly agreeable (Table 3, Models 18-22). Additionally, members with high MTL were more likely to emerge as connected leaders in dyads where the other member was low in MTL (Table 3, Models 28-30). These findings suggest that the dyadic pattern of traits (i.e., the leadership pattern) has a significant role in shaping emergent leadership perceptions even after controlling for the effect of leader or follower traits alone. Results for the Science sample were less robust: only two trait pattern parameters were significant in the first set of ERGMs, and only one (leader high social skill paired with follower agreeableness) remained significant after inclusion of its component traits to the model (Table 3).

Taken together, these additional analyses provide partial support for my trait pattern hypotheses (H1a and 1b) through some support for the role of dyadic leadership trait patterns in both samples. While the more complex 4-trait dyadic trait patterns hypothesized were not supported, less complex variations of those patterns were supported even after controlling for individual trait effects.

Dyadic trait configurations predicting unconnected leadership. Hypotheses 3a-d tested the influence of dyadic trait configurations on unconnected leadership emergence. Each of the four trait configurations included a leader high in MTL yet low in social skills paired with a follower not conforming with the profiles hypothesized in H1a-b: low MTL and low agreeableness (H2a) or conscientiousness (H2b), or high MTL and low agreeableness (H2c) or conscientiousness (H2d). Each of these patterns represent a situation in which a leader has motivation yet lack crucial social ability to lead and the follower is anything other than the ideal follower prototype as hypothesized in H1.

Initial ERGMs testing these trait parameters on predicting unconnected leadership ties failed to support my hypotheses, which prompted us to run a set of follow-up analyses using less complex focal trait patterns as I did for H1a and H1b. Unlike wth H1 and H1b, however, these secondary analyses were nonsignficant or significant in the opposite direction as hypothesized. Only one pattern was positive and significant in the Science MTS sample (high leader MTL paired with low leader MTL and conscientiousness, b =.62, *SE* = .27, p<.05), and the only significant parameters in the Translational sample were significant but in the *opposite* direction as hypothesized. For example, the dyadic configuration of low leader social skills and low follower conscientiousness significantly lowered the probability of unconnected leadership emergence (b = -.35, *SE* = .16, p<.05)[1].

[1] Full results with unconnected networks are available from first author upon request

One potential problem I identified was that my use of the unconnected leadership network DV treated the two types of unconnected leadership, unrequited and unrecognized, as the same type of relationship. In retrospect, I realized there are likely distinctly different factors contributing to a member's failure to identify and grant another's leadership claims (i.e., unrequited leadership) versus a member's failure to identify and grant another's followership claim (i.e., unrecognized leadership). Given the possibility for these differential dynamics, it was likely inappropriate to test for antecedents by analyzing networks of both types of unconnected leadership together. I elaborate further on reasons for the distinction between these unrequited and unconnected leadership in the Discussion section.

To more accurately test H2, then, I reran all analyses separately on both unrequited and unrecognized leadership networks (i.e., the two types of unconnected leadership). I found that while there were no significant results with unrecognized networks[2], there were a number of significant trait pattern parameters when using requited networks. Tables 5 and 6 presents these unrequited network results. Similar to my analyses for H1, these results are presented first examining each trait pattern parameter individually (Table 5) before also controlling for the effects of the individual traits comprising each pattern (Table 6).

In both the Science and Translational samples, members high MTL and low in social skill were more likely to emerge as unrequited leaders when paired with others also

[2] Results with unrecognized networks are available from first author upon request

high in MTL yet low in conscientiousness (H2d). Results in Table 5 indicate that dyads with this trait configuration were significantly more likely than chance to develop unrequited leadership relationships (with odds ratios of 134% and 189% more likely in the Translational and Science samples, respectively). This held true in the Translational sample (and was marginal in the Science sample) when the effects of each individual trait were controlled for (Table 6, Models 1-7): only the overall trait pattern, not the individual leader or follower traits, significantly contributed to unconnected leadership emergence. While results in the Science sample were less robust such that significance of this pattern dropped to only marginal when combined with certain traits, this pattern was still more predictive than any of the individual traits (Table 7, Models 1-7). These results support a version of Hypothesis 2d such that the focal ties of interest are unrequited, rather than unconnected, leadership relationships.

For the remaining hypotheses (H2a-H2c), although there was no support for the most complex trait pattern configurations predicting unrequited leadership, a number of the less complex trait patterns proved significant predictors of unrequited leadership (Table 5). Conversely, there were no significant effects for individual member traits alone. For example, the trait pattern of high leader MTL and low follower agreeableness significantly increased the likelihood of unrequited leadership emergence in both Science and Translational samples (49% and 68% increase in odds, respectively), whereas the effect of either trait alone were not significant. Furthermore, these trait patterns remained significant in the Translational sample after controlling for the the effect of each individual trait (Table 6). While results were not as robust in the Science sample (Table

7), I noted that, even though trait pattern variables lost significance when the effects of the individual traits were controlled for, those individual traits were never significant themselves. Therefore, similar to H1, these results support the importance of trait patterns, both between- and within-person pattern, over individual member patterns in predicting the emergence of unrequited leadership relationships between group members.

Tie dissonance and leadership emergence. Hypotheses 3 and 4 predicted that leadership perceptions are influenced by the presence positive or negative relationships between dyad members. More specifically, friendship ties (H3) was expected to promote connected leadership emergence (i.e., perceptual alignment), whereas hindrance were expected to promote unconnected leadership emergence (i.e., perceptual disconnect). To test the effect of friendship ties, I used an ERGM parameter that models the influence a co-existing friendship tie has on the probability of connected leadership tie emergence. A similar parameter for hindrance networks was used for ERGMs predicting unconnected tie emergence. I tested these parameters with and without the trait pattern variables examined in H1 and H2.

Table 8 reports the results of the ERGMs including only the tie parameter and the necessary endogenous and team membership controls. In support of Hypothesis 3, the members who report a friendship tie between them are significantly more likely than chance to be in agreement on the type of leadership relationship between them (274% and 225% in Science and Translational samples, respectively). Furthermore, this effect remained significant after accounting for the effect of all the trait pattern configurations tested in H1 and H2 (Tables 2-7). The magnitude of friendship's effect on connected

leadership emergence as compared to the role of traits also appears to be comparatively stronger as evident by the larger odds ratios.

In contrast, results for the effect of hindrance ties on unconnected leadership emergence, were nonsignificant, failing to support Hypothesis 4. However, given the questions raised earlier about the appropriateness of combining unrequited and unconnected networks into a single unconnected network, I ran additional ERGMs using each of these individual networks. Furthermore, to find indirect support of the hypothesis, I also ran models testing the effect of hindrance networks on connected leadership emergence. Using the same cognitive dissonance rationale as before, if positively valence ties promote alignment in leadership perceptions, then negatively valenced ties should suppress that alignment (i.e., make it less likely than chance for connected leadership to form).

Results from these additional analyses were mixed (Table 9). Although there was marginal evidence of hindrance ties promoting unrequited leadership emergence (i.e., a member rejecting or ignoring another's leadership claim) in the Translational sample (b = .52, p = .06), the parameter remained nonsignificant in the Science sample (b = .19, p = .44). Furthermore, hindrance networks significantly *suppressed* the likelihood of unrecognized leadership emergence (i.e., a member failing to recognize another's reliance on him or her for leadership) in the Science sample such that unrecognized leadership emergence was 88% less likely to emerge in the presence of hindrance ties. Indeed, the unrecognized leadership results were very similar to the ERGMs predicting connected leadership emergence: hindrance ties significantly suppressed the likelihood of

connected leadership emergence. While this effect is in alignment with what principles of cognitive dissonance argue, the interpretation of the unrecognized leadership results is less clear.

Social influences and connected leadership. Hypotheses 5a and b proposed the social context within a group as an additional influencer of connected leadership emergence. More specifically, I hypothesized that connected leadership is more likely to emerge between two members when others in the group also recognize one of those individuals as a leaders (H5a), and that the influence is stronger in more cohesive groups (H5b). To model this influence, I used an *idegreepopularity* ERGM parameter. This endogenous parameter reflects the tendency of a person with at least one incoming connected leadership tie (i.e., identifying that person as a connected leader) to have on average more than one connected leadership tie. In other words, if a person is a connected leader with someone else, that person is more likely than chance when paired with any other random group member to be a connected leader. This parameter was included in all models reported previously in Tables 3, 4, 6, and 8 as the Social influence parameter.

Results indicated this social influence parameter significantly increased the probability of connected leadership emergence for both the Science and Translational samples. Although the exact coefficient value varies across models, members who are connected leaders to at least one other member are on average 280% more likely than chance in the Science sample to be connected leaders to other members and on average 440% more likely than chance in the Translational sample. This holds even when trait patterns and non-leadership ties were controlled for. To test whether group cohesion

moderated this influence (H5b), I used a median-split to divide my sample according to MTS-level cohesion. I then ran ERGMs on each sample that included only my control variables and the social influence parameter to compare the parameter coefficient values across levels of cohesion. For both Science and Translation samples, the coefficient remained positive and significant ($p<.01$) with trivial differences in odds ratio magnitude across cohesion levels (285% versus 293% for low and high cohesion in the Science sample and 433% versus 445% for the Translational sample). Thus, although the difference between low and high cohesion groups is in the hypothesized direction, it was insufficient to provide convincing support for Hypothesis 5b.

Group Level Consequences of Connected Versus Unconnected Leadership

Hypotheses 6 and 7 offered possible group level consequences arising from perceptual disconnects in leadership relationships. More specifically, I expected proximal consequences of higher evaluations of group process efficacy (H6) and desire to work with that same group in the future (H7) when the proportion of connected to unconnected ties was higher. To test these hypotheses, I correlated the proportion of connected versus unconnected leadership within a MTS to MTS-aggregated scores of group satisfaction and viability.

The correlations revealed noticeably different trends between the Science and Translational samples. In the Translational sample, there was a positive correlation between proportion of connected leadership and positive group outcome that was significant for group satisfaction and viability ($r = .54$, $p<.05$) and marginal for group

process efficacy ($r = .36$, $p=.06$), thereby partially supporting H6 and supporting H7. In contrast, correlations in the Science sample were significant for group satisfaction and viability, yet in the opposite direction ($r = -.43$, $p<.05$), and were near-zero for group process efficacy ($r = .04$, $p = .83$). I discuss possible explanations for this discrepancy between samples in the Discussion section.

DISCUSSION

This study adds to the existing leadership literature in several ways. First, this is the first empirical work to consider the existence of perceptual disconnects within informal leadership emergence and examine its antecedents. While separate veins of work have studied the nature of leadership perceptions (e.g., Epitropaki & Martin, 2004; Lord, Foti, & De Vader, 1984) and the presence of disconnects between leader and follower assessments of LMX quality (e.g., Sin et al., 2009), there has been little study of the opportunity for disconnects in leadership emergence itself. My results not only provided evidence that significant disconnects exist, but also that the antecedents of perceptual disconnect came from three distinct types of factors (i.e., trait, relationship, and social influence). Second, the significance of multiple between- and within-person trait configurations in predicting leadership perceptual disconnects lends additional support to the pattern-based approach to studying traits in leadership phenomena advocated by others (e.g., Dinh & Lord, 2013; Foti & Hauenstein, 2007; Trichas et al., 2013). Finally, it demonstrates the value of simultaneous study of multiple levels of leadership predictors using a social network approach. Although previous work has studied the individual contributes of trait, relational, and situational factors, an ERGM approach allows for more integrated and precise study of each factor that may be applicable for many other kinds of research questions.

Perceptual disconnects in leadership emergence

Our dyadic-level analysis of leadership emergence revealed significant disconnects between members on who was occupying leader or follower roles. The average of connected to unconnected leadership density across time points was approximately half (.57 and .40 for Translational and Science MTSs, respectively). This indicates that for every leadership tie that was fully connected (i.e., both members of a dyad recognize each other's respective leader and follower roles), there were two leadership ties in the network that were unconnected in some way (i.e., either unrequited or unrecognized). This finding is notable for both methodological and theoretical reasons.

Methodologically, the presence of these disconnects suggests that we may need to move from an individual to dyadic-level measurement approach when studying informal leadership emergence phenomenon. As noted earlier, leader emergence is commonly measured only from the follower's perspective (e.g., Carson et al., 2007; Mehra et al., 2006), which effectively obscures the distinction between fully connected and unrecognized leadership relationships and obscures the presence of unrequited leadership entirely. By beginning to capture not just leader emergence, but a measure of the connectedness of that emergence, we may be able to more precisely understand what fosters the development of connected versus unconnected leadership relationships within a group, and then assess the implications of each on subsequent leader effectiveness. My partial support of H7 in the Translational sample suggests there is a differential value of connected over unrequited leadership, and more work is needed to more fully understand the consequences of each.

My work also makes a theoretical contribution to the leader perception literature by highlighting the need to expand our investigations of perceptions to the dyadic level to capture disconnects. The majority of the previous work on leadership perceptions has focused solely on follower perceptions. Research on implicit leadership theories (ILTs) has done much to improve our understanding of what traits are most prototypical of leaders (Epitropaki & Martin, 2004; Lord, Foti, & De Vader, 1984) and what types of individual biases (Eden & Leviatan, 1975; Rush, Thomas, & Lord, 1977; Weiss & Adler, 1981) influence whether or not members perceive someone as a leader. My results, however, suggests that leadership perception research should consider the joint perception of leader and followers to more precisely assess the nature of the emergent leadership.

This approach aligns with DeRue and Ashford's (2010) conceptualization of leadership as a social process that develops through a series of granting and claiming interactions between individuals to establish their respective leading and following roles. In their paper, the authors theorized situations in which leader and follow claims were fully granted versus instances of "failed construction" in which the process was disrupted. My work is the first to empirically demonstrate that the "failed construction" conditions do indeed occur, and they can be accounted for by either lack of granting from the follower (i.e., unrequited leadership) or the leader (i.e., unrecognized leadership). Futhermore, I provide initial evidence of differential antecedents for the different leadership types.

Though I successfully distinguished between leadership types, my failure to find support for unconnected leadership antecedents, yet finding ample support for unrequited leadership antecedents, suggests my initial set of unconnected leadership hypotheses may have been inadvertently misspecified. I delineated the difference between unrequited and unrecognized leadership in my Introduction as whether the follower or failing to recognize a leadership claim or a leader is failing to recognize a followership claim. While both clearly reflect situations of disconnected leadership emergence, there are almost assuredly different dynamics causing each, particularly from the trait-based perspective. The former may be due to a poorly constructed leadership claim or a follower unmotivated to follow (i.e., low leader social skills or high follower MTL), whereas the latter may be due to poorly constructed followership claim or leader unmotivated to lead (i.e., lower follower social skills or low leader MTL). I saw when re-examining my hypotheses that they perfectly conform to the unrequited, not unrecognized, form of unconnected leadership. Therefore, it is relatively unsurprising that my hypotheses worked out for only unrequited leadership. Future research should focus on unrecognized leadership and examine what other factors are most relevant for that type of leadership disconnect.

Pattern-based approaches to leadership research

Our results revealed a number of dyadic leadership trait configurations that differentially increased the likelihood of either connectedness or disconnectedness in leadership emergence perceptions after controlling for the main effects of each individual trait. More specifically, connected leadership was more likely in dyads with a leader high

in social skills and a follower low in MTL and agreeableness, or with a leader high in MTL and a follower low in MTL. Unrequited leadership was more likely in dyads with a) a leader high in MTL and low in social skills and a follower high in MTL and low in conscientiousness, b) a leader high in MTL and a follower high in MTL and low in conscientiousness, or c) a leader high in MTL and a follower high in MTL and low in agreeableness. These findings are significant in that they extends the pattern approach used for leader profiles (i.e., within-person trait patterns) to consider the relational configuration between leader and follower. There has been a number of studies examining leader profiles (e.g., Foti & Hauenstein, 2007; Hirschfeld, Jordan, Thomas, and Feild, 2008; Smith & Foti, 1998), yet relatively few considering dyadic-level profiles (Richards & Hackett, 2012). My results show that dyadic patterns do matter, more so than any one member's trait profile. The key here is the focus on emergent *leadership* versus emergent *leaders.* Leadership is a relationship between two individuals that requires the acceptance of both members of each other's respective roles. If the dynamics between individuals is not conducive to such agreement, unconnected leadership is far more likely to emerge tha might otherwise be expected.

Though my results do support the basic concept of dyadic leadership patterns hypothesized in H1a-b and H2a-d, the fact that the majority of those predicted patterns were unsupported in the data still remains. With the exception of one 4-trait dyadic pattern with unrequited leadership (namely, leader high MTL and low social skills combined with follower high MTL and low conscientiousness), the data did not support the significance of the hypothesized patterns. One reason for this may be the

noted difficulty in finding effects for higher order interactions (for a review of issues related to detecting interactions, see Whisman & McClelland, 2005). The 4-trait dyadic patterns I proposed are very complex, essentially combine three different interactions: two leader traits, two follower traits, and the leader by follower patterns. Thus, is it perhaps unsurprising I was unable to find support, yet could detect some of the less complex patterns in my follow up analyses. Future work to test for these dyadic leadership patterns in different samples, particularly those with longer-standing groups with a larger sample of groups, to determine whether the effects can be detected under different conditions.

Integration of levels of antecedent investigations

Finally, my three-level approach to studying antecedents of leadership disconnects represents a more comprehensive/integrated approach to leadership research. Though different veins of leadership theories over time discuss the roles of traits, situations, and the social context, these factors are almost never considered simultaneously (for a SRM example of an exception to this, see Livi, Kenny, Albright & Pierro, 2008). This makes the relative contribution of each difficult to discern. By using ERGMs, I was able to directly test the role of each while controlling for the effect of the other factors.

I found support of distinct antecedents of perceptual disconnects in leadership emergence across all three levels of influence. Beyond the trait-related factors discussed earlier, the social context of members was consistently significant in predicting connected leadership: if others outside of a given dyad agreed an individual was their leader, the

probability that connected leadership emerged within that dyad was greatly increased. Furthermore, irrespective of the specific member traits, members who were friends with one another (i.e., having a positively valenced relationship) were more likely than chance to agree on leader/follower roles. Similarly, members with adversarial ties were significantly less likely than chance to agree on those same roles. These results address the call (e.g., Contractor et al., 2012, Yukl, 2012) for a more integrated approach to the study of leadership phenomenon. Future research should attempt to better account for factors across individual, dyadic, and network levels in the analysis strategies. The incorporation of network techniques into this research, as has already been adopted by several researchers (e.g., Balkundi, Barsness & Michael, 2009; Balkundi & Kilduff, 2006; Emery, Calvard, & Pierce, 2013), is one such option.

Despite my support for the role of positive and negatively valenced relationship in connected leadership, I found only marginal support for adversarial ties promoting unrequited leadership and no support with unconnected or unrecognized leadership. I hypothesized that the presence of adversarial ties would increase the likelihood of unconnected leadership via principles of cognitive dissonance theory (Festinger, 1957): if members did not like one another, it would be more likely they would be unreceptive to claims of leadership (or followership) from one another. However, it may be that the primary reason for disconnects in leadership perceptions are not due to intentional rejection of leadership (or followership) claims, but rather a more unintentional inability for perceive a claim has even been issued. For example, two of the four significant trait patterns included low leader social skills, indicating that leaders may have been

unsuccessfully communication or demonstrating their intention to lead, and three of them including high follower MTL, indicating that followers may have simply been so focused on leading themselves that they did not pick up on the leadership claims of others. This nuance, whether disconnects occur due to intentional rejection versus failure to recognize claims, is an important one for understanding the base nature of leadership disconnects. While the current work broke down unrecognized leadership into unrequited versus unrecognized, future research should similarly investigate the role of intentionality.

Limitations and future research

This study has some limitations that should be noted. One major issue I encountered was the non-homogeneity across the Science and Translational MTSs, thereby effectively halving my sample size for the majority of my analyses. Because non-homogeneity violates an assumption necessary for combining multiple networks into one sample for ERGM analyses, I had to run all antecedent analyses in parallel, which is how I also ran my consequences analyses for consistency's sake. Low sample size was not likely problematic for ERGM analyses because the effect N is based on the number of possible ties in a network, not number of people. For example, a six-person group has 30 possible ties, making the effective N (referred to more commonly as I) 30. My two subsamples had effective sample sizes of 704 (Science) and 906 (Translational). However, my consequences analyses were at the group level (H6 and H7), and with sample sizes of only 27 and 28 for the Science and Translational subsamples, the lack of significant correlations may have been in part due to insufficient power. Future work should use a

higher powered design to more effectively analyze the consequences of leadership perceptual disconnects.

The non-homogeneity across Science and Translational samples may have also been a reason for the notably different results within samples. While Science sample results were generally in the expected direction, just not largely significant, for my antecedent hypotheses, there was a major difference in my consequence hypothesis (H7) proposing higher proportions of connected leadership are positively related to group viability. While the positive, significant correlation in the Translational sample ($r=.54$, $p<.05$) supported this hypothesis, the correlation in the Science sample was significant and negative ($r=-.43$, $p<.05$). It is unclear what specifically can account for this different, but there are many differences between the Science and Translational samples to choose from (e.g., co-located versus geographically distributed MTSs, undergraduate students versus a blend of undergraduate and graduate students on MTSs, content of group deliverable required, disciplines represented within MTSs). As noted earlier, these differences were built into the data collection for the purposes of other studies using this dataset, so while I had hoped that they could be controlled for or were not anticipated to influence the phenomena of interest in the present study, it is possible that one or more may have caused my anomalous results. Future studies using a less complicated, more homogenous sample of groups should seek to replicate my results to determine which set of results, Science or Translational, are more generalizable.

A final limitation to note is computational. To examine my dyadic trait configuration hypotheses, I was unable to control for all individual trait effects in a single model.

Instead, I ran series of models such that each "main effect" was tested individually. For example, I ran four models when testing a a leadership pattern of leader high MTL and high social skill combined with follower low MTL: one with only the leadership pattern alone, one with the pattern plus leader MTL, one with the pattern plus follower MTL, and one with the pattern plus a parameter reflecting the leader patter high MTL and high social skill. Ideally, I would have combined all those parameters to test the contribution of each main effect or lower-order pattern simultaneously, as is standard in traditional regression. However, when I attempted to run such a model, the inclusion of so many exogenous parameters paired with the additional constraints involved with using a structural zero approach caused the model to be unstable with unreliable parameter coefficients. So, while I believe my alternative approach of presented a series of main effect models effectively shows the contribution of the leadership pattern over individual traits, I recognize there are shortcommings to the method. One way to overcome this hurdle in the future would be to examining leadership within one very large group, such as an organization. Such a sample would not require the use of structural zeros or other alternative methods required for combining smaller networks into one sample for ERGMs, which may allow for improved model stability.

