A Longitudinal Investigation of the Interactional Process Mechanisms of Leadership Emergence in Dyads

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ABSTRACT

The purpose of the following study was to advance the science of leadership emergence by taking a process-oriented approach to understand the dyadic micro-level interacts that underlie the emergence of leader-follower relationship. While most leadership emergence research focuses mainly on attributes, behaviors, or perceptions of individuals and neglects the multi-level, temporal and contextual of the emergence leaders, this study focuses on dyads’ attributes, behaviors and perceptions and considers the teams, over time, and in situ. Individuals worked together in teams over the course of four weeks to accomplish a task, and their verbal interactions were recorded and coded. Attributes of dyads and dyadic perceptions of leader-follower relationship emergence were collected. Results showed dyads that were more similar in leadership self-efficacy were more likely to engage in symmetrical types of interactions. Furthermore, the more dyads engaged in such symmetrical exchanges, the more likely they were to both see each other as leaders, than to both not see each as leaders. Contrary to expectations, no significant results were found for the effect of dyadic dissimilarity on dyadic interactions, or for the effect of complementary interactions of leader-follower relationship emergence. Implications of these findings are discussed.
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GENERAL AUDIENCE ABSTRACT

The purpose of this dissertation was to better understand how and why leaders and followers emerge in groups based on how they communicate with each other and what characteristics they possess. Most related research focuses mainly on the characteristics that a single person who emerges as a leader or follower posses. What makes this study unique is that the focus is not exclusively on the individual, but rather is on a pair of individuals and not just their characteristics but also their forms of communication they engage in. In addition, the pair is studied in a group, over time and in a quasi-naturalistic environment to better include temporal and contextual factors. Participants worked together in teams over the course of four weeks to accomplish a task, and they were audio recorded as they worked together. Characteristics of the pairs were measured, as was whether a leader-follower relationship formed between the pair. Results showed pairs who were more similar in their own abilities to lead (leadership self-efficacy) were more likely to engage in a particular type of communication pattern (symmetry). Furthermore, pairs who engaged in these types of communication patterns (symmetry) were more likely to both see each other as leaders, than to both not see each as leaders. Contrary to expectations, no significant relationships were found between dissimilar pairs and patterns of communication. Implications of these findings are discussed.
DEDICATION

This dissertation, and all of the effort put into it, is dedicated to my father, Martin McCusker, who may not have been physically here on Earth, but whose love and support I felt right beside me every single step of the way. Dad, early in my childhood, you predicted I would be a doctor. Take this as one of the few instances that I actually admit that you were right.
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# TABLE OF CONTENTS

Chapter 1 – Introduction ........................................................................................................ 1

Chapter 2 – Review of the Literature ..................................................................................... 4

2.1 – Defining Leadership ........................................................................................................ 4

2.2 – Leadership as a Socio-perceptual and Relational Process .......................................... 5

2.3 – Leadership Process from a Discourse-based Lens ........................................................ 9

2.4 – Hypothesis Development ............................................................................................... 13

2.4.1 – Dynamics of the process. ......................................................................................... 13

2.4.2 – Outcome of the process. ......................................................................................... 16

2.4.3 – Antecedents of the process. ..................................................................................... 18

Chapter 3 – Method ................................................................................................................ 29

3.1. – Data Source ................................................................................................................ 29

3.2 – Participants .................................................................................................................... 29

3.3 – Procedure ..................................................................................................................... 30

3.4 – Measures ....................................................................................................................... 31

3.4.1 – Antecedent measures .............................................................................................. 31

3.4.2 – Process measure. .................................................................................................... 34

3.4.3 – Outcome measure. ................................................................................................. 39

3.4.4 – Control measure. ................................................................................................. 40

Chapter 4 – Results ................................................................................................................. 41

4.1 – Descriptive Statistics, Correlations, and Reliability .................................................... 41

4.2 – Hypothesis Tests ......................................................................................................... 44

Chapter 5 – Discussion ......................................................................................................... 52

5.1 – Summary of Findings and Contributions ..................................................................... 52
5.2 – Limitations, Strengths, and Future Research .................................................................................. 57
5.3 – Conclusion ...................................................................................................................................... 60
References ............................................................................................................................................. 61
Appendices ........................................................................................................................................... 76
Tables .................................................................................................................................................... 97
Figures .................................................................................................................................................. 109
LIST OF TABLES