Table 1

Connected Leadership Tie Distribution Across Time Points

	Science MTS			Translational MTS		
	T1	T2	Δ	T1	T2	Δ
Proportion of ties within team	80.1%	67.5%	12.6%	62.8%	77.7%	-14.9%
Proportion of ties between team	19.9%	32.5%	-12.6%	37.2%	22.3%	14.9%

Table 2

Trait Configuration and Connected Leadership Emergence

Note: ** p<.01,* p<.05, † p<.10. Agree = Agreeableness, Consc = Conscientiousness, MTL = Motivation to Lead. Each row reports the coefficient for the specified trait parameter when included in an ERGM model also containing control variables (edges, isolates, mutual, nodematch(Team)), a Friendship parameter (edgecov(Friendship)), and social influence parameter (idegreepopularity). Coefficients for these other parameters are not reported due to space constraints (table reports results from 46 separate models), but are available from first author upon request. For Science sample, n = 150 divided into 27 MTSs, with effective sample size (i.e., possible ties between individuals) of 704. For Translational sample, n = 172 divided into 28 MTSs, with effective sample size of 906. The formula Exp(B) – 1 converts model parameter estimates to percent change in odds.

			Science MTSs		Translational MTSs		
Trait Configuration	Leader trait(s)	Follower trait(s)	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)		Odds Ratio
4-trait dyadic configuration							
(H1a)	MTL(high)x Social Skills(high)	MTL(low)x Agree(high)	0.36 (0.31)	43%	0.38 (0.33)		46%
(H1b)	MTL(high)x Social Skills(high)	MTL(low)x Consc(high)	-0.05 (0.42)	-5%	0.79 (0.38)	*	120%
3-trait dyadic configuration							

	MTL(high)x Social Skills(high)	MTL (low)	0.13 (0.23)		14%	0.58 (0.21)	*	79%
	MTL(high)x Social Skills(high)	Agree (high)	0.42 (0.22)	†	52%	0.42 (0.2)	*	52%
	MTL only (high)	MTL(low)x Agree(high)	-0.06 (0.26)		-6%	0.34 (0.33)	*	40%
	Social Skills (high)	MTL(low)x Agree(high)	0.53 (0.25)	*	70%	0.64 (0.28)		90%
	MTL(high)x Social Skills(high)	Consc (high)	0.17 (0.25)		19%	0.36 (0.22)		43%
	MTL only (high)	MTL(low)x Consc(high)	-0.25 (0.39)		-22%	0.68 (0.3)	*	97%
	Social Skills (high)	MTL(low)x Consc(high)	0.11 (0.32)		12%	0.58 (0.29)	†	79%
2-trait dyadic configuration								
	MTL only (high)	MTL (low)	-0.13 (0.2)		-12%	0.63 (0.21)	**	88%
	MTL only (high)	Agree (high)	0.12 (0.19)		13%	0.33 (0.17)	†	39%
	MTL only (high)	Consc (high)	0.25 (0.23)		28%	0.14 (0.19)		15%
	Social Skills (high)	MTL (low)	0.28 (0.18)		32%	0.55 (0.21)	*	73%
	Social Skills (high)	Agree (high)	0.49 (0.2)	*	63%	0.25 (0.21)		28%
	Social Skills (high)	Consc (high)	0.06 (0.23)		6%	0.21 (0.21)		23%
2-trait pattern (within-person)								
	MTL(high)xSocial Skills(high)	--	0.04 (0.02)		4%	0.08 (0.02)	**	8%
	--	MTL(low)x Agree(high)	0.07 (0.04)		7%	0.06 (0.04)		6%

	--	MTL(low)x Consc(high)	0.05 (0.04)		5%	0.04 (0.04)		4%
Single trait (leader)								
	MTL	--	0.16 (0.16)		17%	0.61 (0.2)	**	84%
	Social Skills	--	0.18 (0.11)		20%	0.3 (0.12)	*	35%
Single trait (follower)								
	--	MTL	-0.01 (0.2)		-1%	-0.49 (0.2)	*	-39%
	--	Consc	0.24 (0.15)		27%	-0.14 (0.15)		-13%
	--	Agree	0.42 (0.19)	*	52%	-0.09 (0.17)		-9%

Table 3

Decomposition of Trait-pattern Parameters, Translational Sample

Note: ** p<.01,* p<.05, † p<.10. Agree = Agreeableness, Consc = Conscientiousness, MTL = Motivation to Lead. All models include control variables (edges, isolates, mutual, nodematch(Team)), Friendship parameter (edgecov(Friendship)), and Social influence parameter (idegreepopularity). For Science sample, n = 150 divided into 27 MTSs, with effective sample size (i.e., possible ties between individuals) of 704. For Translational sample, n = 172 divided into 28 MTSs, with effective sample size of 906. The formula Exp(B) – 1 converts model parameter estimates to percent change in odds.

		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
Parameter Type	Parameter	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls															
	Endogenous control- edges	-6.2 (0.56) **	-100%	-7.93 (0.86) **	-100%	-6.78 (0.64) **	-100%	-4.75 (0.86) **	-99%	-5.38 (0.81) **	-100%	-6.73 (0.62) **	-100%	-6.27 (0.74) **	-100%
	Endogenous control- isolates	-0.37 (0.27)	-31%	-0.34 (0.28)	-29%	-0.38 (0.26)	-32%	-0.36 (0.28)	-30%	-0.39 (0.29)	-32%	-0.36 (0.26)	-30%	-0.38 (0.28)	-32%
	Endogenous control- mutual	1.93 (0.42) **	589%	1.94 (0.46) **	596%	1.96 (0.42) **	610%	2.05 (0.43) **	677%	1.97 (0.44) **	617%	1.97 (0.45) **	617%	1.96 (0.44) **	610%
	Exogenous control - team membership	0.79 (0.23) **	120%	0.82 (0.25) **	127%	0.76 (0.25) **	114%	0.76 (0.23) **	114%	0.77 (0.26) **	116%	0.78 (0.26) **	118%	0.76 (0.24) **	114%
Social influence															
	Social influence (H5a)	1.74 (0.19) **	470%	1.62 (0.22) **	405%	1.69 (0.21) **	442%	1.72 (0.2) **	458%	1.71 (0.22) **	453%	1.64 (0.22) **	416%	1.71 (0.21) **	453%
Non-leadership networks															
	Coexistence of Friendship tie (H3)	1.15 (0.2) **	216%	1.12 (0.23) **	206%	1.16 (0.2) **	219%	1.18 (0.23) **	225%	1.23 (0.21) **	242%	1.12 (0.23) **	206%	1.18 (0.22) **	225%
Trait variables															
	Leader high MTL and high Social Skills, Follower low MTL and high Consc (H1b)	0.79 (0.38) *	120%	0.57 (0.38)	77%	0.58 (0.38)	79%	0.71 (0.33) *	103%	0.9 (0.33) *	146%	0.52 (0.33)	68%	0.71 (0.37) †	103%
	Leader MTL			0.57 (0.2) **	77%										
	Leader Social Skills					0.21 (0.12) †	23%								
	Follower MTL							-0.43 (0.2) *	-35%						
	Follower Consc									-0.23 (0.16)	-21%				
	Leader high MTL and high Social Skills											0.06 (0.03) *	6%		
	Follower low MTL and high Consc													0.01 (0.05)	1%

Parameter Type	Parameter	Model 8		Model 9		Model 10		Model 11		Model 12	
		Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls											
	Endogenous control- edges	-6.12 (0.59) **	-100%	-7.51 (0.88) **	-100%	-6.69 (0.67) **	-100%	-5.07 (0.9) **	-99%	-6.67 (0.62) **	-100%
	Endogenous control- isolates	-0.35 (0.27)	-30%	-0.32 (0.28)	-27%	-0.35 (0.26)	-30%	-0.35 (0.27)	-30%	-0.36 (0.27)	-30%
	Endogenous control- mutual	1.98 (0.43) **	624%	1.97 (0.47) **	617%	1.94 (0.45) **	596%	1.99 (0.43) **	632%	1.94 (0.46) **	596%
	Exogenous control - team membership	0.76 (0.23) **	114%	0.75 (0.25) **	112%	0.77 (0.25) **	116%	0.77 (0.25) **	116%	0.76 (0.26) **	114%
Social influence											
	Social influence (H5a)	1.69 (0.22) **	442%	1.61 (0.24) **	400%	1.69 (0.21) **	442%	1.69 (0.2) **	442%	1.62 (0.21) **	405%
Non-leadership networks											
	Coexistence of Friendship tie (H3)	1.15 (0.22) **	216%	1.15 (0.22) **	216%	1.16 (0.23) **	219%	1.19 (0.21) **	229%	1.15 (0.22) **	216%
Trait variables											
	Leader high MTL and Social Skills, Follower low MTL	0.58 (0.21) *	79%	0.43 (0.25) †	54%	0.51 (0.27) †	67%	0.56 (0.22) *	75%	0.4 (0.28)	49%
	Leader MTL			0.45 (0.19) *	57%						
	Leader Social Skills					0.18 (0.13)	20%				
	Follower MTL							-0.32 (0.22)	-27%		
	Leader high MTL and Social Skills									0.06 (0.03) *	6%

Parameter Type	Parameter	Model 13		Model 14		Model 15		Model 16		Model 17	
		Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls											
	Endogenous control- edges	-6.24 (0.62) **	-100%	-7.72 (0.89) **	-100%	-6.81 (0.71) **	-100%	-5.27 (0.96) **	-99%	-6.82 (0.62) **	-100%
	Endogenous control- isolates	-0.41 (0.29)	-34%	-0.35 (0.28)	-30%	-0.37 (0.27)	-31%	-0.38 (0.27)	-32%	-0.38 (0.29)	-32%
	Endogenous control- mutual	1.93 (0.48) **	589%	1.93 (0.45) **	589%	1.97 (0.45) **	617%	2.04 (0.49) **	669%	1.98 (0.46) **	624%
	Exogenous control - team membership	0.8 (0.25) **	123%	0.78 (0.24) **	118%	0.76 (0.25) **	114%	0.77 (0.26) **	116%	0.78 (0.27) **	118%
Social influence											
	Social influence (H5a)	1.74 (0.23) **	470%	1.62 (0.23) **	405%	1.66 (0.25) **	426%	1.64 (0.24) **	416%	1.69 (0.24) **	442%
Non-leadership networks											
	Coexistence of Friendship tie (H3)	1.13 (0.23) **	210%	1.19 (0.24) **	229%	1.18 (0.23) **	225%	1.2 (0.23) **	232%	1.2 (0.23) **	232%
Trait variables											
	Leader high MTL and Social Skills, Follower high Agree	0.42 (0.2) *	52%	0.28 (0.25)	32%	0.32 (0.26)	38%	0.69 (0.23) **	99%	0.2 (0.27)	22%
	Leader MTL			0.5 (0.23) *	65%						
	Leader Social Skills					0.23 (0.13) †	26%				
	Follower Agree							-0.23 (0.2)	-21%		
	Leader high MTL and Social Skills									0.06 (0.03) †	6%

Parameter Type	Parameter	Model 18 Coefficient (S.E.)	Model 18 Odds Ratio	Model 19 Coefficient (S.E.)	Model 19 Odds Ratio	Model 20 Coefficient (S.E.)	Model 20 Odds Ratio	Model 21 Coefficient (S.E.)	Model 21 Odds Ratio	Model 22 Coefficient (S.E.)	Model 22 Odds Ratio
Controls											
	Endogenous control- edges	-6.1 (0.59) **	-100%	-6.94 (0.68) **	-100%	-5.03 (0.91) **	-99%	-5.53 (0.81) **	-100%	-6.56 (0.68) **	-100%
	Endogenous control- isolates	-0.33 (0.27)	-28%	-0.36 (0.28)	-30%	-0.34 (0.27)	-29%	-0.34 (0.27)	-29%	-0.39 (0.27)	-32%
	Endogenous control- mutual	1.92 (0.43) **	582%	2 (0.43) **	639%	1.96 (0.4) **	610%	1.98 (0.45) **	624%	2 (0.42) **	639%
	Exogenous control - team membership	0.78 (0.24) **	118%	0.76 (0.23) **	114%	0.73 (0.25) **	108%	0.75 (0.24) **	112%	0.76 (0.25) **	114%
Social influence											
	Social influence (H5a)	1.68 (0.22) **	437%	1.68 (0.21) **	437%	1.74 (0.19) **	470%	1.69 (0.21) **	442%	1.74 (0.2) **	470%
Non-leadership networks											
	Coexistence of Friendship tie (H3)	1.15 (0.2) **	216%	1.21 (0.22) **	235%	1.17 (0.24) **	222%	1.2 (0.21) **	232%	1.22 (0.22) **	239%
Trait variables											
	Leader high Social Skills, Follower low MTL and high Agree	0.64 (0.28) *	90%	0.63 (0.28) *	88%	0.56 (0.27) *	75%	0.67 (0.28) *	95%	0.58 (0.29) *	79%
	Leader high Social Skills			0.25 (0.13) †	28%						
	Follower MTL					-0.34 (0.2) †	-29%				
	Follower Agree							-0.16 (0.16)	-15%		
	Follower low MTL and high Agree									0.03 (0.04)	3%

Parameter Type	Parameter	Model 23 Coefficient (S.E.)	Model 23 Odds Ratio	Model 24 Coefficient (S.E.)	Model 24 Odds Ratio	Model 25 Coefficient (S.E.)	Model 25 Odds Ratio	Model 26 Coefficient (S.E.)	Model 26 Odds Ratio	Model 27 Coefficient (S.E.)	Model 27 Odds Ratio
Controls											
	Endogenous control- edges	-6.19 (0.58) **	-100%	-7.9 (0.81) **	-100%	-5.03 (0.87) **	-99%	-5.26 (0.84) **	-99%	-6.13 (0.76) **	-100%
	Endogenous control- isolates	-0.34 (0.28)	-29%	-0.33 (0.26)	-28%	-0.4 (0.26)	-33%	-0.33 (0.27)	-28%	-0.36 (0.28)	-30%
	Endogenous control- mutual	1.96 (0.46) **	610%	1.91 (0.43) **	575%	2.01 (0.39) **	646%	1.93 (0.45) **	589%	1.96 (0.44) **	610%
	Exogenous control - team membership	0.76 (0.25) **	114%	0.8 (0.25) **	123%	0.74 (0.27) *	110%	0.78 (0.26) **	118%	0.77 (0.24) **	116%
Social influence											
	Social influence (H5a)	1.74 (0.2) **	470%	1.66 (0.21) **	426%	1.75 (0.17) **	475%	1.68 (0.23) **	437%	1.73 (0.22) **	464%
Non-leadership networks											
	Coexistence of Friendship tie (H3)	1.17 (0.22) **	222%	1.11 (0.21) **	203%	1.2 (0.25) **	232%	1.21 (0.23) **	235%	1.17 (0.2) **	222%
Trait variables											
	Leader high MTL, Follower low MTL and high Consc	0.68 (0.3) *	97%	0.49 (0.31)	63%	0.53 (0.33)	70%	0.82 (0.29) **	127%	0.68 (0.34) †	97%
	Leader MTL			0.55 (0.18) **	73%						
	Follower MTL					-0.36 (0.19) †	-30%				
	Follower Consc							-0.24 (0.18)	-21%		
	Follower low MTL and high Consc									0 (0.06)	0%

Parameter Type	Parameter	Model 28		Model 29		Model 30	
		Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls							
	Endogenous control- edges	-6.15 (0.57) **	-100%	-7.68 (0.83) **	-100%	-5.18 (0.94) **	-99%
	Endogenous control- isolates	-0.34 (0.27)	-29%	-0.31 (0.27)	-27%	-0.36 (0.27)	-30%
	Endogenous control- mutual	1.98 (0.44) **	624%	1.98 (0.44) **	624%	1.99 (0.42) **	632%
	Exogenous control - team membership	0.72 (0.24) **	105%	0.79 (0.25) **	120%	0.72 (0.25) **	105%
Social influence							
	Social influence (H5a)	1.66 (0.21) **	426%	1.61 (0.23) **	400%	1.64 (0.18) **	416%
Non-leadership networks							
	Coexistence of Friendship tie (H3)	1.21 (0.2) **	235%	1.16 (0.21) **	219%	1.2 (0.21) **	232%
Trait variables							
	Leader high MTL, Follower low MTL	0.63 (0.21) **	88%	0.52 (0.24) *	68%	0.5 (0.21) *	65%
	Leader MTL			0.48 (0.18) *	62%		
	Follower MTL					-0.27 (0.22)	-24%

Parameter Type	Parameter	Model 31		Model 32		Model 33	
		Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls							
	Endogenous control- edges	-6.28 (0.56) **	-100%	-6.62 (0.69) **	-100%	-5.19 (0.96) **	-99%
	Endogenous control- isolates	-0.39 (0.28)	-32%	-0.34 (0.28)	-29%	-0.35 (0.25)	-30%
	Endogenous control- mutual	2.01 (0.37) **	646%	1.98 (0.43) **	624%	2.04 (0.37) **	669%
	Exogenous control - team membership	0.75 (0.26) **	112%	0.81 (0.25) **	125%	0.75 (0.25) **	112%
Social influence							
	Social influence (H5a)	1.72 (0.18) **	458%	1.66 (0.2) **	426%	1.74 (0.18) **	470%
Non-leadership networks							
	Coexistence of Friendship tie (H3)	1.21 (0.22) **	235%	1.14 (0.24) **	213%	1.18 (0.23) **	225%
Trait variables							
	Leader high Social Skills, Follower low MTL	0.55 (0.21) *	73%	0.39 (0.23) †	48%	0.47 (0.22) *	60%
	Leader Social Skills			0.16 (0.13)	17%		
	Follower MTL					-0.32 (0.23)	-27%

Parameter Type	Parameter	Model 34		Model 35		Model 36	
		Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls							
	Endogenous control- edges	-6.92 (0.59) **	-100%	-7.75 (0.81) **	-100%	-6.51 (0.67) **	-100%
	Endogenous control- isolates	-0.37 (0.26)	-31%	-0.38 (0.28)	-32%	-0.34 (0.28)	-29%
	Endogenous control- mutual	1.99 (0.42) **	632%	1.97 (0.47) **	617%	1.97 (0.47) **	617%
	Exogenous control - team membership	0.78 (0.24) **	118%	0.79 (0.26) **	120%	0.79 (0.25) **	120%
Social influence							
	Social influence (H5a)	1.67 (0.2) **	431%	1.66 (0.21) **	426%	1.62 (0.22) **	405%
Non-leadership networks							
	Coexistence of Friendship tie (H3)	1.15 (0.19) **	216%	1.16 (0.24) **	219%	1.16 (0.23) **	219%
Trait variables							
	Leader high MTL and high Social Skills	0.08 (0.02) **	8%	0.05 (0.03)	5%	0.14 (0.05) *	15%
	Leader MTL			0.35 (0.25)	42%		
	Leader Social Skills					-0.31 (0.26)	-27%

Table 4

Decomposition of Trait-pattern Parameters, Science Sample

Note: ** p<.01,* p<.05, † p<.10. Agree = Agreeableness, Consc = Conscientiousness, MTL = Motivation to Lead. All models include control variables (edges, isolates, mutual, nodematch(Team)), Friendship parameter (edgecov(Friendship)), and Social influence parameter (idegreepopularity). For Science sample, n = 150 divided into 27 MTSs, with effective sample size (i.e., possible ties between individuals) of 704. For Translational sample, n = 172 divided into 28 MTSs, with effective sample size of 906. The formula Exp(B) – 1 converts model parameter estimates to percent change in odds.

		Model 1		Model 2		Model 3		Model 4		Model 5	
Parameter Type	Parameter	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls											
	Endogenous control- edges	-4.95 (0.5) **	-99%	-5.26 (0.6) **	-99%	-6.32 (0.97) **	-100%	-5.38 (0.91) **	-100%	-5.33 (0.69) **	-100%
	Endogenous control- isolates	0.04 (0.3)	4%	0.08 (0.28)	8%	0 (0.31)	0%	0.06 (0.3)	6%	0.05 (0.3)	5%
	Endogenous control- mutual	0.13 (0.37)	14%	0.12 (0.37)	13%	0.12 (0.37)	13%	0.12 (0.39)	13%	0.14 (0.35)	15%
	Exogenous control - team membership	1.79 (0.3) **	499%	1.79 (0.29) **	499%	1.79 (0.31) **	499%	1.76 (0.31) **	481%	1.77 (0.3) **	487%
Social influence											
	Social influence (H5a)	1.35 (0.19) **	286%	1.33 (0.19) **	278%	1.33 (0.19) **	278%	1.33 (0.19) **	278%	1.35 (0.2) **	286%
Non-leadership networks											
	Coexistence of Friendship tie (H3)	0.67 (0.25) *	95%	0.66 (0.22) **	93%	0.64 (0.24) *	90%	0.66 (0.23) **	93%	0.66 (0.25) *	93%
Trait variables											
	Leader high Social Skills, Follower low MTL and high Agree	0.53 (0.25) *	70%	0.41 (0.29)	51%	0.43 (0.25) †	54%	0.56 (0.26) *	75%	0.42 (0.28)	52%
	Leader Social Skills			0.12 (0.13)	13%						
	Follower Agree					0.34 (0.2) †	40%				
	Follower MTL							0.14 (0.22)	15%		
	Follower low MTL and high Agree									0.04 (0.05)	4%

Parameter Type	Parameter	Model 6		Model 7		Model 8	
		Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls							
	Endogenous control- edges	-4.99 (0.49) **	-99%	-5.14 (0.57) **	-99%	-6.07 (0.96) **	-100%
	Endogenous control- isolates	0.07 (0.3)	7%	0.06 (0.3)	6%	0.03 (0.3)	3%
	Endogenous control- mutual	0.08 (0.38)	8%	0.11 (0.37)	12%	0.14 (0.38)	15%
	Exogenous control - team membership	1.8 (0.32) **	505%	1.78 (0.31) **	493%	1.78 (0.3) **	493%
Social influence							
	Social influence (H5a)	1.33 (0.2) **	278%	1.32 (0.19) **	274%	1.33 (0.2) **	278%
Non-leadership networks							
	Coexistence of Friendship tie (H3)	0.69 (0.27) *	99%	0.68 (0.24) **	97%	0.64 (0.25) *	90%
Trait variables							
	Leader high Social Skills, Follower high Agree	0.49 (0.2) *	63%	0.45 (0.23) †	57%	0.36 (0.2) †	43%
	Leader high Social Skills			0.05 (0.14)	5%		
	Follower high Agree					0.27 (0.2)	31%

Table 5

Trait Configuration and Unrequited Leadership Emergence

Note: ** p<.01,* p<.05, † p<.10. Agree = Agreeableness, Consc = Conscientiousness, MTL = Motivation to Lead. Each row reports the coefficient for the specified trait parameter when included in an ERGM model also containing control variables (edges, isolates, mutual, nodematch(Team)) and a social influence parameter (idegreepopularity). Coefficients for these other parameters are not reported due to space constraints (table reports results from 46 separate models), but are available from first author upon request. For Science sample, n = 150 divided into 27 MTSs, with effective sample size (i.e., possible ties between individuals) of 704. For Translational sample, n = 172 divided into 28 MTSs, with effective sample size of 906. The formula Exp(B) – 1 converts model parameter estimates to percent change in odds.

				DV: Unrequited Leadership					
				Science MTSs			Translational MTSs		
Trait Configuration		Leader trait	Follower trait	Coefficent (S.E.)		Odds Ratio	Coefficent (S.E.)		Odds Ratio
4-trait dyadic configuration									
	(H2a)	MTL(high)x Social Skills(low)	MTL(low)x Agree(low)	0.02 (0.56)		2%	-0.57 (0.73)		-43%
	(H2b)	MTL(high)x Social Skills(low)	MTL(low)x Consc(low)	0 (0.33)		0%	0.28 (0.47)		32%
	(H2c)	MTL(high)x Social Skills(low)	MTL(high)x Agree(low)	0.36 (0.61)		43%	0.56 (0.42)		75%
	(H2d)	MTL(high)x Social Skills(low)	MTL(high)x Consc(low)	1.06 (0.52)	*	189%	0.85 (0.34)	*	134%

3-trait dyadic configuration							
	MTL(high)x Social Skills(low)	MTL(low)	-0.31 (0.31)	-27%	0.47 (0.34)		60%
	MTL(high)x Social Skills(low)	Agree(low)	0.17 (0.4)	19%	0.19 (0.39)		21%
	MTL(high)x Social Skills(low)	MTL(high)	0.45 (0.32)	57%	0.4 (0.27)		49%
	MTL(high)x Social Skills(low)	Consc(low)	0.3 (0.29)	35%	0.64 (0.29)	*	90%
	MTL only (high)	MTL(low)x Agree(low)	0.29 (0.26)	34%	0.27 (0.34)		31%
	Social Skills (low)	MTL(low)x Agree(low)	0.27 (0.31)	31%	-0.43 (0.38)		-35%
	MTL only (high)	MTL(high)x Agree(low)	0.5 (0.32)	65%	0.63 (0.3)	*	88%
	Social Skills (low)	MTL(high)x Agree(low)	0.3 (0.28)	35%	0.26 (0.35)		30%
	MTL only (high)	MTL(low)x Consc(low)	-0.17 (0.23)	-16%	0.34 (0.31)		40%
	Social Skills (low)	MTL(low)x Consc(low)	-0.38 (0.26)	-32%	-0.36 (0.32)		-30%
	MTL only (high)	MTL(high)x Consc(low)	0.5 (0.32)	65%	0.6 (0.28)	*	82%
	Social Skills (low)	MTL(high)x Consc(low)	0.3 (0.28)	35%	0.26 (0.29)		30%
2-trait dyadic configuration							
	MTL only (high)	MTL(high)	0.35 (0.23)	42%	0.47 (0.21)	*	60%

	MTL only (high)	Agree(low)	0.4 (0.19)	*	49%	0.52 (0.26)	*	68%
	MTL only (high)	Consc(low)	0.1 (0.16)		11%	0.58 (0.22)	*	79%
	Social Skills (low)	MTL(high)	0.28 (0.2)		32%	-0.06 (0.26)		-6%
	Social Skills (low)	MTL(low)	-0.28 (0.2)		-24%	-0.16 (0.25)		-15%
	Social Skills (low)	Agree(low)	0.3 (0.21)		35%	-0.11 (0.29)		-10%
	Social Skills (low)	Consc(low)	0.03 (0.18)		3%	-0.06 (0.23)		-6%
2-trait pattern (within-person)								
	MTL(high)xSocial Skills(low)	NA	0.02 (0.03)		2%	0.01 (0.03)		1%
	NA	MTL(low)x Agree(low)	0.04 (0.05)		4%	-0.05 (0.04)		-5%
	NA	MTL(high)x Agree(low)	0.08 (0.04)	*	8%	0.05 (0.04)		5%
	NA	MTL(low)x Consc(low)	-0.05 (0.04)		-5%	0.37 (0.23)		45%
	NA	MTL(high)x Consc(low)	0 (0.04)		0%	-0.11 (0.29)		-10%
Single trait (leader)								
	Motiv	NA	0.04 (0.16)		4%	-0.05 (0.15)		-5%
	Social Skills	NA	-0.03 (0.09)		-3%	0.04 (0.12)		4%
Single trait (follower)								
	NA	Consc	0.04 (0.11)		4%	-0.05 (0.1)		-5%
	NA	Agree	-0.26 (0.15)	†	-23%	-0.03 (0.15)		-3%
	NA	MTL	0.21 (0.18)		23%	0.02 (0.17)		2%

Table 6

Decomposition of Trait-pattern Parameters Predicting Unrequited Leadership, Translational Sample

Note: ** p<.01,* p<.05, † p<.10. Agree = Agreeableness, Consc = Conscientiousness, MTL = Motivation to Lead. For Science sample, n = 150 divided into 27 MTSs, with effective sample size (i.e., possible ties between individuals) of 704. For Translational sample, n = 172 divided into 28 MTSs, with effective sample size of 906. The formula Exp(B) – 1 converts model parameter estimates to percent change in odds.

		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
Parameter Type	Parameter	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls															
	Endogenous control-edges	-3.52 (0.36) **	-97%	-1.82 (0.71) *	-84%	-2.1 (0.6) **	-88%	-1.93 (0.6) **	-85%	-1.92 (0.77) *	-85%	-2.9 (0.71) **	-94%	-1.6 (0.57) **	-80%
	Endogenous control-isolates	-0.71 (0.38) †	-51%	-0.04 (0.43)	-4%	-0.04 (0.43)	-4%	-0.04 (0.44)	-4%	-0.04 (0.43)	-4%	-0.07 (0.43)	-7%	-0.07 (0.43)	-7%
	Endogenous control-mutual	0.66 (0.39) †	93%	0.73 (0.41) †	108%	0.73 (0.4) †	108%	0.72 (0.42) †	105%	0.73 (0.4) †	108%	0.73 (0.41) †	108%	0.75 (0.42) †	112%
	Exogenous control - team membership	0.87 (0.22) **	139%	0.8 (0.21) **	123%	0.8 (0.21) **	123%	0.79 (0.22) **	120%	0.8 (0.23) **	123%	0.81 (0.21) **	125%	0.79 (0.22) **	120%
Social influence															
	Social influence	0.55 (0.14) **	73%	0.29 (0.18)	34%	0.29 (0.18)	34%	0.29 (0.18)	34%	0.29 (0.18)	34%	0.3 (0.18) †	35%	0.3 (0.18)	35%
Trait Variables															
	Leader high MTL and low Social Skills, Follower high MTL and low Consc (H2d)	0.85 (0.34) *	134%	0.97 (0.36) *	164%	0.96 (0.36) *	161%	1.01 (0.37) *	175%	0.96 (0.38) *	161%	1.1 (0.38) *	200%	1.18 (0.37) **	225%
	Leader MTL			-0.08 (0.15)	-8%										
	Leader Social Skills					0.01 (0.1)	1%								
	Leader high MTL and low Social Skills							-0.02 (0.03)	-2%						
	Follower MTL									-0.05 (0.17)	-5%				
	Follower Consc											0.21 (0.12) †	23%		
	Follower high MTL and low Consc													-0.06 (0.04) †	-6%

Parameter	Model 8 Coefficient (S.E.)	Odds Ratio	Model 9 Coefficient (S.E.)	Odds Ratio	Model 10 Coefficient (S.E.)	Odds Ratio	Model 11 Coefficient (S.E.)	Odds Ratio	Model 12 Coefficient (S.E.)	Odds Ratio
Endogenous control-edges	-3.54 (0.36) **	-97%	-1.79 (0.75) *	-83%	-2.14 (0.6) **	-88%	-1.95 (0.59) **	-86%	-3 (0.72) **	-95%
Endogenous control-isolates	-0.72 (0.38) †	-51%	-0.04 (0.43)	-4%	-0.04 (0.43)	-4%	-0.03 (0.43)	-3%	-0.07 (0.44)	-7%
Endogenous control-mutual	0.7 (0.4) †	101%	0.75 (0.41) †	112%	0.76 (0.4) †	114%	0.74 (0.41) †	110%	0.77 (0.41) †	116%
Exogenous control - team membership	0.86 (0.22) **	136%	0.81 (0.22) **	125%	0.81 (0.22) **	125%	0.81 (0.22) **	125%	0.8 (0.22) **	123%
Social influence	0.55 (0.14) **	73%	0.28 (0.18)	32%	0.29 (0.18)	34%	0.29 (0.18)	34%	0.29 (0.18)	34%
Leader high MTL and low Social Skills, Follower low Consc	0.64 (0.29) *	90%	0.71 (0.29) *	103%	0.68 (0.29) *	97%	0.72 (0.31) *	105%	0.8 (0.31) *	123%
Leader MTL			-0.09 (0.15)	-9%						
Leader Social Skills					0.01 (0.1)	1%				
Leader high MTL and low Social Skills							-0.02 (0.03)	-2%		
Follower Consc									0.24 (0.13) †	27%

Parameter	Model 13 Coefficient (S.E.)	Odds Ratio	Model 14 Coefficient (S.E.)	Odds Ratio	Model 15 Coefficient (S.E.)	Odds Ratio	Model 16 Coefficient (S.E.)	Odds Ratio	Model 17 Coefficient (S.E.)	Odds Ratio
Endogenous control-edges	-3.53 (0.36) **	-97%	-1.77 (0.76) *	-83%	-1.94 (0.75) *	-86%	-2.41 (0.79) **	-91%	-1.95 (0.59) **	-86%
Endogenous control-isolates	-0.73 (0.37) †	-52%	-0.07 (0.43)	-7%	-0.06 (0.44)	-6%	-0.07 (0.42)	-7%	-0.07 (0.42)	-7%
Endogenous control-mutual	0.63 (0.4)	88%	0.72 (0.39) †	105%	0.72 (0.4) †	105%	0.72 (0.41) †	105%	0.73 (0.39) †	108%
Exogenous control - team membership	0.85 (0.22) **	134%	0.81 (0.23) **	125%	0.8 (0.22) **	123%	0.81 (0.22) **	125%	0.8 (0.22) **	123%
Social influence	0.56 (0.14) **	75%	0.29 (0.18)	34%	0.29 (0.18)	34%	0.3 (0.18)	35%	0.3 (0.18)	35%
Leader high MTL, Follower high MTL and low Agree	0.63 (0.3) *	88%	0.72 (0.35) *	105%	0.7 (0.34) *	101%	0.75 (0.33) *	112%	0.77 (0.36) *	116%
Leader MTL			-0.1 (0.15)	-10%						
Follower MTL					-0.05 (0.17)	-5%				
Follower Agree							0.08 (0.14)	8%		
Follower high MTL and low Agree									-0.02 (0.04)	-2%

Parameter	Model 18 Coefficient (S.E.)	Model 18 Odds Ratio	Model 19 Coefficient (S.E.)	Model 19 Odds Ratio	Model 20 Coefficient (S.E.)	Model 20 Odds Ratio	Model 21 Coefficient (S.E.)	Model 21 Odds Ratio	Model 22 Coefficient (S.E.)	Model 22 Odds Ratio
Endogenous control-edges	-3.56 (0.37) **	-97%	-1.88 (0.76) *	-85%	-1.88 (0.76) *	-85%	-3.09 (0.74) **	-95%	-1.54 (0.57) *	-79%
Endogenous control-isolates	-0.71 (0.37) †	-51%	-0.05 (0.43)	-5%	-0.05 (0.43)	-5%	-0.08 (0.43)	-8%	-0.09 (0.44)	-9%
Endogenous control-mutual	0.66 (0.37) †	93%	0.71 (0.4) †	103%	0.71 (0.4) †	103%	0.74 (0.42) †	110%	0.74 (0.41) †	110%
Exogenous control - team membership	0.87 (0.22) **	139%	0.83 (0.22) **	129%	0.83 (0.22) **	129%	0.82 (0.22) **	127%	0.81 (0.22) **	125%
Social influence	0.55 (0.15) **	73%	0.29 (0.18)	34%	0.29 (0.18)	34%	0.29 (0.18)	34%	0.3 (0.18) †	35%
Leader high MTL, Follower high MTL and low Consc	0.6 (0.28) *	82%	0.72 (0.28) *	105%	0.72 (0.28) *	105%	0.85 (0.31) *	134%	0.98 (0.31) **	166%
Leader MTL			-0.08 (0.17)	-8%						
Follower MTL					-0.08 (0.17)	-8%				
Follower Consc							0.25 (0.13) †	28%		
Follower high MTL and low Consc									-0.08 (0.04) *	-8%

Parameter	Model 23 Coefficient (S.E.)	Model 23 Odds Ratio	Model 24 Coefficient (S.E.)	Model 24 Odds Ratio	Model 25 Coefficient (S.E.)	Model 25 Odds Ratio
Endogenous control-edges	-3.59 (0.37) **	-97%	-1.49 (0.75) †	-77%	-1.7 (0.75) *	-82%
Endogenous control-isolates	-0.72 (0.38) †	-51%	-0.06 (0.43)	-6%	-0.05 (0.43)	-5%
Endogenous control-mutual	0.64 (0.39)	90%	0.68 (0.4) †	97%	0.68 (0.41) †	97%
Exogenous control - team membership	0.87 (0.24) **	139%	0.81 (0.23) **	125%	0.8 (0.21) **	123%
Social influence	0.55 (0.15) **	73%	0.27 (0.18)	31%	0.28 (0.17)	32%
Leader high MTL, Follower high MTL	0.47 (0.21) *	60%	0.67 (0.25) *	95%	0.63 (0.25) *	88%
Leader MTL			-0.21 (0.16)	-19%		
Follower MTL					-0.14 (0.18)	-13%

Parameter	Model 26 Coefficient (S.E.)	Model 26 Odds Ratio	Model 27 Coefficient (S.E.)	Model 27 Odds Ratio	Model 28 Coefficient (S.E.)	Model 28 Odds Ratio
Endogenous control-edges	-3.55 (0.36) **	-97%	-1.63 (0.76) *	-80%	-2.76 (0.83) **	-94%
Endogenous control-isolates	-0.72 (0.37) †	-51%	-0.06 (0.43)	-6%	-0.05 (0.43)	-5%
Endogenous control-mutual	0.69 (0.41) †	99%	0.77 (0.41) †	116%	0.75 (0.4) †	112%
Exogenous control - team membership	0.84 (0.22) **	132%	0.78 (0.22) **	118%	0.79 (0.22) **	120%
Social influence	0.55 (0.14) **	73%	0.29 (0.18)	34%	0.29 (0.18)	34%
Leader high MTL, Follower low Agree	0.52 (0.26) *	68%	0.64 (0.26) *	90%	0.69 (0.28) *	99%
Leader MTL			-0.16 (0.16)	-15%		
Follower Agree					0.15 (0.16)	16%

Parameter	Model 29 Coefficient (S.E.)	Model 29 Odds Ratio	Model 30 Coefficient (S.E.)	Model 30 Odds Ratio	Model 31 Coefficient (S.E.)	Model 31 Odds Ratio
Endogenous control-edges	-3.63 (0.37) **	-97%	-1.46 (0.78) †	-77%	-3.48 (0.77) **	-97%
Endogenous control-isolates	-0.71 (0.38) †	-51%	-0.06 (0.44)	-6%	-0.08 (0.44)	-8%
Endogenous control-mutual	0.7 (0.39) †	101%	0.77 (0.41) †	116%	0.8 (0.41) †	123%
Exogenous control - team membership	0.86 (0.21) **	136%	0.81 (0.23) **	125%	0.81 (0.21) **	125%
Social influence	0.55 (0.15) **	73%	0.29 (0.18)	34%	0.29 (0.18)	34%
Leader high MTL, Follower low Consc	0.58 (0.22) *	79%	0.72 (0.25) **	105%	0.82 (0.26) **	127%
Leader high MTL			-0.24 (0.17)	-21%		
Follower low Consc					0.33 (0.14) *	39%

Table 7

Decomposition of Trait-pattern Parameters Predicting Unrequited Leadership, Science Sample

Note: ** p<.01,* p<.05, † p<.10. Agree = Agreeableness, Consc = Conscientiousness, MTL = Motivation to Lead. For Science sample, n = 150 divided into 27 MTSs, with effective sample size (i.e., possible ties between individuals) of 704. For Translational sample, n = 172 divided into 28 MTSs, with effective sample size of 906. The formula Exp(B) – 1 converts model parameter estimates to percent change in odds.

		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
Parameter Type	Parameter	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls															
	Endogenous control-edges	-1.88 (0.54) **	-85%	-1.89 (0.71) *	-85%	-1.8 (0.63) **	-83%	-1.87 (0.62) **	-85%	-2.38 (0.86) *	-91%	-2.48 (0.73) **	-92%	-1.63 (0.55) **	-80%
	Endogenous control-isolates	0.72 (0.39) †	105%	0.71 (0.37) †	103%	0.71 (0.41) †	103%	0.72 (0.38) †	105%	0.69 (0.39) †	99%	0.69 (0.39) †	99%	0.65 (0.4)	92%
	Endogenous control-mutual	-0.6 (0.41)	-45%	-0.62 (0.38)	-46%	-0.61 (0.4)	-46%	-0.62 (0.4)	-46%	-0.58 (0.39)	-44%	-0.6 (0.41)	-45%	-0.59 (0.39)	-45%
	Exogenous control - team membership	0.65 (0.22) **	92%	0.64 (0.21) **	90%	0.65 (0.22) **	92%	0.64 (0.21) **	90%	0.62 (0.22) **	86%	0.63 (0.22) **	88%	0.66 (0.21) **	93%
Social influence															
	Social influence	0.81 (0.2) **	125%	0.8 (0.2) **	123%	0.8 (0.21) **	123%	0.8 (0.21) **	123%	0.81 (0.2) **	125%	0.8 (0.19) **	123%	0.83 (0.2) **	129%
Trait Variables															
	Leader high MTL and low Social Skills, Follower high MTL and low Consc (H2d)	1.06 (0.52) *	189%	1.03 (0.56) †	180%	0.97 (0.54) †	164%	1.02 (0.57) †	177%	0.94 (0.53) †	156%	1.21 (0.59) *	235%	1.11 (0.55) *	203%
	Leader MTL			0 (0.16)	0%										
	Leader Social Skills					-0.02 (0.09)	-2%								
	Leader high MTL and low Social Skills							0 (0.04)	0%						
	Follower MTL									0.15 (0.18)	16%				
	Follower Consc											0.15 (0.13)	16%		
	Follower high MTL and low Consc													-0.06 (0.04)	-6%

		Model 8		Model 9		Model 10	
Parameter Type	Parameter	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls							
	Endogenous control-edges	-1.89 (0.55) **	-85%	-1.48 (0.78) †	-77%	-1.32 (0.89)	-73%
	Endogenous control-isolates	0.73 (0.39) †	108%	0.75 (0.39) †	112%	0.73 (0.37) †	108%
	Endogenous control-mutual	-0.62 (0.39)	-46%	-0.6 (0.4)	-45%	-0.62 (0.4)	-46%
	Exogenous control - team membership	0.61 (0.21) **	84%	0.61 (0.21) **	84%	0.62 (0.2) **	86%
Social influence							
	Social influence	0.79 (0.2) **	120%	0.8 (0.21) **	123%	0.8 (0.2) **	123%
Trait Variables							
	Leader high MTL, Follower low Agree	0.4 (0.19) *	49%	0.46 (0.21) *	58%	0.28 (0.22)	32%
	Leader MTL			-0.12 (0.17)	-11%		
	Follower Agree					-0.14 (0.17)	-13%

		Model 11		Model 12		Model 13	
Parameter Type	Parameter	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Controls							
	Endogenous control-edges	-2.39 (0.65) **	-91%	-2.76 (0.89) **	-94%	-2.7 (2.09)	-93%
	Endogenous control-isolates	0.71 (0.39) †	103%	0.69 (0.38) †	99%	0.69 (0.41) †	99%
	Endogenous control-mutual	-0.59 (0.39)	-45%	-0.6 (0.38)	-45%	-0.61 (0.39)	-46%
	Exogenous control - team membership	0.64 (0.22) **	90%	0.62 (0.22) *	86%	0.62 (0.21) **	86%
Social influence							
	Social influence	0.81 (0.2) **	125%	0.82 (0.2) **	127%	0.82 (0.2) **	127%
Trait Variables							
	Follower high MTL and low Agree	0.08 (0.04) *	8%	0.07 (0.05)	7%	0.1 (0.09)	11%
	Follower MTL			0.12 (0.2)	13%		
	Follower Agree					0.05 (0.34)	5%

Table 8

Influence of Friendship and Hindrance Networks on Connected and Unconnected Leadership Emergence

Note: ** p<.01,* p<.05, † p<.10. For Science sample, n = 150 divided into 27 MTSs, with effective sample size (i.e., possible ties between individuals) of 704. For Translational sample, n = 172 divided into 28 MTSs, with effective sample size of 906. The formula Exp(B) – 1 converts model parameter estimates to percent change in odds.