Table 1 – Results of K-mean Cluster Analysis for ILT and IFT of Entire Sample .................... 97
Table 2 – Results of K-mean Cluster Analysis for ILT and IFT of Study Sample Only......... 98
Table 3 – Categories of Outcome Variable of Leader-follower Relationship ......................... 99
Table 4 – Means, Standard Deviations, Intercorrelations and Reliability Coefficients for Individual Level Variables.......................................................................................................................... 100
Table 5 – Means, Standard Deviations, and Intercorrelations for Dyadic Level Continuous Variables ............................................................................................................................... 101
Table 6 – Means of Dyadic Dissimilarity of Dominance and LSE and Percent of Complementary and Percent of Symmetrical Interacts by ILT-IFT Congruence Categories ............ 102
Table 7 – Means of Dyadic Dissimilarity of Dominance and LSE and Percent of Complementary and Percent of Symmetrical Interacts by Leader-follower Relationship Categories .. 103
Table 8 – Results of Regression Analysis Testing Reliability of Dyadic Attribute Difference Scores................................................................................................................................................. 104
Table 9 – Results of Hierarchical Linear Regression of Change in Relational Control Moves over Time ................................................................................................................................................. 105
Table 10 – Results of Multiple Multinomial Logistic Regression of the Effect of Dyadic Interacts on Leader-Follower Relationship Emergence ................................................................. 106
Table 11 – Results of Hierarchical Linear Regression of Dyadic Complementary Interacts on LSE Dissimilarity, Dominance Dissimilarity, and ILT-IFT Congruence................................. 107
Table 12 – Results of Hierarchical Linear Regression of Dyadic Symmetrical Interacts on LSE Dissimilarity, Dominance Dissimilarity, and ILT-IFT Congruence................................. 108
LIST OF FIGURES

Figure 1 – Depiction of conceptual model and study Hypotheses 1 and 3.............................. 109
Figure 2 – Depiction of conceptual model and study Hypotheses 2; 4-6................................. 110
Figure 3 – Image of coding platform of Mangold Interact program (Mangold, 2010). .......... 111
Figure 3 – Longitudinal trajectory of percent of relational control moves sent from individuals to
dyadic partners......................................................................................................................................... 112
Chapter 1 – Introduction

The importance of informal leadership in today’s workplace is perhaps more pronounced than ever before. As organizations shift toward team-based structures, decentralized formal leadership, and fluctuating demands, there is a much greater need for individuals and collectives to assume informal leadership positions. That is, individuals in teams will need to fluidly and dynamically “step up to the plate” to reach collective goals and will often have to do so autonomously or semi-autonomously. Thus, there is growing need to understand the process by which individuals in teams come to assume informal leadership positions.

Yet, according to two prevalent leadership scholars, “a fundamental question that remains to be answered is how leadership and leader-follower relationships develop” (DeRue & Ashford, 2010, p. 627). The authors of this quote suggest that even after almost a century of research on leadership, there exists very little insight on the “how” of leadership emergence, or, in other words, the process by which leadership relations come into existence. This is because the vast majority of leadership research has been “leader-centric” (Uhl-Bien, Riggio, Lowe, & Carsten, 2013), a-contextual (Oc, 2018), and cross-sectional in design (Day, 2014). But in reality, the emergence of leadership is a socially constructed process, emerging from the dynamic interactions of all group members within a given social context over time (Avolio, Walumbwa, & Weber, 2009; Hollander & Julian, 1969).

Fortunately, in recent years, the leadership field has generally come to define leadership as a socio-perceptual and relational process (See McCusker, Foti, & Abraham, 2018 for a review of process-oriented definitions of leadership), that is co-constructed through the interactions of all actors in a group (Emery, 2012) and where patterns of leadership emerge from interactions and cognitions among all actors in a group (Hannah & Avolio, 2011). Leadership Identity
Construction Theory (DeRue & Ashford, 2010) characterizes these interactions as a series of behavioral “claims” and “grants” of leadership enacted among dyads in the group. Through a reciprocal, dynamic process of claiming and granting leadership, group members form individual and relational identities as leaders and followers, which, over time, become recognized by the group and result in the emergent leadership (DeRue, 2011). Thus, emergent leadership is the outcome of the leadership emergence process. By examining patterns of behavior among dyads in action, this study focuses on the interactional dynamics of the process of leadership emergence, and how they produce the emergent outcome of emergent leader-follower relationships.

Despite the conceptualization of leadership emergence as the socio-perceptual and relational process, few leadership studies actually study the process of leadership; rather they study the outcome of the process (Hunter, Bedell-Avers, & Mumford, 2007). The methods used for leadership research continue to lack the process-orientation needed to study the dynamic, interactional processes of leadership emergence (Fairhurst & Uhl-Bien, 2012). Process-oriented models aim to understand the “how” and “why” of phenomena (Dublin, 1976) and the methods used to test such models must include both data collection techniques that effectively capture the dynamics of the process mechanisms as well as analysis techniques that uncover and test dynamic patterns of the mechanisms (Grand, Braun, Kuljanin, Kozlowski, & Chao, 2016).

In this study, I explicitly differentiate the process of leadership emergence from the outcome of emergent leadership. I take an organizational discourse based approach (Fairhurst & Connaughton, 2014; Fairhurst & Uhl-Bien, 2012) to conceptualize the leadership process and use process-oriented methods of behavioral observation coding and sequence-based dyadic data analysis to test my hypotheses. The purpose of this study is thus to uncover the interpersonal and
interactional mechanisms (process) through which informal leader-follower relationships arise (outcome). In addition, I aim to understand how cognitive and personality characteristics of a dyad (inputs) impact the interactional process mechanisms.

This study advances the science of leadership emergence in four ways. First, by operationalizing leadership as a sequence of dyadic verbal exchanges between individuals unfolding over time, I align the conceptual and operational definitions of leadership. Second, by examining dyadic antecedents of leadership emergence, I shift the focus from personological (Carter, DeChurch, Braun, & Contractor, 2015) predictors of leadership to relational ones, heeding calls for more dyadic level research. Third, by purposefully measuring the leadership process in action, I model the process in context and over time. Finally, I demonstrate the utility of combining historically traditional data collection methods (e.g., behavioral observation; Bales, 1951) with newer pattern and sequencing techniques (e.g., sequential analyses) to better understand the “how” and “why” of leadership emergence.
Chapter 2 – Review of the Literature

2.1 – Defining Leadership

In 1974, Stogdill claimed, “there are almost as many different definitions of leadership as there are people who have attempted to define the concept” (p. 7). Stogdill’s point is that the term “leadership” carries many different meanings depending on the person, the field of research, and the perspective from which it is approached. While it is generally accepted that leadership involves *influencing others* in some capacity (Fischer, Dietz, & Antonakis, 2017; Yukl, 1989), this conceptualization is open to broad interpretation (Alvesson & Spicer, 2014). The difficulty in defining leadership arises in part because leadership is a complex concept, laden with myriad contextually bound dimensions and facets.

Perhaps the clearest conceptual differentiation within leadership is whether leadership is formal or informal. Formal leadership stems from an official position or role, such as a manager, supervisor, or political head. Informal leadership stems from an entity outside an officially designated position (Balkundi & Kilduff, 2006; Morgeson, DeRue, & Karam, 2009). While I acknowledge formal and informal leadership are often not independent, this study will focus exclusively on informal leadership. For the purposes of succinctness, from here on my use of the term “leadership” refers to leadership in this informal sense.

The second distinction, which is related the first, is the study of *leaders* versus the study of *leadership*. The leadership development literature differentiates leaders from leadership, such that leader development focuses on developing a person who influences, and leadership development focuses on developing the process of influence (Day, 2000). Similarly, this proposed study does not aim to understand what it is about a particular person who emerges as influential, but rather to understand the influence emergence process. Thus, this is a study of
leadership emergence.

The final distinction is between leadership emergence and leadership effectiveness (Judge, Colbert & Ilies, 2004), and both can be studied in the context of informal leadership (Foti & Hauenstein, 2007). The former, emergence, focuses on who comes to have influence in groups, while the latter, effectiveness, focuses on the successfulness or productivity in influencing others. This study centers on understanding the former, emergence, and in particular, the relational process of leadership emergence.

2.2 – Leadership as a Socio-perceptual and Relational Process

Defining leadership emergence as a socio-perceptual and relational process is perhaps best done by first discussing the concept of emergence. The study of emergence and emergence theory in the organizational sciences is rooted in multilevel theory (Kozlowski & Klein, 2000) and is defined as a process by which higher level, collective phenomena arise from interactions of lower level elements over time (Cronin, Weingart, & Todorova, 2011; Kozlowski & Klein, 2000). What sets emergent constructs apart from other group-level constructs (i.e., contextual/global and cumulative) is that emergent constructs only come into existence because of the interactions among the lower level units. Thus, for a construct to be considered emergent, it must arise from lower level units that interact in a dynamic way over time. In this way, an emergent construct (i.e., an emergent leader-follower relationship) is differentiated from the process of emergence- or leadership emergence. The former is a result or a product of the latter (Grand et al., 2016).