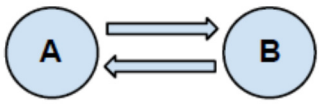
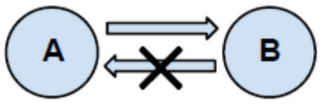
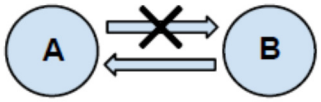
	DV: Connected Leadership				DV: Unconnected Leadership			
	Science Sample		Translational Sample		Science Sample		Translational Sample	
Parameter	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Endogeneous control - edges	-5.1 (0.5) **	-99%	-6.14 (0.53) **	-100%	-1.63 (0.39) **	-80%	-2.99 (0.32) **	-95%
Endogeneous control - isolates	0.06 (0.31)	6%	-0.34 (0.25)	-29%	-0.18 (0.6)	-16%	-1.65 (0.68) *	-81%
Endogeneous control - mutual	0.04 (0.38)	4%	1.92 (0.43) **	582%	0.11 (0.25)	12%	0.84 (0.23) **	132%
Exogenous control - team membership	1.64 (0.3) **	416%	0.75 (0.26) **	112%	0.37 (0.16) *	45%	0.46 (0.15) **	58%
Social influence	1.29 (0.19) **	263%	1.75 (0.18) **	475%	0.42 (0.17) *	52%	0.9 (0.13) **	146%
Friendship tie co-existence (H3)	1.32 (0.24) **	274%	1.18 (0.21) **	225%				
Hindrance tie co-existence (H4)					0.13 (0.26)	14%	-0.31 (0.22)	-27%

Table 9

Additional Examination of Role of Friendship and Hindrance Networks

Note: ** p<.01,* p<.05, † p<.10. For Science sample, n = 150 divided into 27 MTSs, with effective sample size (i.e., possible ties between individuals) of 704. For Translational sample, n = 172 divided into 28 MTSs, with effective sample size of 906. The formula Exp(B) – 1 converts model parameter estimates to percent change in odds.

	DV: Connected Leadership				DV: Unrequited Leadership				DV: Unrecognized Leadership			
	Science Sample		Translational Sample		Science Sample		Translational Sample		Science Sample		Translational Sample	
Parameter	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio	Coefficient (S.E.)	Odds Ratio
Endogeneous control - edges	-4.66 (0.51) **	-99%	-5.71 (0.49) **	-100%	-3.06 (0.39) **	-95%	-3.54 (0.37) **	-97%	-2.52 (0.62) **	-92%	-4.08 (0.55) **	-98%
Endogeneous control - isolate	0.09 (0.28)	9%	-0.42 (0.28)	-34%	0.17 (0.31)	19%	-0.7 (0.37) †	-50%	-0.09 (0.3)	-9%	-0.17 (0.29)	-16%
Endogeneous control - mutua	0.21 (0.34)	23%	2.13 (0.38) **	741%	-0.8 (0.37) *	-55%	0.7 (0.38) †	101%	-0.54 (0.65)	-42%	1.83 (0.54) **	523%
Exogenous control - team me	2.19 (0.28) **	794%	1.09 (0.24) **	197%	0.69 (0.22) **	99%	0.87 (0.22) **	139%	-0.11 (0.26)	-10%	0.51 (0.29) †	67%
Social influence	1.37 (0.2) **	294%	1.67 (0.15) **	431%	0.99 (0.18) **	169%	0.55 (0.15) **	73%	0.54 (0.33)	72%	0.66 (0.23) **	93%
Friendship tie co-existence												
Hindrance tie co-existence	-1.93 (0.56) **	-85%	-0.87 (0.35) *	-58%	0.19 (0.25)	21%	0.52 (0.28) †	68%	-2.14 (0.71) **	-88%	-1.3 (0.69) †	-73%

Leadership Type	Pattern of Ties	Description
Connected		Member B perceives self as relying on Member A for leadership; Member A perceives self as providing leadership to Member B. **Member A is a connected leader within the dyad.**
Unconnected, unrequited		Member A perceives self as providing leadership to Member B; Member B does *not* perceive self as relying on Member A for leadership. **Member A is a unconnected, unrequited leader within the dyad.**
Unconnected, unrecognized		Member B perceives self as relying on Member A for leadership; Member A does *not* perceive self as providing leadership to Member B. **Member A is a unconnected, unrecognized leader within the dyad.**

Leadership tie, leader perspective ("Who do you provide leadership to?")

Leadership tie, follower perspective ("Who do rely on for leadership?")

Figure 1

Classifications of Leadership Perceptual Disconnects

Focus	#	Hypothesis
Antecedent (Trait)	H1a-b	The emergence of a connected leadership relationship between a leader high in both motivation to lead and social skills and a follower low in motivation to lead and high in (a) agreeableness or (b) conscientiousness is more likely than would be expected by chance alone.
	H2a-b	The emergence of an unconnected leadership relationship between a leader high in motivation to lead yet low in social skills and a follower low in motivation to lead and (a) agreeableness or (b) conscientiousness is more likely than would be expected by chance alone.
	H2c-d	The emergence of an unconnected leadership relationship between a leader high in motivation to lead yet low in social skills and a follower high in motivation to lead and low in (c) agreeableness or (d) conscientiousness is more likely than would be expected by chance alone.
Antecedent (Relationship)	H3	The presence of a friendship relationship between two members positively predicts the presence of a connected leadership relationship between them.
	H4	The presence of an adversarial relationship between two members positively predicts the presence of an unconnected leadership relationship between them.
Antecedent (Social Influence)	H5a	Holding all other variables constant, connected leadership is more likely to emerge within a dyad if the leader has connected leadership relationships with one or more others in the group.
	H5b	The extent to which connected leadership emergence between dyad members is influenced by external group member perceptions is moderated by the group's cohesion. The higher the group's cohesion, the stronger the influence of the external perceptions on the likelihood of connected leader emergence within a dyad.
Outcome (Group)	H6	Higher proportions of connected versus unconnected emergent leadership within a group is positively related to perceptions of the group's efficacy.

	H7	Higher proportions of connected versus unconnected emergent leadership within a group is positively related to future group viability.

Figure 2

Summary of Hypotheses

APPENDIX A. MAKING DYADIC TRAIT CONFIGURATION MATRICES

Consider a network that has 3 individuals (A, B, and C). Compared to the group average (high = above average, low = below average) their personality scores are as follows:

A: high MTL, high social skills, low agreeableness

B: high MTL, high social skills, high agreeableness

C: low MTL, low social skills, high agreeableness

The dyadic trait configuration matrix needed to test H1a (i.e., high leader MTL and social skills paired with low follower MTL and high agreeableness) would be as follows:

	A	B	C
A	0	0	0
B	0	0	0
C	1	1	0

Cells are referenced by (row position, column position). Directed sociometric matrices are constructed such that each cell represents whether or not the person designed by the row header sent a tie to the person designated by the column header. For example, cell (3,1) represents the tie from C to A, whereas cell (1, 3) represents the tie from A to C. If this matrix was a representation of leadership ties, cell (3,1) would indicate that C nominated A as a leader.

The interpretation of the dyadic trait configuration matrices is that a 1 represents a combination of leader and follower traits in alignment with the hypothesized pattern. In the above matrix, again considering cell (3,1), the cell value is 1 because C's trait profile (low MTL, high agreeableness) matches the hypothesized follower profile, and A's trait profile (high MTL, high social skills) matches the hypothesized leader profile.

APPENDIX B. CONSTRUCTING CONNECTED AND UNCONNECTED LEADERSHIP NETWORKS

Consider a 3-person network with the following leadership ties (assessed from both the follower and leader perspectives, respectively):

"Who do you rely on for leadership?"

	A	B	C
A	0	0	1
B	1	0	1
C	0	1	0

Who do you provide leadership to?

	A	B	C
A	0	1	1
B	0	0	0
C	0	1	0

In this situation, there are four leadership ties from the follower perspective (C is A's leader, A and C are B's leader, B is C's leader) and three from the leader perspective (A perceives self as leading B and C, and C perceives self as leading B). To create the connected and unconnected networks, I transpose the leader-perspective leadership network (i.e., so that directed ties flow from follower to leader) and superimpose the two leadership networks. Ties present in both matrices are retained for the connected network, and the others create the unconnected network.

Connected Leadership

	A	B	C
A	0	0	0
B	1	0	1
C	0	0	0

Unconnected Leadership

	A	B	C
A	0	0	1
B	0	0	0
C	0	1	0

APPENDIX C. UNREPORTED HYPOTHESIS

An additional hypothesis I wanted to test explored connected, shared leadership. This is a special type of connected leadership in which both members viewed one another simultaneously as leaders and followers. In other words, this represents instances of mutually recognized shared leadership relationships. I hypothesized that this type of relationship would develop when both dyad members possessed a leader trait profile (i.e., high MTL and high social skills), yet were also highly agreeable and willing to consider sharing the leadership role:

H2: Connected shared leadership is more likely than chance to emerge in dyads with both member high in motivation to lead, social skills, *and* agreeableness

In my operalization of shared, connected leadership, all the conditions for connected leadership had to be met in *both* direction for each dyad member. In network terms, this was represented as the intersection of two connected leadership networks, one from each member's vantage point.

Unfortunately, I was unable to test this hypothesis due to the sparseness of these networks in my sample. Approximately 75% of the Science sample and 90% of the Translational sample MTSs had shared connected leadership network densities of less than 10%. The low frequency of ties would not allow the ERGMs to run properly.

One reasons for this sparseness may be that my approach to operationalizing shared connected leadership was inappropriate. Shared leadership describes the relationship between team members when multiple members share leadership functions (Carson et al., 2007). In other words, members in shared leadership roles are simultaneously providing leadership to others and receiving leadership from others. My operalization of shared leadership followed from DeRue and Ashford's (2010) claiming and granting principles: when there is shared connected leadership, members of a leadership dyad should simultaneously 1) claim leadership and grant the other's followership claim and 2) claim followership and grant the other's leadership claim. However, it may be the members do not in reality recognize this duality when enacting shared leadership: they may see other leaders as equals, yet not parse that into the two roles of leading and following.

APPENDIX D. Dissertation Proposal

Introduction

Throughout the majority of its existence, leadership theory and research focused on leadership phenomena in the context of singular, formal leaders as they influence their followers and the broader organization (Bass & Bass, 2008). In this paradigm, leaders are formally appointed to their positions such that there is no ambiguity about which individuals have leader status. Recently, however, there has been a growing interest in the contribution of *informal* leaders to team or organizational effectiveness (e.g., Friedrich, Vessey, Schuelke, Ruark, & Mumford, 2009; Pearce & Sims, 2002; Wang, Waldman, & Zhang, 2014) beyond that of formal leaders. One particularly popular vein of informal leadership research is the study of shared leadership in which multiple group members share leadership responsibilities within a group (e.g., Carson, Tesluk, & Marrone, 2007; Pearce & Conger, 2003). Though the shared leadership empirical literature is relatively new, there is nonetheless ample evidence in support of its benefits over vertical leadership (e.g., D'Innocenzo, Mathieu, & Kukenberger, 2014; Nicolaides, et al., 2014; Wang et al., 2014).

One consideration missing from the shared leadership literature, however, is the subjectivity of informal leader role occupancy. Leadership is commonly recognized to be a relationship that develops between leaders and followers. Theories such as leader prototype (Lord, Foti, & De Vader, 1984; Lord & Maher, 1991) and leader member exchange (LMX; Graen, 1976, Graen & Uhl-Bien, 1995) are leadership theories acknowledging the interplay of leader and follower attributes and perceptions in determining leader effectiveness. Furthermore, LMX is a truly dyadic theory that emphasizes the dyadic, relationship aspect of leadership. However, dyadic and followership theories such as these are almost exclusively applied to situations in which leader and follower roles are formally appointed and objectively clear. In the case of shared leadership emergence within a group, members occupy leadership roles solely on account of the informal influence relationships they form with others. According to DeRue and Ashford (2010), this process of establishing leader (and follower) identities is enacted through a series of claiming and granting of members' respective roles. Leader identities are fully constructed only when their claims of leadership within a group are granted by others who then take on the reciprocal follower identities. From this perspective, whether or not a leadership relationship exists between two members can only be fully understood by taking both parties' perspectives into account.

This raises an interesting question for shared leadership: do the members appointed by the group as its informal leaders actually recognize this new role? To date,

shared leadership research measures leader emergence solely from the follower's perspective. A growing proportion of this research employs social network analysis (SNA) methodology to operationalize shared leadership. This approach uses centrality or density scores derived from leadership networks that are constructed by members reporting who they perceive as leaders (e.g., Carson et al., 2007; Mehra, Smith, Dixon, & Robertson, 2006). However, while this tells us who people are relying on for leadership, we do not know whether these individuals acknowledge leadership nominations and assume leader identities. In other words, there may be a perceptual disconnect between group members about who is leading and who is following. The perception by member A of member B as a leader does not assure that member B acknowledges this role and assumes a leader identity.

Perceptual disconnects in leadership research

Indeed, meta-analytic evidence of frequent misalignment between leader and follower perceptions from the LMX literature (e.g., Gerstner & Day, 1997; Sin, Nahrgang, & Morgeson, 2009) suggests that perceptual disconnects between potential leaders and potential followers are likely. In both Gerstner and Day's 1997 analysis and Sin and colleagues' (2009) work over a decade later, there was only a moderate correlation of .37 between leader and follower ratings of LMX. Furthermore, the magnitude of the discrepancy of the views, over and above the average LMX level, can be predictive of leader effectiveness (Sherman, Kennedy, Woodard, & McComb, 2012). This finding highlights the importance of measuring dyadic phenomena at the appropriate level of analysis: if a phenomenon is dyadic, measurement from only one person's perspective is inappropriate because it represents only one half of the leadership/followership picture. Unfortunately, few LMX researchers appear to be using appropriate dyadic-level measurement when studying dyadic-level leadership phenomena. In a recent study examining the frequency of misalignment between level of hypotheses and level of analyses in leadership research, 91% of articles featuring dyadic-level theories demonstrated misalignment in the level of analysis used to test the hypotheses (Gooty, Serban, Thomas, Gavin, & Yammarino, 2012).

If similar inconsistencies exist in perceptions of leader emergence, socio-cognitive theories of identity construction suggest that such inconsistencies can be associated with meaningful variance in subsequent leader effectiveness and group outcomes (e.g., DeRue & Ashford, 2010). People's identities are heavily shaped by interactions and judgments of others: self-concepts that are not reinforced through congruent interactions with others are unable to endure (DeRue, Ashford, & Cotton, 2009; DeRue & Ashford, 2010;Goffman, 1959). More specifically for leadership, De Rue and Ashford (2010) posit that leader and follower identities are formed through a reciprocal process of claims and grants of members' respective identities. If either a) the prospective follower does not grant the leadership claim or b) a prospective follower issues a claim for following a prospective leader that is not acknowledged by that member, leader (and follower) identities are not established. In such cases where

leadership is "unconnected", leader effectiveness is expected to suffer (DeRue & Ashford, 2010). Investigations of this require a measurement approach that simultaneously considers leader and follower views when establishing leadership emergence. One such potential measurement approach, that I will use in the present study, is social network analysis.

Dissertation objectives

Taken together, the overarching aim of this research study is to examine the existence and impact of perceptual disconnects in informal leadership emergence within groups. By taking into consideration both dyadic-level and network-level factors contributing to the emergence of different types of leadership, I hope to provide a comprehensive view of this emergent phenomenon. The introduction of this paper continues in three parts. In the first part, I review the arc of leadership research as it shifts its focus from the leader outward to also include considerations of situation and relationship with followers. In the second part, I highlight the importance of perceptual disconnects in the dyadic leadership theory research and illustrate how similar disconnects may be meaningful for understanding the nature of informal leadership emergence. In the final part, I present a taxonomy to describe different types of perceptual disconnects in the leadership emergence context before presenting hypotheses about the antecedents and consequences of these disconnects in a group context.

The evolution of leadership research: from leaders outward

To put a dyadic approach to studying leadership emergence in context, I first review how the focus in leadership research has shifted from almost exclusively on leader characteristics and abilities to also include considerations of the context and followers as well. Instead of determining the core traits and characteristics required for leadership, researchers became interested in the interplay between leader, follower, and situational attributes as they relate to leadership outcomes. This more inclusive study of leadership provided an increasingly nuanced and complex perspective on what factors contribute to leader emergence and effectiveness.

Leader traits and behaviors: the foundations of leadership research. The early theories of leadership focused almost exclusively on the leader as the sole determinant of leadership phenomena, irrespective of other components of the leadership relationship (e.g., followers). The origins of the modern study of leadership stem from a historiometric approach to understanding leaders (Bass & Bass, 2008). Early leadership research can be broadly classified as "Great man" theories (Carlyle, 1869) in which the propensity to emerge and succeed as a leader is an innate, heritable quality of specific individuals. Through a historical analysis of characteristics common to known great leaders, researchers were convinced that there are certain qualities of individuals that dictate whether or not they will become a leader, irrespective of specific situations or other factors (Galton, 1869; Woods, 1913). This perspective propelled the trait-based approaches to leadership that dominated the leadership research of the early to mid 1900s

that attempted to identify the necessary and sufficient characteristics required for an individual to lead effectively.

Contingency theories: considering situational factors in leadership. By the mid-1930s and early 1940s, critiques of the pure leader-centric research argued that the scope needed to be extended to consider the role of the situation in determining leader effectiveness (e.g., Case, 1933; Hook, 1943; Murphy, 1941). Again drawing on historical events, leadership researchers argued that the environment played a critical role in determining who the leader was and what actions he or she engaged in. Thus, from this situationalist perspective, researchers argued situational factors such as specific societal contexts (Mumford, 1909) or task requirements (Murphy, 1941) were perhaps more important than leader characteristics when predicting leadership outcomes.

In contrast to these strict person- or situation-oriented perspectives, the emergence of contingency theories argue that both person and situation matter (Bass & Bass, 2008; Yukl, 2012). For example, Stogdill(1948) concluded leader traits are only important as they relate to the leader's situation. Accordingly, different traits may be important for leadership depending on the specific demands of the situation. This concept is the core of a number of contingency theories of leadership, which all explain leadership effectiveness in terms of situation by trait interactions (Yukl, 2012).

The key differentiator between different contingency theories is the specific individual differences and situational moderators each chooses to focus on. For example, Fiedler's contingency model (1968) uses task structure, leader position power, and type of relationship with subordinates as the key moderators of how effective a certain type of leader will be. Leaders with the same exact set of leader traits may be effective or ineffective, depending on the levels of these three situational characteristics. Path-goal theory (Evans, 1970; House, 1971), on the other hand, focuses on a different set of task and environmental characteristics, such as role clarity, routine, and organizational regulations, as key moderators. Furthermore, this theory recognizes that subordinate characteristics count as part of the situational context. For example, subordinate levels of need for autonomy and work motivation are both considerations within the path-goal model for leader effectiveness. The multiple-linkage model (Yukl, 1981) is yet another contingency model proposing its own, slightly different set of moderator variables, including the availability of resources, the group's cohesiveness, the leader's designated role, and the subordinates' levels of effort and skill in performing their tasks. Regardless of the specific variables of interest, the rise of contingency theories signify a fundamental shift in leadership research by recognizing that leaders cannot be studied in isolation. Rather, the *interaction* of leader characteristics with both situational and follower attributes was defined as a crucial predictor of leadership outcomes.

Followership theories: exploring the contribution of followers. Influenced by contingency theories that recognized the importance of follower attributes to leadership effectiveness (e.g., House, 1971), a separate vein of research began focusing more specifically on the nature of the follower's role in leadership phenomenon. This approach

represented a further broadening of the leadership lens, extending now to include leaders, followers, and situations as distinct sources influencing leadership outcomes. The theories that adopted this perspective emphasized the role of follower cognitions in forming leadership perceptions and influencing subsequent leader effectiveness (Bass & Bass, 2008). The central premise in followership theories is that the follower's perceptions and endorsements of a leader are key influencers of both leaders' emergence and effectiveness. These leadership perceptions, in turn, are largely dependent on the follower's implicit leadership theories (ILTs): the basic beliefs and assumptions followers have about the characteristics of effective leaders (Eden & Leviatan, 1975; Epitropaki & Martin, 2004; Lord, Foti & DeVader, 1984; Offerman, Kennedy & Wirtz, 1994; Rush, Thomas, & Lord, 1977). If an individual does not conform to a follower's conceptualization of prototypic leaders and their attributes, that potential leader is unlikely to be evaluated favorably, and therefore not "legitimized" in the leader role (Hollander, 1961; Hollander & Julian, 1970; Lord & Maher, 1991).

Although there are some characteristics common to many followers' conceptualization of leaders, there can be significant variation in ILTs from person to person (Lord et al., 1984). People's conceptualizations of what it means to be a leader, also referred to as leader schemas (Emerich, 2001), are influenced by a number of sources. Societal influences as well as personal experiences with leadership may help initially form these schemas, and they may evolve over time according to new personal experiences or exposure to leadership models (Lord, Brown, Harvey, & Hall, 2001). Therefore, evaluating the ILTs of any given leader's followers is important for interpretation of any evaluations of the leader's effectiveness. In other words, variance in leader effectiveness across followers (or for the same followers over time) may arise from variation in ILTs that impact follower leader perceptions, true changes in leader behavior, or both.

In a different vein, Hollander's (1992) theory of upward influence focuses not on the impact of follower ILTs on subsequent leadership perceptions, but instead on how actual follower behavior can influence the leader's subsequent behavior and effectiveness. The key concept in upward influence is that leadership is not a one-way path of influence, flowing from the leader to the follower. Instead, influence within a leader-follower dyad can go both ways: the behaviors of followers can influence subsequent leader actions just as much as leaders influence followers (Heslin & Latham, 2004; Holland, 1992). For example, followers who use upward influence tactics with their leaders are able to secure organizational assistance and resources that they would otherwise not have, thereby better positioning themselves for success (e.g., Schreischeim, Castro, & Yammarino, 2000; Yukl, Guinan, & Sottolano, 1995). This theory reinforces the notion that, in order to obtain a complete understanding of leaders and the factors contributing to their effectiveness, a full consideration of the perceptions and behaviors of followers is required.

Despite frequent early assertions that the *relationship* between leaders and followers is an important part of the leadership phenomenon, theories that specifically examined leadership as a dyadic, integrated phenomenon did not emerge until the 1970s (Dansereau, Graen, & Haga, 1975; Graen, 1976). While early leadership theories extensively discussed characteristics and behaviors of leaders and followership theories shed light on the role of the followers, none of these theories simultaneously considered the roles of both leaders and followers. By considering the quality of the leader-member relationship as a unique factor contributing to leader effectiveness over and above either leader or follower characteristics and behaviors, theories related to leader-member exchange (LMX; Graen, 1976) shifted the focus of leadership research from the individual to the dyadic level. The integration of LMX into the leadership literature can be considered yet another step towards expanding the domain of factors impacting leadership outcomes: including LMX, the identified types of unique sources contributing to leadership phenomena include leader, follower, situation, and relationship components.

LMX: the intersection of leader and follower experiences/perceptions. Modern LMX theory arose from ideas in Graen's (1976) vertical-dyad linkage (VDL) theory. In this work, he proposes that the relationship between a leader and each of the followers is a unique two-way interaction. Given that each leader-member relationship is unique, it is therefore inappropriate to evaluate leaders via average behavior scores because the variations in leader behavior across followers could be meaningful. Instead, leadership perceptions are more accurately assessed at the dyadic level so that differences across leader-follower dyads can be analyzed. These foundations discussed in VDL theory evolved into the more comprehensive theory of LMX.

Unlike previous leadership theories focusing on either leaders, followers, or features of the context, LMX uses the emergent relationship between leaders and followers to explain variance in outcomes. LMX views the leader-follower relationship as a social exchange process: when leaders grant followers greater status, rewards, or responsibilities, followers respond with harder work, increased loyalty, and more dependability (Dirks & Ferrin, 2002; Yukl, 2012). When relationship quality is high, leaders and followers both benefit through a successful social exchange process. LMX levels have been linked to important job-related consequences such as subordinate job satisfaction, career development, and performance (Erdogan & Liden, 2002; Gerstner & Day, 1997; Liden, Sparrowe, & Wayne, 1997; Schriesheim, Castro, & Cogliser, 1999). In addition to absolute levels of LMX quality, relative LMX quality as compared across leader-follower dyads involving the same leader can contribute meaningfully to leader-member outcomes (Henderson, Wayne, Shore, Bommer, & Tetrick, 2008), indicating that variance in LMX across subordinates can be detrimental to follower outcomes.

An important note about the LMX literature is that it has focused exclusively on relationships between formally defined leaders and followers (Yukl, 2012). This means that there is no ambiguity for the dyad members regarding who is occupying the leader role and who is supposed to be the follower. However, formally assigned, vertical

leadership structures is just one subset of situations to which LMX could apply. The founders of LMX theory themselves suggest that principles of their theory could be applied to situations involving lateral peers or with informally assigned leadership roles (Graen & Uhl-Bien, 1995). This potential for additional applications is becoming increasingly relevant as the leadership research increasingly recognizes that informally emerging leadership is a common occurrence in modern organizations worthy of study.

The shift towards informal leadership structures. In contrast to clearly defined vertical organization hierarchies of the past, modern organizations are shifting towards flatter, horizontal hierarchies and project team-based work (Hills, 2007; Kozlowski & Bell, 2003;Lawler, Mohrman, & Ledford, 1995; Yukl, 2012). This decreasing prominence of formal leader and follower appointments creates more ambiguity about which organizational members are recognized as leaders. Thus, evaluating both leader emergence as well as leader effectiveness becomes paramount. With informal leadership, a priori knowledge of who is leading and who is following is no longer clear: instead, the first step to studying leadership effects becomes identifying the emergent leader and follower roles. Only once leaders are identified within the organization or group can the study of other leadership phenomena begin.

Even before the shift toward flatter organization structure, informal leadership has long been recognized as important within self-managed work teams (i.e., project work groups). Self-managed teams are defined as teams in which the responsibilities and authority normally granted to formal managers must be negotiated among the team members themselves (Cohen, 1991; Katzenbach & Smith, 1993; Orsburn, Moran, Musselwhite, & Zenger, 1990; Wellins, Byham, & Wilson, 1991). In doing so, the members must decide which individual or individuals should take on traditional leader activities such as direction setting and coordination necessary for successful team performance (Morgeson, DeRue, & Karam, 2009). While self-managed teams often also have an external formal leader, the team leadership capacity developed amongst members allows them to take on a substantial amount of leadership responsibilities not covered by formal leader (Day, Gronn, & Salas, 2004; 2006). This represents one example of how informal leadership emergence can occur even within formal leadership structures. Though this leadership capacity is more commonly discussed in terms of many members engaging in leadership behaviors, other research does examine emergence of particular leaders within the group (e.g., Foti & Hauenstein, 2007; Hollander, 1964).

The study of shared leadership represents a more recent trend in leader emergence research. Shared leadership is defined as sharing leadership roles and responsibilities across two or more individuals in a group (Carson, Tesluk, & Marrone, 2007; Pearce & Conger, 2003). Though formally appointed leaders may engage in shared leadership, this literature has almost exclusively examined informally emerging. One type of operalization used to measure shared leadership include network measures in which individuals report the group members they perceive as leaders of their team (e.g., Carson et al, 2007; Mayo, Meindl, & Pastor, 2003; Small & Rentsch, 2010). Once leaders are

identified, metrics such as leadership network density (e.g.,Carson et al., 2007; Mayo, Meindl, & Pastor, 2003) or decentralization (Mayo et al., 2003; Small & Rentsch, 2010) are used to examine relationships between types of shared leadership and team effectiveness outcomes.

Role of perceptions in informal leadership emergence and effectiveness. With no formally appointed leader ad follower roles to rely on, research on informal leadership phenomena is heavily reliant on understanding individuals' subjective perceptions of the type of quality of the leadership rather than more objective measures of leader status or behavior. The entire power of informal leaders must be granted to them from their followers in lieu of true organizational backing; thus, evaluation of the leaders from the follower's perspective becomes paramount to understanding the type and effectiveness of leadership. The literature to date on ILTs provides some insight on factors affecting these follower perceptions relating to leadership.

Early work on ILTs examined individual traits commonly used by followers to infer leadership in others. Research found traits such as intelligence, dominance, sensitivity or charisma were commonly present in followers' prototypes of leaders (Epitropaki & Martin, 2004; Lord et al., 1984). In other words, followers perceived targets as likely to lead if the targets exhibited high levels of one or more of these traits because recognizing the presence of these traits triggered the entire leader schema. Furthermore, once a target was perceived as a leader, the follower began to associate other characteristics consistent with their leader prototype with that target, even if those are characteristics were not explicitly present (Foti & Lord, 1987; Phillips & Lord, 1982).

This finding that perception of single leader-relevant trait can trigger perception of other characteristics associated within a leader schema served as the foundation to the recent pattern-based approach to understanding ILTs and leader perceptions (Lord & Dinh, 2014). Instead of focusing on specific traits relevant to leader schemas, this approach considers networks of attributes. Social-cognitive and neurological research indicates that the intrapersonal and interpersonal processes relating to leadership evaluation are governed by input from multiple systems (Dinh, Lord, & Hoffman, 2014; Lord & Shondrick, 2011). Given such a complicated, integrated process, explaining leadership perceptions using individual traits alone may be overly simplistic. In support of this assertion, recent research using pattern approaches to predict leadership perceptions have proven able to predict variance in perceptions over and above studies considering traits individually (Dinh & Lord, 2013; Foti & Hauenstein, 2007; Trichas, Schyns, & Lord, 2013).

Although the work of Dinh, Lord and colleagues has done much to inform our understanding of leadership from the follower's perspective, the informal leadership literature still lacks an integrated understanding of emergent leadership from the *leader's* perspective. Because the leader role is informally granted via interactions amongst group members, the newly nominated leaders may or may not actually recognize the role, or associated responsibilities, appointed to them. Considering the many elements shown to

influence follower perceptions of leadership, it follows that the perceptions of the leaders themselves may also be influenced by their own set of factors. Depending on these sets of factors operating within a group, there may be significant disconnects between members on who is perceived as leaders, and who is supposed to be following those leaders.

Perceptual disconnects such as these are relatively common in the psychology literature, and investigating the reasons behind and consequences of perceptual disconnects have yielded deeper understanding of several phenomenon. In the leadership literature in particular, one example of the presence of perceptual disconnects in dyadic relationships is found in the LMX research.

Perceptual disconnects in leader-member exchange. By definition, a relationship between a leader and a follower exists independently of either one of them and arises from both individuals' perceptions (Dansereau, 1995; Dansereau, Yammarino, & Markham, 1995). In other words, a relationship cannot be adequately defined by assessing one member's experience of it because the true nature of the relationship is determined via the intersection of member perceptions. Thus, even though there is only one relationship shared between the two people, there is no guarantee that each person perceives it similarly.

Indeed, an analysis of the LMX literature indicates that leaders and followers very commonly diverge in their assessments of the relationship between them (Gerstner & Day, 1997; Schriesheim, Cogliser, Scandura, Lankau, & Powers, 1999; Sin, Nahrgang, & Morgeson, 2009). Despite LMX being a dyadic theory, the majority of the research assesses LMX at the individual level (e.g., from the leader or follower's perspective, but not an integration of the two views) and rarely assess LMX from more than one perspective in a given study (Gerstner & Day, 1997; Schriesheim, Neider & Scandura, 1998; Schriesheim, 2011). Using the minority of studies actually measuring LMX from both perspectives, two meta-analyses found a corrected correlation between leader and follower LMX ratings of only .37 (Gerstner & Day, 1997; Sin et al., 2009). This moderate correlation between leader and follower perceptions of relationship quality raises an interesting question: which person's assessment of LMX is the "correct" perception of the relationship? In these single-perspective LMX studies, if LMX had instead been assessed from the alternative perspective (e.g., by using leader-rated LMX instead of follower-rated LMX, or vice versa), would the researchers draw the same conclusions about the impact of LMX on important job-related outcomes?

This question is perhaps not the correct one to be asking, however, given that dyadic phenomena are best assessed using methods that can account for variance between dyad member perspectives and allow for integration of multiple perspectives for a more accurate description of the phenomenon of interest. For example, social relations modeling (SRM; Kenny, 1994) allows interpersonal phenomenon to be analyzed by partitioning variance according to four main sources: target, perceiver, relationship, and

group. By accounting for each source independently, researchers are able to more accurately understand the various forces influencing the perceptions within a dyad.

As another dyadic leadership phenomenon, informal leader emergence is likely to offer similar opportunities for perceptual disconnects as are present in LMX. Here, the disconnect is not on evaluating the quality of a leader-follower relationship; instead, the disconnect is whether or not there even *is* a leader-follower relationship between two individuals. Previous studies of leadership have assumed stable leader and followership roles and examined the relationships and qualities of these leaders and followers: however, I argue that the very determination of leader and follower roles in instances of informal emergent leadership requires closer examination. There may be a fundamental disconnect in formally "leaderless" groups in the degree to which members see themselves (and others) informally as leaders or followers. In other words, even if member A recognizes member B as a leader, there is no guarantee that member B recognizes that leader-role nomination. Alternatively, member B may view him or herself as providing leadership to member A, but member A does not recognize that relationship. Either situation has potential to induct role conflict within a group, a phenomenon whose negative consequences have been a frequent topic of interest leadership research.

Leadership and role conflict. Role conflict describes the dissonance experienced by individuals when they encounter multiple, contradictory expectations for what is required of them in a given role (Lynch, 2007). This dissonance causes stress for the individuals and negatively impacts performance (Quah & Campbell, 1994). Leaders commonly experience role conflict that arises from sources including ambiguity of leader role definitions, incompatibility among several roles, and inability to meet the demands of a role (Bass & Bass, 2008). Regardless of the specific source of role conflict, this dissonance invariably hinders the leader's effectiveness and well-being. In the context of informal leader emergence, the source of ambiguous leader role definition is most relevant.

Ambiguity of leader role definition occurs when the leader position is ill-defined, making it difficult for those in leader roles to determine role expectations (Kahn, Wolfe, Quinn, Shoeck, & Rosenthal, 1964). Without a clear understanding of role expectations, leaders are often unsuccessful in adequately enacting the necessary behaviors for their role. Role ambiguity is a particularly noted issue for middle and lower-level leaders in organizations on account of the different way these individuals must behave when interacting with either subordinates or superiors (Bass & Bass, 2008). Even though they have managerial powers over a subset of subordinates, they are also aware that they are still relatively powerless in the context of the organization overall and require their supervisors' approval for many decisions. The ambiguity surrounding the extent of their powers creates conflict because they are asked to exert power and authority over their subordinates, yet are unclear on exactly how free they are to make leadership decisions (Miller & Schull, 1962).

Role ambiguity also arises when leaders feel their status is not sufficiently backed by the organization. In a study of non-commissioned officers and higher ranking officials in the military, Moore and Smith (1953) found the non-commissioned officers actually felt more stress than the officials. This stress originated from officers' perceptions that there was too little distinction between their rank and the ranks of those they were supposed to lead in conjunction with the impression that the higher ranking officials did not fully support the officers' legitimacy as leaders. Thus, even formally appointed leaders can still experience ambiguity in what the nature of their powers truly is depending on how the role is formalized and supported by the upper levels of the organization.

Though role conflict has largely been examined in the context of formal leadership, role conflict may develop in informal leader emergence as well via role ambiguity and disagreement amongst members on who is serving in which role. Unlike formal leadership, informal leader and follower roles are almost entirely constructed through social exchanges of role claiming and granting (DeRue & Ashford, 2010). In this view, leader identities can only truly emerge if the potential leader issues claims for that role to other members who then grant them those leadership claims and issue their own for the follower roles. If at any point this cycle is broken (e.g., a member fails to acknowledge or rejects a leader's claim), leadership construction is incomplete because member perceptions regarding leadership are disconnected from one another. In cases of these disconnects, members may be left with a sense of ambiguity or outright disagreement over who is occupying which roles. Both of the situations would result in role conflict and stress for any member attempting to serve as an informal leader. In contrast, if leader and followers have aligned perceptions of leader emergence, leaders would be relatively confident and clear in what their role is and which members in the group are relying on them for leadership.

From this discussion of role conflict, there are two main takeaways that apply to issues in informal leadership emergence . First, by virtue of being informally appointed by their peers, informal leaders may be more susceptible than formal leaders to role conflict and ambiguity as they attempt to establish their leader position within a group. Second, the degree to which emergent leaders and followers exhibit disconnects in their leadership perceptions may be a significant factor in the amount of role conflict experienced. To better understand this second point, I now offer a set of terms and descriptions utilizing social network terms of the possible types of disconnects a leader-member dyad could experience regarding the leadership relationship between them.

A taxonomy of leadership perceptual disconnects. I borrow from network terminology for this leadership taxonomy because of the ease it affords us when describing dyadic phenomenon. The majority of terminology and methods in traditional psychology research, including leadership research, uses individuals as the basic unit of interest and has been historically dominated by person-centric theories (e.g., internal

psychological processes, reactions to external factors, individual traits) that were tested using individual-level analyses (Dionne et al., 2014; Wasserman & Robins, 2012). In contrast, network theory and terminology was developed to accurately capture interpersonal relationships; accordingly, network theorists uses dyads as the fundamental building block of their models (e.g. Borgatti & Foster, 2003; Brass, Galaskiewicz, Greve, & Tsai, 2004). Relationships between individuals are represented as ties. Ties can be directed (i.e., flowing from one node to another) or undirected (i.e., bidirectionalty) as well as valued (i.e., Likert-type evaluation) or binary. The decisions of which type of ties to use depend on the conceptual fit of these features with the relationship being measured.

Because informal leadership emergence is a dyadic phenomenon determined by perceptions from both leaders and followers, this type of relationship is most appropriate captured by considering two different types of directed ties: leader relationships from the leader- and follower-perspectives. Depending on whether or not these ties coexist between a given pair of members indicates the extent to which there is dyadic agreement on the nature of the relationship between them (i.e., whether perceptual convergence or disconnect in leader roles exists). Though I acknowledge that it may be possible to have valued versus binary assessments of leader and follower roles, for the sake of conceptual clarity and in line with the way leader and follower identity construction has been previously conceived (i.e., DeRue & Ashford, 2010), I consider these leadership ties as binary. In other words, members either perceive themselves and others as taking on leader or follower roles, or they do not: there is no "partial construction" of these identities.

With this framework in mind, I now describe the different possible configurations of overlap or divergence in leadership ties from the leader and follower perspectives. (Insert Table 1 here)

Connected leadership. Connected leadership describes instances of perceptual alignment within a dyad on who is occupying a leader or follower role. Both members agree that one member has taken on a leader role, and the other has taken on a follower role, with all the responsibilities and duties implied by those respective roles. In network terms, connected leadership ties result from the complete overlap of leader- and follower-perceived leadership ties (i.e., Member A indicates reliance on Member B for leadership, and Member B indicates providing leadership to Member A). Connected leadership is not restricted to vertical leadership relationships: shared, connected leadership would describe instances in which both member of a dyad simultaneously indicate providing leadership to and relying on each other for leadership.

Unconnected leadership. Unconnected leadership refers to instances in which there is some sort of perceptual disconnect within a given dyad on who is occupying a leader or follower role. In network terms, this manifests as a leadership tie from one perspective (i.e, from a leader or follower perspective) that is not reciprocated by the other. There are two possible types of unconnected leadership. *Unrequited leadership* denotes dyadic relationships in which one member believes he or she is leader for another member who in turn does not grant that person the leadership role. On the other hand, *unrecognized*

leadership describes dyadic relationships in which one member is relying on someone for leadership who either does not recognize he or she is expected to serve as a leader for that person, or actively refuses to acknowledge the leader role. Though the interpersonal dynamics that may cause unrequited versus unrecognized leadership to emerge, both forms unconnected leadership represent failures of leader identity construction (DeRue & Ashford, 2010).

When considering these forms of connected and unconnected leadership in relation to the extant emergent leadership literature, an important point is that this literature assumes all emergent leadership is connected leadership because leader emergence is almost universally assessed from only the follower's perspective (e.g., Carson et al., 2007; Mayo, Meindl, & Pastor, 2003; Small, 2008). By failing to capture views of group leadership from the leader-perspective, connected versus unrecognized leaders are indistinguishable from one another. Furthermore, the possibility of emergent unrequited leaders is completely obscured. In short, by measuring leader emergence from only one perspective, researchers are incompletely capturing the dyadic leadership phenomenon in a way similar to the single-perspective issues already recognized in the LMX literature (Gooty et al., 2012; Sin et al., 2009). By first exploring possible factors contributing to either connected or unconnected leader emergence, I can begin to uncover what factors create these disconnects and what their potential consequences on leadership-related outcomes may be.

Determining the types of possible antecedents

In the review of leadership research, we saw that researchers have explored four broad types of factors or sources relevant to leadership phenomenon: leader factors (i.e., leader traits and behaviors), follower factors (i.e., follower traits and prototypes), dyadic factors (i.e., LMX), and environmental factors (i.e., characteristics of the task or situation). Though these sources are typically studied independently from one another, in part due to the analytical challenges in combining individual, dyadic, and group level variables (Thomas, Martin, Epitropaki, Guillaume, & Lee, 2013), work using a social relations modeling (Kenny, 1994) to leadership has revealed some unique insights gained by studying all these levels simulatenously (e.g., Kenny & Livi, 2009; Livi, Kenny, Albright, & Pierro, 2008). By partitioning the variance according to the level of the source, we are able to gain a more comprehensive perspective on how individuals, relationships between individuals, and the surrounding environment uniquely impact leadership emergence and effectiveness.

In light of the contributions of the SRM approach, I organize my hypotheses on antecedents of perceptual disconnects in leadership in a similar fashion. I begin with a set of hypotheses considering what types and configurations of individual leader- and follower-related traits predict different categories of leader emergence within dyads. This is akin to the individual level in SRM and is based in the leader and follower trait-based findings in the extant literature. Next, I offer a set of hypotheses concerning the role of other pre-existing relationships between dyad members as influences of leadership

perceptual alignment. This is loosely analogous to relationship variance in SRM that captures idiosyncrasies within specific dyads contributing to leadership perceptions (Livi et al., 2008), such that that non-leadership relationships within a dyad may uniquely contribute to leadership perspectives beyond individual-level factors. Finally, I offer a set of hypotheses examining what features of the network environment (i.e., the group structure in which each dyad is embedded in) may influence leadership perceptions. This final bucket expands on the group variance in SRM by using a higher level of specificity achievable through a social network analysis (SNA) approach. SNA is an ideal method for studying dyadic relationship dynamics within a broader social context (Sparrowe & Liden, 1997) because it is able to analyze how structural configurations can impact member behavior and perceptions, and vice versa. In short, SNA techniques specifically break down how and why the surrounding context influences leadership phenomenon.

After presenting my core antecedent hypotheses, I offer several additional hypotheses regarding possible moderators and consequences of connected versus unconnected leadership emergence within groups.

Antecedents of connected and unconnected leadership emergence

Whether or not leader-follower relationships emerge between any two individuals depends on both dispositional and situational factors. Trait-based theories of leadership have identified a number of specific individual differences linked to leader emergence falling under general categories of dominance and leadership-relevant abilities such as cognitive ability or social skills. These two categories reflect an individual's motivation and ability to lead. Though meta-analytic evidence supports the importance of these individual differences (e.g., Judge, Bono, Ilies, & Gerhardt, 2002), recent SNA-based research suggests that individuals' positions within an broader network also plays a role in determining which members will emerge as leaders (Emery, Calvard, & Pierce, 2013). Thus, a given member's propensity to emerge as a group's leader may depend on both personal and situational characteristics.

This previous literature on leadership emergence focused on individual statuses versus dyadic-level claiming and granting of leadership identities. To differentiate situations in which connected versus unconnected leadership may arise requires three additional considerations of the 1) configurations of dyad member characteristics, 2) other pre-existing relationships within a dyad, and 3) nature of the dyad members' embeddedness within the broader social network. In this section, I present hypotheses for antecedents of connected and unconnected leadership emergence under each of these categories.

Configuration of dyad member characteristics. Because connected leadership requires both the leader and the follower to claim and grant their respective roles, the prospective leader's profile of leader-congruent individual differences gives an incomplete picture of the likelihood of leader emergence. Instead, we must consider the characteristics of both dyad members in comparison to one another to assess whether one

is complementary to the other in terms of ceding (or accepting) a leadership role to (or from) another. Furthermore, because connected leadership requires recognition and response to leader/follower cues, we also need to consider each member's level of social awareness/self-monitoring as part of the equation. If one member lacks the ability to recognize or correctly interpret status claims from another, connected leadership may fail to establish regardless of the other dispositional attributes within the dyad.

To start, I first describe traits associated with leader emergence and then hypothesize which configurations of dyad-member traits will predict connected versus unconnected leadership.

Leader qualities.

Motivation to lead. Motivation to lead (MTL; Chan & Drasgow, 2001) is a construct meant to capture individuals' motivational dispositions that "affect a leader's or leader-to-be's decision to assume leadership training, roles, and responsibilities and that affect his or her intensity of effort at leading and persistence as a leader (p. 482). MTL is a more immediate mediator of the well-established relationship between extraversion and leader emergence (Hong, Catano, Liao, 2011; Judge et al., 2002). It was developed to hone in on the components of dominance and sociability within extraversion that are thought to drive that trait's connection with leadership (Chan & Drasgow, 2001). Since the original scale's development, multiple studies have established a clear connection between levels of MTL and propensity to emerge as a leader within leaderless groups (e.g., Hong et al., 2011; Oh, 2012; Luria & Benson, 2013).

Of the three sources of motivation captured by MTL (affective-identity, social-normative, and non-calculative motivation), affective-identity and social-normative are most relevant to predicting connected and unconnected leadership. In affective-identity motivation, the intrinsic enjoyment of occupying leadership roles drives individuals to seek out those roles (Chan & Drasgow, 2001). Alternatively, individuals driven by social-normative motivation take on leadership roles out of a sense of obligation: they feel it is their duty to accept leadership responsibilities if others ask them to do so. Regardless of the different motivations for assuming leadership position, both high affective-identity and high affective-identity individuals gravitate towards leadership positions.

Dominance. Meta-analytic evidence supports extraversion as the positive relationship between extraversion and leader emergence (Judge et al., 2002). Though socialization and dominance are both components of extraversion, Judge and colleagues (2002) note that the dominance aspect is thought to drive this relationship. Indeed, a recent meta-analysis found dominance-related constructs exhibit incremental validity over and above broader measures of extraversion for predictor leader outcomes (Do & Minbashian, 2014). When individuals are predisposed to desire exerting influence over others to take control of a situation, their ensuing direction-setting and influence behaviors naturally position them as group leaders.

Social skills. In addition to the above traits influencing individuals' desire and propensity to seek out leadership positions, another important component determining successful leader emergence is whether individuals have the *ability* to carry out their leadership intentions. Social skills have long been recognized as a crucial aspect of a successful leader's skillset (e.g., Bray, Campbell, & Grant, 1974; Connelly et al., 2000; Mumford, O'Connor, Clifton, Connelly, & Zaccaro, 1993). In order to successful lead others, a leader must be able to recognize the nature of interpersonal relationships with others and manage those relationships to foster followers' productivity. Similarly, the process of leader emergence requires a successful negotiation of leader and follower roles such that the follower accepts the leader's dominant position and is willing to take direction from the leader (DeRue & Ashford, 2010). Social skills are necessary in this process in that leaders must be sensitive to the needs and motives of the potential followers and able to use that knowledge to help control the social situation between them. If these skills are lacking, the successful establishment of the leader identity is unlikely.

Self-monitoring. Individuals high in self-monitoring are able to adapt their behavior to please others or take advantage of a particular situation at hand (Snyder, 1979; Snyder & Gangestead, 1986). High self-monitors are sometimes labeled as "chameleons" due to their ability to tailor the way they are perceived based on situational demands (Mehra & Schenkel, 2008; Snyder, 1979). In the context of leadership, self-monitoring is important because effective leaders must change their particular style dependent on the shifting needs of the task or specific followers (e.g., Fiedler, 1964; Stogdill, 1948). Thus, similar to social skills, a sufficient level of self-monitoring is necessary for individuals who wish to emerge as leaders. Previous empirical findings support a positive relationship between levels of self-monitoring and propensity to emerge as a leader (Dobbins, Long, Dedrick, & Clemons 1990; Zaccaro, Foti, & Kenny, 1991).

Consideration of the follower. The above discussion of leader traits only speaks to half of the leadership emergence picture: individuals can only emerge as leaders if their followers accept them as leaders. Having reviewed several traits traditionally associated with leader emergence, I now consider how different configurations of them within a dyadic context may give rise to either connected, unrequited, or unrecognized leadership.

Leader characteristics in the dyadic context. The individual differences I discussed in the previous section can be roughly broken down into categories of motivational and ability characteristics that are associated with leader emergence. When considering connected and unconnected leader emergence, the primary differentiation between the two types is whether or not leaders and follower both recognize and accept the emergent roles of one another. Doing so requires these individuals to possess a sufficiently high degree of social acuity to correctly make identity claims and interpret the claims of the other during interpersonal exchanges. In other words, although

dominance and motivation to lead are necessary for individuals to seek leadership roles and thus emerge as leaders, those traits alone are not sufficient to connected leader emergence. When individuals have the desire to lead but lack the social skills to make viable leadership claims that will be granted by others, fully connected leadership relationships will fail to materialize. Only when motivation or disposition to lead and the social ability to lead are combined can connected leadership emerge.

Furthermore, whether or not connected leadership emerges at the dyadic level depends on the prospective follower's individual differences as well. For example, if both members of a dyad are predisposed towards assuming leader positions, there may be resistance from each of them in accepting the other's leadership claims since they both want to be the leader. Therefore, one member may fully recognize that the other is making a leadership claim, yet because that member wants to be the leader as well, the initial leadership claim will be rejected. One except to the above situation, however, is if both dyad members are also highly agreeable and willing to consider sharing the leadership role. In such cases, a connected form of shared leadership (e.g., Carson et al., 2007) may instead develop in which both members simultaneous accept leader and follower identities.

Outside of this shared leadership context, however, ideal follower profiles are those that pair a low motivation to lead with a predisposition towards wanting to getting along in order to get the job done. Thus, one profile for an ideal follower is one who is both low in motivation to lead and high in a desire to get along with others. However, individuals may also be receptive of leadership claims even if they are not driven by needs to get along. In the team setting, an additional driver could be a strong desire to successfully complete the assigned team task (i.e., conscientious). If individuals want the team to be successful but they themselves are not interested in leadership roles, then they will be more likely to grant claims of others for leadership to ensure the team's task moves forward. Taken together, I hypothesize the following:

H1a: Connected leadership is more likely than chance to emerge in dyads with a leader high in both motivation to lead and social acuity and a follower high in agreeableness yet low in motivation to lead

H1b: Connected leadership is more likely than chance to emerge in dyads with a leader high in both motivation to lead and social acuity and a follower high in conscientiousness yet low in motivation to lead

H2: Connected shared leadership is more likely than chance to emerge in dyads with both member high in motivation to lead, social skills, *and* agreeableness

Furthermore, because it is more difficult for potential leaders (i.e., individuals with attributes predisposing them towards leadership) to issue successful leadership claims when they lack the social skills or acuity to navigate interpersonal interactions, it follows that unconnected leadership is more likely than chance to emerge in any situation

other than when the potential follower is ideally suited to be a follower. More specifically:

H3a: Unconnected leadership is more likely than chance to emerge in dyads with a leader high in motivation to lead and low in social acuity and a follower low in motivation to lead and low in agreeableness

H3b: Unconnected leadership is more likely than chance to emerge in dyads with a leader high in motivation to lead and low in social acuity and a follower low in motivation to lead and low in conscientiousness

H3c: Unconnected leadership is more likely than chance to emerge in dyads with a leader high in motivation to lead and low in social acuity and a follower high in motivation to lead and low in agreeableness

H3d: Unconnected leadership is more likely than chance to emerge in dyads with a leader high in motivation to lead and low in social acuity and a follower high in motivation to lead and low in conscientiousness

For these hypotheses, I am using motivation to lead and social boldness as indicators of leader motivation. While motivation to lead is perhaps a more proximal antecedent to leader emergence, the broader trait of social boldness is also closely related to emergence. For social acuity, I am using a social skills inventory and self-monitoring to capture both the awareness of the social situation and the ability to modify behavior accordingly.

Relationships within the dyad. In addition to dyad member characteristics, other types of pre-existing connections between dyad members are likely to impact the probability of perceptual disconnects leader emergence. Cognitive dissonance theory (Festinger, 1962) states that people are constantly striving for internal consistency in the beliefs, ideas, and values they hold about others and the world at large. When people notice inconsistencies (i.e., dissonance) across these thoughts, they are motivated to find ways to reconcile them via rationalization or revisions of the ones not in line with the others. Principles of cognitive dissonance play a role in leadership emergence within a dyad with pre-existing positive or negative relationships (i.e., ties) between the members because those relationships influence how one member's leadership claim is perceived by the other. If the members are connected via positively-valenced ties, such as trust or friendship, a subsequent leadership claim is likely to be accepted by the follower because accepting the request from a trusted friend is more in line with the follower's pre-existing perceptions of that person that rejecting that claim. Similarly, if there has been previous conflict between members, they may be less likely to be receptive to claims that one would otherwise predict because of the dissonance created by agreeing to follow someone who one has previously disagreed with. In other words, holding everything else constant, pre-existing ties between dyad members serve as a distinct source of leadership perceptual variance.

I expect that the influence of these ties will serve as a distinct source of leadership perceptual variance, over and above what is accounted for by individual differences. Though there may be a possibility for an interaction between this source and the contribution of the dyad's trait configurations, I choose to handle the different sources of variance in an additive manner because I am interested in the unique contribution of each. This decision aligns with the way Kenny and colleagues handle multiple levels of social influence in SRM (Kenny, 1994).

H4: Connected leadership is more likely than chance in dyads with friendship ties

H5: Unconnected leadership (unrequited and unrecognized) is more likely than chance in dyads with adversarial ties

Dyad as embedded in the broader social context. The third type of consideration is the way the members of the dyad are connected within the larger network. Leadership researchers have long noted that leaders do not exist in a vacuum: the way in which leaders and their followers are connected to others within the group or organization can influence leadership perceptions and effectiveness within a given leader-member dyad (Balkundi & Kilduff, 2006; Boal & Hooijberg, 2000; Sparrowe & Liden, 2005; Yukl, 2012). While a few researchers have used social network methods to provide empirical evidence in support of this embeddedness influences (for an example of how network position impacts LMX outcomes, see Sparrow & Liden, 2005), this factor is more commonly ignored or examined in a relatively coarse manner in the literature. By considering the embeddedness of leader-follower dyads within the social context of the broader network, I attempt to more explicitly test how the leadership perceptions of team members other than the focal dyad members may affect leadership perceptions within the dyad.

According to social comparison theory (Festinger, 1954), people's perceptions of others is often influenced by how their peers judge those others. All other factors being equal, we are more likely to view member A as a leader if we know our friends rely on that person as a leader. Thus, for a given dyad of member A and B, if member B is connected to member C and member C has nominated A as a leader, there is a greater chance that member B will rate A as a leader than if A had received no other leader nominations. This type of transitive relationship is also suggested by balance theory (Heider, 1958). The central premise of balance theory is that the pattern of an individual's positive and negative relationships with others must be balanced such that there are no inconsistencies in their patterns. In other words, if Members A and B both have positive relationships with Member C, it would be more incongruous for Members A and B to have a negative versus a positive relationship, since they both relate positively to a common other.

Balance theory has more commonly been used to justify triadic phenomenon such as the one just described (e.g., Tse ,Lam, Lawrence, & Huang, 2013) than transitive relationships. However, balance theory can easily apply to transitive relationship by

virtue of the fact that people are very often aware of the patterns of surrounding social ties (Freeman, Freeman, & Michaelson, 1988; Heider, 1958), and this extends to transitive relationships just as easily as it does for triadic. When Member A is considering whether or not to perceive Member C as a leader, this perception will be influenced by how other members connected positively to Member A perceive Member C. Therefore, if Member A view Member B as a leader, and Member B views Member C as a leader, it follows that it is more congruous for Member A to perceive C as a leader than as anything else.

Consideration of this embeddedness addresses the calls from researchers to stop measuring leadership as though it exists in isolation (e.g., Contractor, DeChurch, Carson, Carter, & Keegan, 2012; Yukl, 2012). Leader perceptions are influenced not just by proximal factors (e.g., individual differences, leader-follower exchanges) because people's interactions with each other are shaped by the influences of 3rd parties. While the phenomenon of social comparison theory in this emergent leadership context is relatively obvious, the primary interest here is identifying whether this social influence contributes meaningful variance in leadership perceptual disconnects over and above the more proximal trait configuration- and pre-existing connection- based influencers.

H6a: Holding all else equal, connected leadership is more likely to emerge within a dyad if the leader has connected leadership relationships with one or more others in the group.

The extent to which connected leadership emergence at the dyadic level is influenced by leadership perceptions of other group members likely depends in part on the group's cohesion levels. In Festinger's seminal 1950 paper on the nature of group influences on member opinions, he proposed that there is a direct relationship between the cohesion of a group and the pressure that group members feel to make sure all members share the same opinions. When applied to leadership perceptions, this suggests that one dyad member's perceptions of the other member's leadership status is more influenced by the perceptions of the other group members when the group is close-knit. The less connected group members are overall, the less the opinions of others will influence the leadership perceptions established within a given dyad.

H6b: The extent to which connected leadership emergence between dyad members is influenced by external group member perceptions is moderated by the group's cohesion. The higher the group's cohesion, the stronger the influence of the external perceptions on the likelihood of connected leader emergence within a dyad.

Consequences of connected versus unconnected leadership

According to the basis tenants of leader identity construction put forth by DeRue and Ashford (2010), one consequence of failed identity construction is decreased leadership effectiveness. When leader and follower identities are not agreed upon and therefore not fully constructed, members have less role clarity on who is expected to fulfill which roles within the team. Therefore, not only will unconnected leaders be less

likely to engage in the range of leadership behaviors required for successful team functioning (Morgeson et al., 2009), the unconnected followers will similarly be less clear in their responsibilities for completing the assigned tasks. This ambiguity can lead to both decreased member confidence that the team will be successful as well as a desire to work on that team in the future. To the extent that the degree of successful leader identity within a team is captured by the proportion of connected to unconnected leadership ties within the team's network, I hypothesize the following:

H7: Higher proportions of connected versus unconnected emergent leadership within a team is positively related to perceptions of the team's efficacy

H8: Higher proportions of connected versus unconnected emergent leadership within a team is positively related to future team viability

Method

Participants

Approximately 400 undergraduates from two American universities and 80 graduate students from a French business school will be randomly assigned into workgroups tasked with developing an interdisciplinary, innovative solution to an environmental issue. While students work on this project and respond to related surveys throughout the project as part of their course requirements, they have the opportunity to deny researchers access to their data. Half of the workgroups, the Science groups, will be comprised of an equal mix of undergraduate psychology and ecology students, while the other workgroups, the Translational groups, consist of undergraduate psychology and graduate business students. Because the students are further subdivided within workgroups into component teams based on which discipline they belong to (i.e., which class they are in), and each component team is responsible for specific deliverables independent from the joint group deliverable, these groups fit the definition of multiteam systems (Mathieu, Marks, & Zaccaro, 2001). Each Science and Translational group have to submit a final group deliverable after 6 weeks of the group being formed. Though there will be a brief portion of time in which pairs of Science and Translational groups have the opportunity to provide feedback on each other's work, we treat the groups as distinct in the present study. This results in a total sample of 60 workgroups that range between 6-10 students.

Procedure

Once participants are assigned their workgroup, each group member is given access to videoconferencing, project management site, and email accounts to be used to communicate with their group throughout the project. Members are required to have at least one virtual meeting at the beginning of the project in order to complete a team charter task, but are otherwise free to interact however they choose (e.g., over email, via videoconference, in person, etc.). The project task requires workgroup members to share

knowledge and work interdependently in order to produce one joint team deliverable that will count towards each member's class grade.

Participants will complete surveys at three points throughout the project. Individual differences, demographics, and initial friendship networks will be captured at the beginning of the project (T0) before participants receive their group assignments. In the second and third surveys (T1 and T2, respectively), we will assess the development of a number of expressive and instrumental networks in addition to psychometric assessment of individual- and team-level emergent states. T1 will be administered approximately three weeks after the group begins work on the project, and T2 will be administered immediately following the submission of the final group deliverable (approximately three weeks after T1).

Data Collection/Measures

Individual difference measures. Prior to the start of group work, participants will complete the T0 survey that contains a number of individual differences and demographic variables. I report here only the subset of variables that pertain directly to my study's hypotheses. These individual differences fall broadly under categories assessing dominance, social acuity, and followership traits.

Dominance. Dominance will be measured via social boldness and motivation to lead. These constructs tap into related, yet distinct elements of dominance expected to relate with leadership emergence. Social boldness, a facet of extraversion expected to drive the relationship between extraversion and leader emergence (Judge et al., 2002), will be measured using the 10- IPIP scale (Goldberg et al., 2006). IPIP scales are widely used, publically available, reliable scales meant to facilitate the study of personality. Participants will use a 5-point Likert scale to indicate the extent to which each item accurately describes them (1=very inaccurate, 5=very accurate). Sample items include "Am good at making impromptu speeches" and "Have a strong personality". Motivation to lead will be measured using Chan and Drasgow's (2001) 6-item scale for which participants will use a 5-point Likert scale (1=strong disagree, 5= strongly agree) to respond to a prompt asking them to indicate how well each statement in the scale describes themselves. A sample item is "I usually want to be the leader in the groups that I work in".

Followership traits. Though the low end of the above dominance traits are also characteristic of ideal followers, my hypotheses further suggest agreeableness and conscientiousness in followers are important predictors of connected leadership emergence. Agreeableness and conscientiousness will be measured using 10-item IPIP scales (Goldberg et al., 2006) in which participants respond to the same prompt with the same 5-point Likert scale response options as is used for social boldness. Sample items for these scales are "Have a good word for everyone" and "Am always prepared", respectively.

Social acuity. Social acuity will be assessed using measures of social skills and self-monitoring. We will using abridged versions of Riggio's (1984) Social Skills Inventory (SSI) social skill facets of emotional sensitivity (ES) and social control (SC), as developed by Oldmeadow, Quinn and Kowert (2013). Participants will respond to each 4-item scale using a 5-point Likert scale to indicate the extent to which the statements relate to them (1=not at all like me, 5= exactly like me). Sample items include "I can accurately tell what a person's character is upon first meeting him or her" (ES) and "I am usually very good at leading group discussions" (SC). Self-monitoring will be assessed using Lennox and Wolfe's (1984) 8-item scale. Participants will respond to each item using the same item stem and response options as for the SSI. A sample item is "Once I know what the situation calls for, it's easy for me to regulate my actions accordingly".

Network measures. Sociometric items will be administered in T1 and T2 in order to measure the emergent networks within project groups. Unlike traditional measures, sociometric measures typically are single items used to establish ties between members (i.e., nodes) by asking participants which members of their network they feel a given item applies to.

***Leadership emergence*.** Leadership emergence will be assessed from both leader and follow perspectives in order to construct connected and unconnected leadership networks as discussed earlier in the paper. For the follower perspective, which is the only perspective commonly used in leadership emergence research (e.g., Carson et al., 2007; Small & Rentsch, 2008), we will use the item "Who you rely on for leadership?" This is a modified version of the measure used by Carson and colleagues ("To what degree does your team rely on this individual for leadership""; 2007) that shifts the referent from the team to the dyadic level and also more clearly delineates leaders from non-leaders due to the binary measurement. We assess the leader perspective using a complementary item,"Who do you provide leadership to?".

Connected leadership. Connected leadership requires that both members of a dyad agree on the leader and follower roles between them. Therefore, each tie in a connected leadership network would represent a dyadic relationship in which the member who believes he or she is leading the other is also recognize by the other member as a leader. To create this tie from the leader- and follower-leadership ties described above, we will transpose the leader-perspective sociometric data matrix (so that ties are flowing into the leader, not the follower) and identify the ties that overlap with the follower-perspective matrix. In other words, if Member A indicates reliance on Member B for leadership on the follower-perspective item and Member B indicates providing leadership to Member A on the leader-perspective item, we will construct a connected leadership tie between Member A and B.

Unconnected leadership. Unconnected leadership describes ties in which a leadership relationship between two members is only perceived by one of the members. If only the leader perceives the relationship, the leadership is referred to as unrequited; if only the follower perceives the leadership relationship, leadership is referred to as

unrecognized. Constructing either type of unconnected leadership network proceeds very similarly as for connected leadership with the exception that the ties are created from instances of non-overlaps. Unrequited leadership networks are created using all leader-perspective ties that are not overlapping with (transposed) follower-perspective ties, with the opposite being true for unrecognized leadership networks. Because my hypotheses involve both types of unconnected leadership, I will create a complete unconnected leadership network by combining the unrequited and unrecognized networks.

Non-leadership networks. To test hypotheses regarding the effect of non-leadership positively or negatively valenced relationships on emergent leadership, friendship and hindrance networks will be measured at T1 and T2. Like leadership networks, these networks are measured using binary scales. Friendship will be assessed by asking "Who do you consider to be a friend?" and dislike will be assessed by asking "Who do you find difficult to work with?". For all sociometric items, participants are presented with their team roster and asked to select as many people from that list as they choose to.

Outcome measures. I will measure team process and outcome efficacy at both T1 and T2 for proximal measures of leadership outcomes. I will use the 3-item short form of Collins and Parker (2009) scale for process efficacy that asks members to rate their confidence in their group that they would be able to do various tasks using a 10-point scale (0=not at all confident, 10=confident). A sample item is "Adapt to changing situations/demands". Outcome efficacy will be measured by asking participants how confident they are that their team can achieve a grade of A, B, C, and D. They will rate their confidence for each grade using the same 10-point scale as for process efficacy.

Perceptions of team viability and satisfaction with the team will also be administered at T2. The Resick, Dickson, and Mitchelson (2010) 4-item scale requires team members to describe their perceptions of their group using a 5-point Likert scale of agreement (1=strongly disagree, 5=strongly agree) with items pertaining to past enjoyment of the team and future willingness to work as part of that group. Sample items include "I really enjoyed being part of this group" and "I wouldn't hesitate to participate on another task with the same group".

Team cohesion as moderator. Team cohesion will be assessed using a 4-item measure (Powers, 2012). Participants must describe their perceptions of their group using a 5-point Likert scale of agreement (1=strongly disagree, 5=strongly agree). A sample item is "Our task group is unified in its task focus".

Proposed Data Analysis Plan

This study's hypotheses can be broken down into four sets. The first three examine antecedents of connected and unconnected leader emergence including dyadic trait configurations (H1-H3), pre-existing positive and negative relationships between

dyad members (H4-H5), and structural consideration within the larger group network (H6a-H6b). Though the antecedents come from different sources (i.e., characteristics of individuals, dyadic relationships, and network structure), they all answer a dyadic-level question: whether or not a tie will emerge between two individuals. I will use exponential random graph modeling (ERGM) to test these hypotheses because of its ability to simultaneously consider all three of these sources in a single model. The fourth hypothesis set (H7-H8) tests for group-level consequences of the different emergent leadership types on group outcomes. This set will be testing using hierarchical linear modeling.

In the following section, I provide more detail on my proposed analysis methods for each set.

Planned Analyses: ERGMs and Hypothesis Sets One Through Four

Because ERGM is a relatively recently developed network technique that many readers may be unfamiliar with, I will briefly provide a conceptual overview of the method to explain its suitability for my research questions.

ERGMs: a way to study the evolution of networks. Put simply, ERGMs are "tie-based models for understanding how and why social network ties arise" (Robins & Lusher, 2013, p.9). They allow researchers to simultaneously examine both endogenous and exogenous factors contributing to the emergence of many kinds of relationships between members in a network. Endogenous factors are sometimes referred to as structural effects because they are based on principles of network self-organization that are independent from actor attributes or external, contextual influences. Network self-organization theories suggest that certain patterns of ties give rise to other patterns of ties, with much of the rationale for these different structural patterns derived from basic social theories of behavior relevant to the type of tie in question. For example, the self-organizing principle of closure describes the tendency of a third tie to form between two actors who are both connected to a third person (Davis, 1970). In directed networks, such as leadership, triadic closure can also be thought of as transitivity (Lusher & Robins, 2013). Exogenous factors, on the other hand, include attributes of the network members as well as the existence of other ties distinct from the network of interest, which are also known as dyadic covariates. In our leadership context, examples of dyadic covariates would be friendship and adversarial ties: the presence (or absence) of these ties serve as types of exogenous factors potentially influencing leadership tie formation.

ERGMs ability to simultaneously analyze the contribution of endogenous and exogenous factors to tie emergence is crucial because it allows researchers to completely parse apart the relative contribution of each. If one tries to predict network emergence from only actor attributes (i.e., individual differences of network members) and omits endogenous factors of self-organization principles, one may inadvertently overestimate the contribution of actor attributes in creating ties between members (Lusher & Robins, 2013). A similar issue would arise if one tried to consider self-organization principles to

the exclusion of exogenous factors. Thus, only by including both endogenous and exogenous variables within a single model can a true understanding of the phenomenon emerge.

I will use the statnet package in R to conduct the ERGM analyses. With this package, I am able to pick the specific exogenous and endogenous parameters of interest to include in the ERGMs. Examples of possible exogenous parameters include levels of node attributes, matches between node attributes, and the existence of other ties. There are also a large number of endogenous parameters to include, each of which represent specific structural patterns that may or may not be relevant to a network depending on the content of its ties. In the next section, I provide some additional detail on what parameters I will be using to test specific hypotheses.

Hypothesis set one: dyadic configuration of traits as predictors. To test H1-H3, I will need to use exogenous parameters that capture the dyadic configuration of leader-follower trait profiles as described in my hypotheses. To do this, I plan to create composite variables from the individual difference scores collected in T0 to represent the various proposed leader and follower profiles. For example, I would combine and individual's score for motivation to lead and self-monitoring to create one leader composite score such that a high composite score indicated a profile hypothesized as necessary (but, of course, not sufficient) for predicting connected leadership (i.e., high in both characteristics). The same approach would be applied to make composite scores for all remaining leader profiles and all follower profiles. These composite scores would form the basis of the actor attributes used in the ERGMs. In order to capture the dyadic configural aspect of the hypotheses, I will use a parameter in my models that compares relative levels of the specified node attributes of each dyad. In other words, this parameter will test whether or not the levels of the leader and follower composite profiles of a given dyad jointly predict the emergence of a connected (or unconnected) leadership tie.

Hypothesis set two: the dyadic context. Hypothesis set two includes H4 and H5, which are the hypotheses about the impact of friendship and adversarial ties on the likelihood of connected and unconnected leadership emergence. As noted earlier, ties of different content than that of the focal network of interest (i.e., leadership) are considered a type of dyadic context factor, which is a subset of all possible exogenous factors influencing network formation. Including these dyadic context factors in ERGMs is a very straightforward process: to do so, I will include a parameter into the model representing whether or not a friendship (H4) or adversarial (H5) tie is present alongside the leadership tie

Hypothesis set three: structural considerations. Hypotheses 6a and b concern the effect of member relationships outside of a dyad on influence within-dyad leadership perceptions. In network terms, the central premise of this notion is that the way members are connected of others in the group with in part determine whether or not other connections will emerge. Thus, this hypothesis set represents the endogenous factors

related to leadership emergence. To test the contribution of social influence as suggested by social comparison and balance theories, I will include several structural parameters such as triadic closure (i.e., triangles formed by directed ties) that represent the type of influence. There are also possible structural parameters that could be used as a proxy of a network's cohesion to test H6b, but I am concurrently exploring possibilities of incorporating the psychometric measurement of team cohesion into these analyses.

Hypothesis sets one through three: the DV. For all ERGM analyses (i.e., for Hypothesis Sets 1-3), I will run two sets of models: one with connected leadership ties as the DV, and one with unconnected leadership ties as the DV. I will construct these networks using the follower- and leader-perspective leadership networks in the manner I described previously in the Methods section. . Because I am collecting data across two time points, I will have to opportunity to run both cross-sectional and lagged analysis in which I use "other tie" data from T1 and leadership network data from T2.

Planned Analyses: Hypothesis Set Four

Hypotheses 7 and 8 suggest that the proportion of connected versus unconnected leadership within a group impacts proximal group outcomes such as collective efficacy, satisfaction with the team, and perceptions of future team viability. To create a variable that reflects the relative proportion of connected to unconnected leadership within a group, I will compute the densities of the connected and unconnected leadership networks. The ratio of those two densities, which effectively controls for group size, can then be used in comparisons to group-level aggregated averages of process and outcome efficacies as well as perceptions of team viability and satisfaction with group experience. Before aggregating individual-level measures to the group level, I will assess r_{wg}, ICC(1) and (2) to assure sufficient justification for aggregation. While the ideal analysis may be regressing T2 outcome variables on T1 leadership ratios, cross-sectional analyses can be done as well to test what relationships hold across time periods.

References

Balkundi, P., & Kilduff, M. (2006). The ties that lead: A social network approach to leadership. *The Leadership Quarterly, 17,* 419–439.

Bass, B. M., & Bass, R. (2008). *The Bass handbook of leadership: Theory, research and managerial implications*. New York, NY: Free Press.

Boal, K. B., & Hooijberg, R. (2001). Strategic leadership research: Moving on.*The Leadership Quarterly*, *11*(4), 515-549.

Borgatti, S. P., & Foster, P. (2003). The network paradigm in organizational research: A review and typology. *Journal of Management, 29,* 991–1013.

Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal, 47*, 795– 817.

Bray, D. W., Campbell, R. J., & Grant, D. L. (1974). *Formative years in business.* Wiley: New York.

Carlyle, T. (1841/1907). *Heroes and hero worship.* Boston: Adams.

Carson, J. B., Tesluk, P. E.,& Marrone, J. A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *Academy of Management Journal, 50,* 1217–1234.

Case, C.M. (1933). Leadership and conjecture. *Sociology and Social Research, 17,* 510-513.

Chan, K., & Drasgow, F. (2001). Toward a theory of individual differences and leadership: Understanding the motivation to lead. *Journal of Applied Psychology, 86,* 481-498.

Cohen, S.G. (1991). *Teams and teamwork: Future directions.* Los Angeles, CA: Center for Effective Organizations, University of Southern California.

Collins, C.G., & Parker, S.K. (2009). Team capability beliefs over time: Distinguishing between team potency, team outcome efficacy, and team process efficacy. *Journal of Occupational and Organizational Psychology, 10,* 1-22.

Connelly, M. S., Gilbert, J. A., Zaccaro, S. J., Threlfall, K., Marks, M. A., & Mumford, M. D. (2000). Exploring the relationship of leadership skills and knowledge to leader performance. *The Leadership Quarterly*, *11*(*1*), 65-86.

Contractor, N. S., DeChurch, L. A., Carson, J., Carter, D. R., & Keegan, B. (2012). The topology of collective leadership. *The Leadership Quarterly, 23,* 994–1011.

D'Innocenzo, L., Mathieu, J.E., & Kukenberger, M.R. (in press) A meta-analysis of different forms of shared leadership-team performance relations. *Journal of Management.*

Dansereau, F. (1995). A dyadic approach to leadership: Creating and nurturing this approach under fire. *Leadership Quarterly, 6,* 479-490.

Danseraeu, F., Jr., Graen, G., & Haga, W.J. (1975). A vertical dyad linkage approach to leadership within formal organizations: A longitudinal investigation of the role making process. *Organizational Behavior and Human Performance,* 13, 46-78.

Danseraeu, F., Yammarino, F.J., & Markham, S.E. (1995). Leadership: The multiple level approaches. *Leadership Quarterly, 6,* 251-263.

Day, D. V., Gronn, P., & Salas, E. (2004). Leadership capacity in teams. *The Leadership Quarterly*, *15*(6), 857-880.

Day, D. V., Gronn, P., & Salas, E. (2006). Leadership in team-based organizations: On the threshold of a new era. *The Leadership Quarterly*, *17*(3), 211-216.

DeRue, D. S., Ashford, S. J., & Cotton, N. C. 2009. Assuming the mantle: Unpacking the process by which individuals internalize a leader identity. In L. M. Roberts & J. E. Dutton (Eds.), *Exploring positive identities and organizations: Building a theoretical and research foundation:* 213–232. New York: Taylor & Francis.

DeRue, D. S., & Ashford, S. J. (2010). Who will lead and who will follow? A social process of leadership identity construction in organizations. *The Academy of Management Review, 35,* 627–647.

Dinh, J. E., & Lord, R. G. (2013, April). *Implicit leadership theories and the dynamics of leadership perception.* Paper presented at the 28th Annual Conference of the Society for Industrial and Organizational Psychology, Houston, TX.

Dinh, J. E., Lord, R. G., & Hoffman, E. L. (2014). Leadership perception and information processing: Influences of symbolic, connectionist, emotion, and embodied architectures. In D. V. Day (Ed.), *The Oxford handbook of leadership and organizations*. New York, NY: Oxford University Press.

Dionne, S. D., Gupta, A., Sotak, K. L., Shirreffs, K. A., Serban, A., Hao, C., ... & Yammarino, F. J. (2014). A 25-year perspective on levels of analysis in leadership research. *The Leadership Quarterly, 25(1),* 6-35.

Dirks, K. T., & Ferrin, D. L. (2002). Trust in leadership: meta-analytic findings and implications for research and practice. *Journal of Applied Psychology*,*87*(4), 611-628.

Do, M. H., & Minbashian, A. (2014). A meta-analytic examination of the effects of the agentic and affiliative aspects of extraversion on leadership outcomes. *The Leadership Quarterly*.

Dobbins, G. H., Long, W. S., Dedrick, E. J., & Clemons, T. C. (1990). The role of self-monitoring and gender on leader emergence: A laboratory and field study.*Journal of Management*, *16*(3), 609-618.

Eden, D., & Leviatan, U. (1975). Implicit leadership theory as a determinant of the factor structure underlying supervisory behavior scales. *Journal of Applied Psychology*, *60*(*6),* 736-741.

Emery, C., Calvard, T., & Pierce, M. (2013). Leadership as an emergent group process: A social network study of personality and leadership. *Group Processes Intergroup Relations, 16(1),* 28-45.

Epitropaki, O., & Martin, R. (2004). Implicit leadership theories in applied settings: factor structure, generalizability, and stability over time. *Journal of Applied Psychology*, *89(2),* 293-310.

Erdogan, B., & Liden, R. C. (2002). Social exchanges in the workplace.*Leadership*, 65-114.

Evans, M. G. (1970). The effects of supervisory behavior on the path-goal relationship. *Organizational Behavior and Human Performance*, *5(3),* 277-298.

Festinger, L. (1950). Informal social communication. *Psychological Review*, *57*(5), 271-282.

Festinger, L. (1954). A theory of social comparison processes. *Human relations*, *7*(2), 117-140.

Festinger, L. (1962). *A theory of cognitive dissonance* (Vol. 2). Stanford University Press.

Fiedler, F. (1964). A contingency model of leadership effectiveness. *Advances in Experimental Social Psychology*, *1*, 149-190.

Fiedler, F. (1968). Personality and situational determinants of leadership effectiveness. In D. Cartwright & A. Zander (Eds.), *Group Dynamics.* New York: Harper & Row.

Foti, R. J., & Hauenstein, N. M. A. (2007). Pattern and variable approaches in leadership emergence and effectiveness. *Journal of Applied Psychology , 92,* 347–355.

Foti, R. J., & Lord, R. G. (1987). Prototypes and scripts: The effects of alternative methods of processing information on rating accuracy. *Organizational Behavior and Human Decision Processes, 39(3),* 318–340.

Freeman, L. C., Freeman, S. C., & Michaelson, A. G. (1988). On human social intelligence. *Journal of Social and Biological Structures*, *11(4),* 415-425.

Friedrich, T. L., Vessey, W. B., Schuelke, M. J., Ruark, G. A., & Mumford, M. D. (2009). A framework for understanding collective leadership: The selective utilization of leader and team expertise within networks. *The Leadership Quarterly, 20,* 933–958.

Galton, F. (1869). *Hereditary genius*. Macmillan and Company.

Gerstner, C. R., & Day, D. V. (1997). Meta-Analytic review of leader–member exchange theory: Correlates and construct issues. *Journal of applied psychology*, *82*(6), 827-844.

Goffman, E. 1959. *The presentation of self in everyday life.* Garden City, NY: Doubleday.

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. C. (2006). The International Personality Item Pool and the future of public-domain personality measures. *Journal of Research in Personality, 40*, 84-96.

Gooty, J., Serban, A., Thomas, J.S., Gavin, M.B., & Yammarino, F.J. (2012) Use and misuse of levels of analysis in leadership research: an illustrative review of leader-member exchange. *The Leadership Quarterly, 23,* 1080-1103.

Graen, G. (1976). Role making processes within complex organizations. In M.D. Dunnette (ed.), *Handbook of industrial and organizational psychology.* Chicago: Rand McNally.

Graen, G. B., & Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development of leader–member exchange (lmx) theory of leadership over 25 years: Applying a multi-level multi-domain perspective. *Leadership Quarterly, 6*, 219– 247.

Heider, F. (1958). *The psychology of interpersonal relations.*

Henderson, D. J., Wayne, S. J., Shore, L. M., Bommer, W. H., & Tetrick, L. E. (2008). Leader–member exchange, differentiation, and psychological contract fulfillment: A multilevel examination. *Journal of Applied Psychology,* 93, 1208–1219.

Heslin, P. A., & Latham, G. P. (2004). The effect of upward feedback on managerial behavior. *Applied Psychology*, *53(1),* 23-37.

Hollander, E.P. (1961). Emergent leadership and social influence. In L. Petrullo & B.M. Bass (eds.), *Leadership and interpersonal behaviors.* New York: Holt, Rinehardt & Winston.

Hollander, E.P. (1992). The essential interdependence of leadership and followership. *Current Directions in Psychological Science, 1(2),* 71-75.

Hollander, E. P., & Julian, J. W. (1970). Studies in leader legitimacy, influence, and innovation. *Advances in Experimental Social Psychology*, *5*, 33-69.

Hook, S. (1943). *The hero in history.* New York: John Day.

Hong, Y., Catano, V. M., & Liao, H. (2011). Leader emergence: the role of emotional intelligence and motivation to lead. *Leadership & Organization Development Journal*, *32*(4), 320-343.

House, R. J. (1971). A path goal theory of leader effectiveness. *Administrative Science Quarterly*, 321-339.

Judge, T. A., Bono, J. E., Ilies, R., & Gerhardt, M. W. (2002). Personality and leadership: A qualitative and quantitative review. *Journal of Applied Psychology , 87(4),* 765–780.

Katzenbach, J. R., & Smith, D. K. (1993). *The discipline of teams* (pp. 111-120). Harvard Business Press.

Kahn, R. L., Wolfe, D. M., Quinn, R. P., Shoek, J. D., & Rosenthal, R. A. (1964). *Organizational stress: Studies in role conflict and ambiguity.* New York: Wiley.

Kenny, D. A. (1994). Interpersonal perception. A social relations analysis. New York: The Guilford Press.

Kenny, D.A. & Stefano Livi, S.(2009). A componential analysis of leadership using the social relations model, in Francis J. Yammarino, Fred Dansereau (ed.) *Multi-Level*

Issues in Organizational Behavior and Leadership (Research in Multi Level Issues, Volume 8) Emerald Group Publishing Limited, pp.147 – 191

Keller, T. (1999). Images of the familiar: Individual differences and implicit leadership theories. Leadership Quarterly, 10, 58–607.

Lawler, E. E., Mohrman, S. A., & Ledford, G. E. (1995). *Creating high performance organizations: Practices and results of employee involvement and total quality management in Fortune 1000 companies*. San Francisco: Jossey-Bass.

Lennox, R. D., & Wolfe, R. N. (1984). Revision of the self-monitoring scale. *Journal of Personality and Social Psychology, 46(6),* 1349-1364.

Liden, R. C., Sparrowe, R. T., & Wayne, S. J. (1997). Leader-member exchange theory: The past and potential for the future. Ferris, G. R. (Ed), *Research in Personnel and Human Resources Management,* Vol. 15. , (pp. 47-119). US: Elsevier Science/JAI Press.

Livi, S., Kenny, D. A., Albright, L., & Pierro, A. (2008). A social relations analysis of leadership. *The Leadership Quarterly*, *19*(2), 235-248.

Lord, R. G., Brown, D. J., Harvey, J. L., & Hall, R. J. (2001). Contextual constraints on prototype generation and their multilevel consequences for leadership perceptions. *The Leadership Quarterly*, *12*(3), 311-338.

Lord, R. G., & Dinh, J. E. (2014). What Have We Learned That Is Critical in Understanding Leadership Perceptions and Leader-Performance Relations?.*Industrial and Organizational Psychology*, *7*(2), 158-177.

Lord, R. G., Foti, R. J., & De Vader, C. L. (1984). A test of leadership categorization theory: Internal structure, information processing, and leadership perceptions. *Organizational Behavior and Human Performance*, *34*(3), 343-378.

Lord, R. G., & Maher, K. J. (1991). *Leadership and information processing: Linking perceptions and performance.* London, England: Rutledge.

Lord, R. G., & Shondrick, S. J. (2011). Leadership and knowledge: Symbolic, connectionist, and embodied perspectives. *The Leadership Quarterly*, *22*(1), 207-222.

Luria, G., & Berson, Y. (2013). How do leadership motives affect informal and formal leadership emergence? *Journal of Organizational Behavior*, *34*(7), 995-1015.

Lusher, D., & Robins, G. (2013). Formation of social network structure. In D. Lusher, J. Koskinen, & G. Robins (Eds.), *Exponential Random Graph Models for Social Networks: Theory, Methods, and Applications.* New York, NY: Cambridge University Press.

Mathieu, J.E., Marks, M.A., & Zaccaro, S.J. (2001). Multi-team systems. In N. Anderson, D. Ones, H.K. Sinangil, & C. Viswesvaran (Eds.), *Handbook of Industrial, Work, and Organizational Psychology (Vol. 2, pp. 289–313).* London: Sage Publications.

Mayo, M. C., Meindl, J. R., & Pastor, J. C. (2003). Shared leadership in work teams: A social network approach. In C. Pierce, & J. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership (pp. 193–214).* Thousand Oaks, CA: Sage.

Mehra, A., & Schenkel, M. T. (2008). The Price Chameleons Pay: Self-monitoring, Boundary Spanning and Role Conflict in the Workplace. *British Journal of Management*, *19*(2), 138-144.

Mehra, A., Smith, B., Dixon, A., & Robertson, B. (2006). Distributed leadership in teams: The network of leadership perceptions and team performance. *The Leadership Quarterly, 17,* 232–245.

Moore, J. V., & Smith, R. G. (1953). Some aspects of noncommissioned officer leadership. *Personnel Psychology*, *6*(4), 427-443.

Morgeson, F. P., DeRue, D. S., & Karam, E. P. (2009). Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management*, *36(1),* 5-39.

Mumford, E. (1909). *The origins of leadership*. University of Chicago Press.

Mumford, M. D., O'Connor, J., Clifton, T. C., Connelly, M. S., & Zaccaro, S. J. (1993). Background data constructs as predictors of leadership. *Human Performance*, *6*(2), 151-195.

Murphy, A. J. (1941). A study of the leadership process. *American Sociological Review*, *6,* 674-687.

Nicolaides, V. C., LaPort, K. A., Chen, T. R., Tomassetti, A. J., Weis, E. J., Zaccaro, S. J., & Cortina, J. M. (2014). The shared leadership of teams: A meta-analysis of proximal, distal, and moderating relationships. *The Leadership Quarterly*, *25*(5), 923-942.

Offermann, L. R., Kennedy Jr, J. K., & Wirtz, P. W. (1994). Implicit leadership theories: Content, structure, and generalizability. *The Leadership Quarterly*,*5*(1), 43-58.

Oh, S. H. D. (2012). Leadership emergence in autonomous work teams: Who is more willing to lead?. *Social Behavior and Personality: an International Journal*, *40(9),* 1451-1464.

Oldmeadow, J. A., Quinn, S., & Kowert, R. (2013). Abridged Social Skills Inventory [Database record]. Retrieved from PsycTESTS.

Moran, L., Musselwhite, E., Zenger, J. H., & Perrin, C. (1990). *Self-directed work teams: The new American challenge*. Homewood, IL: Business One Irwin.

Pearce, C. L., & Conger, J. A. (2003). All those years ago: The historical underpinnings of shared leadership. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 1–18). Thousand Oaks, CA: Sage.

Pearce, C. L., & Sims Jr, H. P. (2002). Vertical versus shared leadership as predictors of the effectiveness of change management teams: An examination of aversive, directive, transactional, transformational, and empowering leader behaviors. *Group dynamics: Theory, research, and practice*, *6*(2), 172.

Phillips, J. S., & Lord, R. G. (1982). Schematic information processing and perceptions of leadership in problem-solving groups. *Journal of Applied Psychology*, *67*(4), 486.

Powers, C.L. (2012, April). What Does Cohesion Capture? An Empirical and Conceptual Analysis. Poster presented at the 2012 Society of Industrial and Organizational Psychology conference in San Diego, California.

Quah, J., & Campbell, K. M. (1994). Role conflict and role ambiguity as factors in work stress among managers in Singapore: Some moderator variables.*Research and Practice in Human Resource Management*, *2*(1), 21-33.

Resick, C. J., Dickson, M. W., Mitchelson, J. K., Allison, L. K., & Clark, M. A. (2010). Team composition, cognition, and effectiveness: Examining mental model similarity and accuracy. *Group Dynamics: Theory, Research, and Practice*, *14*(2), 174-193.

Robins, G. & Lusher, D.(2013). What are exponential random graph models? In D. Lusher, J. Koskinen, & G. Robins (Eds.), *Exponential Random Graph Models for Social Networks: Theory, Methods, and Applications.* New York, NY: Cambridge University Press.

Rush, M. C., Thomas, J. C., & Lord, R. G. (1977). Implicit leadership theory: A potential threat to the internal validity of leader behavior questionnaires. *Organizational Behavior and Human Performance*, *20*(1), 93-110.

Schriesheim, C. A. (2011). The leadership quarterly yearly review for 2011. *The Leadership Quarterly*, *22*(6), 1041.

Schriesheim, C. A., Castro, S. L., & Cogliser, C. C. (1999). Leader-member exchange (LMX) research: A comprehensive review of theory, measurement, and data-analytic practices. *The Leadership Quarterly*, *10*(1), 63-113.

Schriesheim, C. A., Castro, S. L., & Yammarino, F. J. (2000). Investigating contingencies: An examination of the impact of span of supervision and upward controllingness on leader–member exchange using traditional and multivariate within and between-entities analysis. *Journal of Applied Psychology, 85*, 659–677.

Schriesheim, C. A., Cogliser, C. C., Scandura, T. A., Lankau, M. J., & Powers, K. J. (1999). An empirical comparison of approaches for quantitatively assessing the content adequacy of paper-and-pencil measurement instruments.*Organizational Research Methods*, *2*(2), 140-156.

Schriesheim, C. A., Neider, L. L., & Scandura, T. A. (1998). Delegation and leader-member exchange: Main effects, moderators, and measurement issues.*Academy of Management Journal*, *41*(3), 298-318.

Sherman, K. E., Kennedy, D. M., Woodard, M. S., & McComb, S. A. (2012). Examining the "exchange" in leader–member exchange. *Journal of Leadership & Organizational Studies*, *19*(4), 407-423.

Sin, H., Nahrgang, J.D., & Morgeson, F.P. (2009). Understanding why they don't see eye to eye: an examination of leader-member exchange (LMX) agreement. *Journal of Applied Psychology, 94(4), 1048-1057.*

Small, E. E. (2008). *Shared leadership: A social network analysis* (Unpublished doctoral dissertation). The University of Tennessee, Knoxville, TN.

Small, E. E., & Rentsch, J. R. (2010). Shared leadership in teams: A matter of distribution. *Journal of Personnel Psychology*, *9*(4), 203.

Snyder, M. (1979). Self-monitoring processes. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 12, pp. 85-128). New York: Academic Press

Snyder, M., & Gangestad, S. (1986). On the nature of self-monitoring: matters of assessment, matters of validity. *Journal of Personality and Social Psychology*,*51*(1), 125.

Sparrowe, R. T., & Liden, R. C. (1997). Process and structure in leader-member exchange. *Academy of management Review*, *22*(2), 522-552.

Sparrowe, R. T., & Liden, R. C. (2005). Two routes to influence: Integrating leader–member exchange and social network perspective. *Administrative Science Quarterly, 50,* 505–535.

Stogdill, R. M. (1948). Personal factors associated with leadership: A survey of the literature. *The Journal of Psychology*, *25*(1), 35-71.

Thomas, G., Martin, R., Epitropaki, O., Guillaume, Y., & Lee, A. (2013). Social cognition in leader–follower relationships: Applying insights from relationship science to understanding relationship-based approaches to leadership. *Journal of Organizational Behavior*, *34*, 63-81.

Trichas, S., Schyns, B., & Lord, R. G. (2013). ''Facing''leaders: Facial expressions and leadership perceptions. Manuscript submitted for publication.

Tse, H. H., Lam, C. K., Lawrence, S. A., & Huang, X. (2013). When my supervisor dislikes you more than me: The effect of dissimilarity in leader–member exchange on coworkers' interpersonal emotion and perceived help. *Journal of Applied Psychology*, *98*(6), 974.

Vecchio, R. P., & Boatwright, K. J. (2002). Preferences for idealized styles of supervision. Leadership Quarterly, 13, 327–342.Kozlowski, S. W. J., & Bell, B. S. (2003). Work groups and teams in organizations. In W. C. Borman, D. R.

Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology: Industrial and organizational psychology* (Vol. 12, pp. 333–375). Hoboken, NJ: Wiley.

Wang, D., Waldman, D., & Zhang, Z. (2014). A meta-analysis of shared leadership and team effectiveness. *Journal of Applied Psychology, 99(2),* 181-198.

Wasserman, S., & Robins, G. (2012). Social network research: The foundation of network science. In Cooper, H., Camic, P.M., Long, D.L., Panter, A.T., Rindskopf, D. & Sher, K.J. (Eds.), *APA handbook of research methods in psychology, vol 3: Data analysis and research publication* (p. 451-469). Washington, D.C.: American Psychological Association.

Wellins, R. S., Byham, W. C., & Wilson, J. M. (1991). *Empowered teams, creating self managing working groups and the improvement of productivity and participation*. San Francisco, C: Jossey-Bass.

Woods, F.A. (1913). *The influence of monarchs.* New York: Macmillan.

Yukl, G. (1989). Managerial leadership: A review of theory and research. *Journal of Management*, *15(2),* 251-289.

Yukl, G., Guinan, P. J., & Sottolano, D. (1995). Influence tactics used for different objectives with subordinates, peers, and superiors. *Group and Organization Management, 20*, 272–296.

Yukl, G. (2012). *Leadership in organizations* (8th ed.). Upper Saddle River, NJ: Prentice-Hall.

Zaccaro, S. J., Foti, R. J., & Kenny, D. A. (1991). Self-monitoring and trait-based variance in leadership: An investigation of leader flexibility across multiple group situations. *Journal of Applied Psychology*, *76*(2), 308.

REFERENCES

Anderson, C. J., Wasserman, S., & Crouch, B. (1999). A p* primer: Logit models for social networks. *Social Setworks, 21(1),* 37-66.

Balkundi, P., Barsness, Z., & Michael, J. H. (2009). Unlocking the influence of leadership network structures on team conflict and viability. *Small Group Research*, *40*(3), 301-322.

Balkundi, P., & Kilduff, M. (2006). The ties that lead: A social network approach to leadership. *The Leadership Quarterly, 17,* 419–439.

Biemann, T., Cole, M. S., & Voelpel, S. (2012). Within-group agreement: On the use (and misuse) of rwg and rWG (J) in leadership research and some best practice guidelines. *The Leadership Quarterly*, *23*(1), 66-80.

Boal, K. B., & Hooijberg, R. (2001). Strategic leadership research: Moving on.*The Leadership Quarterly*, *11*(4), 515-549.

Borgatti, S. P., & Foster, P. (2003). The network paradigm in organizational research: A review and typology. *Journal of Management, 29,* 991–1013.

Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal, 47*, 795– 817.

Bray, D. W., Campbell, R. J., & Grant, D. L. (1974). *Formative years in business.* Wiley: New York.

Carlyle, T. (1841/1907). *Heroes and hero worship.* Boston: Adams.

Carson, J. B., Tesluk, P. E.,& Marrone, J. A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *Academy of Management Journal, 50,* 1217–1234.

Chan, K., & Drasgow, F. (2001). Toward a theory of individual differences and leadership: Understanding the motivation to lead. *Journal of Applied Psychology, 86,* 481-498.

Chen, G., Kanfer, R., DeShon, R. P., Mathieu, J. E., & Kozlowski, S. W. (2009). The motivating potential of teams: Test and extension of cross-level model of motivation in teams. Organizational Behavior and Human Decision Processes, 110(1), 45-55.

Chen, G., Kirkman, B. L., Kanfer, R., Allen, D., & Rosen, B. (2007). A multilevel study of leadership, empowerment, and performance in teams. *Journal of Applied Psychology, 92(2)*, 331-346.

Chen, T. (2014). *Team composition, emergent states and shared leadership emergence on project teams.* (Doctoral Dissertation). George Mason University, Fairfax, VA.

Collins, C.G., & Parker, S.K. (2009). Team capability beliefs over time: Distinguishing between team potency, team outcome efficacy, and team process efficacy. *Journal of Occupational and Organizational Psychology, 10,* 1-22.

Connelly, M. S., Gilbert, J. A., Zaccaro, S. J., Threlfall, K., Marks, M. A., & Mumford, M. D. (2000). Exploring the relationship of leadership skills and knowledge to leader performance. *The Leadership Quarterly*, *11*(*1*), 65-86.

Contractor, N. S., DeChurch, L. A., Carson, J., Carter, D. R., & Keegan, B. (2012). The topology of collective leadership. *The Leadership Quarterly, 23,* 994–1011.

Day, D. V., & Zaccaro, S. J. (2007). Leadership: A critical historical analysis of the influence of leader traits. *Historical Perspectives in Industrial and Organizational Psychology*, 383-405.

DeRue, D. S., & Ashford, S. J. (2010). Who will lead and who will follow? A social process of leadership identity construction in organizations. *The Academy of Management Review, 35,* 627–647.

DeRue, D. S., Ashford, S. J., & Cotton, N. C. (2009). Assuming the mantle: Unpacking the process by which individuals internalize a leader identity. In L. M. Roherts & J. E. Dutton (Eds.), *Exploring positive identities and organizations: Building a theoretical and research foundation:* 213–232. New York: Taylor & Francis.

Dinh, J. E., & Lord, R. G. (2013, April). *Implicit leadership theories and the dynamics of leadership perception.* Paper presented at the 28th Annual Conference of the Society for Industrial and Organizational Psychology, Houston, TX.

Dinh, J. E., Lord, R. G., & Hoffman, E. L. (2014). Leadership perception and information processing: Influences of symbolic, connectionist, emotion, and embodied

architectures. In D. V. Day (Ed.), *The Oxford handbook of leadership and organizations*. New York, NY: Oxford University Press.

Dionne, S. D., Gupta, A., Sotak, K. L., Shirreffs, K. A., Serban, A., Hao, C., ... & Yammarino, F. J. (2014). A 25-year perspective on levels of analysis in leadership research. *The Leadership Quarterly, 25(1),* 6-35.

Eden, D., & Leviatan, U. (1975). Implicit leadership theory as a determinant of the factor structure underlying supervisory behavior scales. *Journal of Applied Psychology*, *60*(*6),* 736-741.

Emery, C., Calvard, T., & Pierce, M. (2013). Leadership as an emergent group process: A social network study of personality and leadership. *Group Processes Intergroup Relations, 16(1),* 28-45.

Epitropaki, O., & Martin, R. (2004). Implicit leadership theories in applied settings: factor structure, generalizability, and stability over time. *Journal of Applied Psychology*, *89(2),* 293-310.

Festinger, L. (1950). Informal social communication. *Psychological Review*, *57*(5), 271-282.

Festinger, L. (1954). A theory of social comparison processes. *Human relations*, *7*(2), 117-140.

Festinger, L. (1957). *A theory of cognitive dissonance* (Vol. 1. Stanford University Press.

Foti, R. J., & Hauenstein, N. M. A. (2007). Pattern and variable approaches in leadership emergence and effectiveness. *Journal of Applied Psychology , 92,* 347–355.

Foti, R. J., & Lord, R. G. (1987). Prototypes and scripts: The effects of alternative methods of processing information on rating accuracy. *Organizational Behavior and Human Decision Processes, 39(3),* 318–340.

Freeman, L. C., Freeman, S. C., & Michaelson, A. G. (1988). On human social intelligence. *Journal of Social and Biological Structures*, *11(4),* 415-425.

Friedrich, T. L., Vessey, W. B., Schuelke, M. J., Ruark, G. A., & Mumford, M. D. (2009). A framework for understanding collective leadership: The selective utilization of leader and team expertise within networks. *The Leadership Quarterly, 20,* 933–958.

Galton, F. (1869). *Hereditary genius*. Macmillan and Company.

Gerstner, C. R., & Day, D. V. (1997). Meta-Analytic review of leader–member exchange theory: Correlates and construct issues. *Journal of applied psychology*, *82*(6), 827-844.

Goffman, E. 1959. *The presentation of self in everyday life.* Garden City, NY: Doubleday.

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. C. (2006). The International Personality Item Pool and the future of public-domain personality measures. *Journal of Research in Personality, 40*, 84-96.

Gooty, J., Serban, A., Thomas, J.S., Gavin, M.B., & Yammarino, F.J. (2012) Use and misuse of levels of analysis in leadership research: an illustrative review of leader-member exchange. *The Leadership Quarterly, 23,* 1080-1103.

Graen, G. (1976). Role making processes within complex organizations. In M.D. Dunnette (ed.), *Handbook of industrial and organizational psychology.* Chicago: Rand McNally.

Graen, G. B., & Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development of leader–member exchange (lmx) theory of leadership over 25 years: Applying a multi-level multi-domain perspective. *Leadership Quarterly, 6*, 219– 247.

Handcock, M. S., Hunter, D., Butts, C. T., Goodreau, S. M., & Morris, M. (2003). statnet: An R package for the Statistical Modeling of Social Networks. *Web page http://www. csde. washington. edu/statnet.*

Handcock, M. S., Hunter, D. R., Butts, C. T., Goodreau, S. M., & Morris, M. (2008). statnet: Software tools for the representation, visualization, analysis and simulation of network data. *Journal of Statistical Software, 24(1).*

Heider, F. (1958). *The psychology of interpersonal relations.*

Hirschfeld, R. R., Jordan, M. H., Thomas, C. H., & Feild, H. S. (2008). Observed leadership potential of personnel in a team setting: Big five traits and proximal factors as predictors. *International Journal of Selection and Assessment, 16(4),* 385-402.

Hong, Y., Catano, V. M., & Liao, H. (2011). Leader emergence: the role of emotional intelligence and motivation to lead. *Leadership & Organization Development Journal*, *32*(4), 320-343.

Judge, T. A., Bono, J. E., Ilies, R., & Gerhardt, M. W. (2002). Personality and leadership: A qualitative and quantitative review. *Journal of Applied Psychology , 87(4),* 765–780.

Kalish, Y., & Luria, G. (2013). In D. Lusher, J. Koskinen, & G. Robins (Eds.), *Exponential Random Graph Models for Social Networks: Theory, Methods, and Applications.* New York, NY: Cambridge University Press.

Kenny, D. A. (1994). Interpersonal perception. A social relations analysis. New York: The Guilford Press.

Kenny, D.A. & Livi, S.(2009). A componential analysis of leadership using the social relations model, in Francis J. Yammarino, Fred Dansereau (ed.) *Multi-Level Issues in Organizational Behavior and Leadership (Research in Multi Level Issues, Volume 8)* Emerald Group Publishing Limited, pp.147 – 191

Kozlowski, S. W. J., & Bell, B. S. (2003). Work groups and teams in organizations. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Handbook of psychology: Industrial and organizational psychology* (Vol. 12, pp. 333–375). Hoboken, NJ: Wiley.

Lawler, E. E., Mohrman, S. A., & Ledford, G. E. (1995). *Creating high performance organizations: Practices and results of employee involvement and total quality management in Fortune 1000 companies*. San Francisco: Jossey-Bass.

LeBreton, J. M., & Senter, J. L. (2008). Answers to 20 questions about interrater reliability and interrater agreement. *Organizational Research Methods, 11,* 815–852.

Livi, S., Kenny, D. A., Albright, L., & Pierro, A. (2008). A social relations analysis of leadership. *The Leadership Quarterly*, *19*(2), 235-248.

Lord, R. G., Foti, R. J., & De Vader, C. L. (1984). A test of leadership categorization theory: Internal structure, information processing, and leadership perceptions. *Organizational Behavior and Human Performance*, *34*(3), 343-378.

Lord, R. G., & Maher, K. J. (1991). *Leadership and information processing: Linking perceptions and performance.* London, England: Rutledge.

Lord, R. G., & Shondrick, S. J. (2011). Leadership and knowledge: Symbolic, connectionist, and embodied perspectives. *The Leadership Quarterly*, *22*(1), 207-222.

Luria, G., & Berson, Y. (2013). How do leadership motives affect informal and formal leadership emergence? *Journal of Organizational Behavior*, *34*(7), 995-1015.

Mathieu, J.E., Marks, M.A., & Zaccaro, S.J. (2001). Multi-team systems. In N. Anderson, D. Ones, H.K. Sinangil, & C. Viswesvaran (Eds.), *Handbook of Industrial, Work, and Organizational Psychology (Vol. 2, pp. 289–313).* London: Sage Publications.

Mayo, M. C., Meindl, J. R., & Pastor, J. C. (2003). Shared leadership in work teams: A social network approach. In C. Pierce, & J. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership (pp. 193–214).* Thousand Oaks, CA: Sage.

Mehra, A., Smith, B., Dixon, A., & Robertson, B. (2006). Distributed leadership in teams: The network of leadership perceptions and team performance. *The Leadership Quarterly, 17,* 232–245.

Morgeson, F. P., DeRue, D. S., & Karam, E. P. (2009). Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management*, *36(1),* 5-39.

Mumford, T. V., Campion, M. A., & Morgeson, F. P. (2007). The leadership skills strataplex: Leadership skill requirements across organizational levels.*The Leadership Quarterly*, *18*(2), 154-166.

Mumford, M. D., Marks, M. A., Connelly, M. S., Zaccaro, S. J., & Reiter-Palmon, R. (2000). Development of leadership skills: Experience and timing.*The Leadership Quarterly*, *11*(1), 87-114.

Mumford, M. D., O'Connor, J., Clifton, T. C., Connelly, M. S., & Zaccaro, S. J. (1993). Background data constructs as predictors of leadership. *Human Performance*, *6*(2), 151-195.

Nicolaides, V. C., LaPort, K. A., Chen, T. R., Tomassetti, A. J., Weis, E. J., Zaccaro, S. J., & Cortina, J. M. (2014). The shared leadership of teams: A meta-analysis of proximal, distal, and moderating relationships. *The Leadership Quarterly*, *25*(5), 923-942.

Oh, S. H. D. (2012). Leadership emergence in autonomous work teams: Who is more willing to lead?. *Social Behavior and Personality: an International Journal*, *40(9),* 1451-1464.

Oldmeadow, J. A., Quinn, S., & Kowert, R. (2013). Abridged Social Skills Inventory [Database record]. Retrieved from PsycTESTS.

Pearce, C. L., & Conger, J. A. (2003). All those years ago: The historical underpinnings of shared leadership. In C. L. Pearce & J. A. Conger (Eds.), *Shared leadership: Reframing the hows and whys of leadership* (pp. 1–18). Thousand Oaks, CA: Sage.

Pearce, C. L., & Sims Jr, H. P. (2002). Vertical versus shared leadership as predictors of the effectiveness of change management teams: An examination of aversive, directive, transactional, transformational, and empowering leader behaviors. *Group dynamics: Theory, research, and practice*, *6*(2), 172.

Powers, C.L. (2012, April). What Does Cohesion Capture? An Empirical and Conceptual Analysis. Poster presented at the 2012 Society of Industrial and Organizational Psychology conference in San Diego, California.

Resick, C. J., Dickson, M. W., Mitchelson, J. K., Allison, L. K., & Clark, M. A. (2010). Team composition, cognition, and effectiveness: Examining mental model similarity and accuracy. *Group Dynamics: Theory, Research, and Practice*, *14*(2), 174-193.

Richards, D. A., & Hackett, R. D. (2012). Attachment and emotion regulation: Compensatory interactions and leader–member exchange. *The Leadership Quarterly, 23(4),* 686-701.

Robins, G. & Lusher, D.(2013). What are exponential random graph models? In D. Lusher, J. Koskinen, & G. Robins (Eds.), *Exponential Random Graph Models for Social Networks: Theory, Methods, and Applications.* New York, NY: Cambridge University Press.

Rush, M. C., Thomas, J. C., & Lord, R. G. (1977). Implicit leadership theory: A potential threat to the internal validity of leader behavior questionnaires. *Organizational Behavior and Human Performance*, *20*(1), 93-110.

Sin, H., Nahrgang, J.D., & Morgeson, F.P. (2009). Understanding why they don't see eye to eye: an examination of leader-member exchange (LMX) agreement. *Journal of Applied Psychology, 94(4), 1048-1057.*

Small, E. E. (2008). *Shared leadership: A social network analysis* (Unpublished doctoral dissertation). The University of Tennessee, Knoxville, TN.

Small, E. E., & Rentsch, J. R. (2010). Shared leadership in teams: A matter of distribution. *Journal of Personnel Psychology*, *9*(4), 203.

Smith, J. A., & Foti, R. J. (1998). A pattern approach to the study of leader emergence. The *Leadership Quarterly, 9(2),* 147-160.

Sparrowe, R. T., & Liden, R. C. (1997). Process and structure in leader-member exchange. *Academy of management Review*, *22*(2), 522-552.

Sparrowe, R. T., & Liden, R. C. (2005). Two routes to influence: Integrating leader–member exchange and social network perspective. *Administrative Science Quarterly, 50,* 505–535.

Thomas, G., Martin, R., Epitropaki, O., Guillaume, Y., & Lee, A. (2013). Social cognition in leader–follower relationships: Applying insights from relationship science to understanding relationship-based approaches to leadership. *Journal of Organizational Behavior*, *34*, 63-81.

Trichas, S., Schyns, B., & Lord, R. G. (2013). ‘‘Facing’’leaders: Facial expressions and leadership perceptions. Manuscript submitted for publication.

Tse, H. H., Lam, C. K., Lawrence, S. A., & Huang, X. (2013). When my supervisor dislikes you more than me: The effect of dissimilarity in leader–member exchange on coworkers' interpersonal emotion and perceived help. *Journal of Applied Psychology*, *98*(6), 974.

Wang, D., Waldman, D., & Zhang, Z. (2014). A meta-analysis of shared leadership and team effectiveness. *Journal of Applied Psychology, 99(2),* 181-198.

Wasserman, S., & Robins, G. (2012). Social network research: The foundation of network science. In Cooper, H., Camic, P.M., Long, D.L., Panter, A.T., Rindskopf, D. & Sher, K.J. (Eds.), *APA handbook of research methods in psychology, vol 3: Data analysis and research publication* (p. 451-469). Washington, D.C.: American Psychological Association.

Weiss, H. M., & Adler, S. (1981). Cognitive complexity and the structure of implicit leadership theories. *Journal of Applied Psychology, 66(1),* 69-78.

Whisman, M. A., & McClelland, G. H. (2005). Designing, testing, and interpreting interactions and moderator effects in family research. *Journal of Family Psychology*, *19*(1), 111-120.

Woods, F.A. (1913). *The influence of monarchs.* New York: Macmillan.

Yukl, G. (2012). *Leadership in organizations* (8th ed.). Upper Saddle River, NJ: Prentice-Hall.

Zaccaro, S. J. (2007). Trait-based perspectives of leadership. *American Psychologist, 62(1),* 6-16.

Zaccaro, S. J. (2012). Individual differences and leadership: Contributions to a third tipping point. *The Leadership Quarterly, 23(4),* 718-728.

BIOGRAPHY

Samantha J. Holland received her Bachelor of Arts from Northwestern University in 2008 with a double major in Psychology and Mathmatical Methods in the Social Sciences. She began her graduate school career in 2011 at George Mason University, where she earned a Masters of Arts in Industrial/Organizational Psychology in 2013 and her Doctor of Philosophy in the same field in 2015. Samantha currently works as a Consultant at DCI Consulting in Washington, D.C.