Often associated with emergence theory is the Input-Process-Output framework (IPO; McGrath, 1964), which is an oversimplified heuristic often used in team research to conceptualize team processes. While the IPO model has since been updated with more complex
relationships including moderating variables and feedback loops (Matthieu Maynard, Rapp, & Gilson, 2008), its generality and flexibility helps to map an emergence process at a high level, by categorizing variables as antecedents (inputs) which drive processes and result in measureable effects (outcomes). One way this can be applied to leadership is by defining the output (i.e., what has emerged) as emergent or effective leader-follower relationships; antecedents as the lower level units that produce the emerged phenomenon (i.e., ingredients of the emergence process), and the process is the sequence of mechanisms and interactions underlying what has emerged. Leadership scholars have done a very good job modeling the inputs and the outcomes of leadership emergence, but modeling and testing the process component is starkly underrepresented in the empirical literature (Kozlowski, Mak, & Chao, 2016; van Kippenberg & Sitkin, 2013).

The emergence process of leadership in its entirety is made up of multiple simultaneously occurring sub-processes (Fischer et al., 2016). These sub-processes can thus be as micro as a within-individual cognitive categorization process, or as macro as the collective and team influence processes in multi-team systems. Thus, studying the leadership process in its entirety is a practically insurmountable feat, but studying a sub-process of leadership emergence is attainable and parsimonious. An exemplary study modeling a sub-process of emergence is one by Grand et al. (2016), who modeled the emergence of team knowledge in groups. The authors argue that in order to develop and test process-oriented theories about how or why phenomena emerge, researchers must first identify the individual level “core concepts” involved in the process, as well as the manner, or “mechanisms,” in which they combine to produce an emergent phenomenon.

Following Grand et al.’s model and past researchers citing the IPO heuristic (Fischer et
al., 2016; Kozlowski et al, 2016), in this study I treat the process of leadership as a mediating mechanism that explains how and why antecedents of leadership emergence produce leader-follower relationships. It has been argued that there are four critical elements involved in any leadership processes: context, time, levels and interpersonal interaction (McCusker et al., 2018). These must be considered to adequately study a process. That is, leadership process mechanisms are inherently married to and constrained by the social and environmental context in which they unfold (Carter et al., 2015). Second, since it takes time for antecedent to affect outcomes, leadership processes are naturally time consuming (Shamir, 2011). Third, and specifically regarding emergence processes, lower levels elements (i.e., individuals) must combine in some way to produce emergent outcomes (i.e., dyadic relationships). Finally, if leadership involves influencing others (Yukl, 1989), or at the very least perceptions of influence (Lord, Foti, & De Vader, 1984), then this influence process must involve individuals dynamically interacting together in a social situation. Thus, leadership as a process (in the sense of the IPO model) involves the dynamic interpersonal interaction of individuals in a collective, in a particular situation over time. This latter notion of interpersonal interaction coincides well with the conceptualization of leadership emergence as a socio-perceptual and relational process.

The concept of leadership as socio-perceptual and relational is best characterized by relational approaches to leadership. These views treat leadership not as a single person, a characteristic, a set of characteristics, behaviors, or structure, but as a co-constructed, ongoing mutual influence process among dyads (Hollander & Julian; 1989; Uhl-Bien Riggio, Lowe, & Carsten, 2013). In that way, it moves beyond leader or follower-centric approaches to leadership, focusing rather on the perceptions, relationships and connections among actors in the leadership process. Rooted in the idea that leadership only comes into existence because one or more
individuals perceive one or more others as leaderlike (Hogan, Curphy, & Hogan, 1994; Lord & Maher, 1991), relational approaches to leadership emphasize the contribution of both dyad members in leadership processes. Methodologically, these approaches aim to understand leadership phenomena by gathering information about leadership relationships from both members of the dyad (i.e., leader and follower; manager and subordinate; perceiver and target; Gooty, Serban, Thomas, Gavin, & Yammarino, 2012). For example, relational approaches to leadership emergence examine how attributes (e.g., Kalish, 2014; Emery, 2012), cognitions (Wilgus, 2017), or behaviors (Marchiondo, Myers, & Kopelman, 2015) of both dyad members contribute to the emergence of leadership. Relational approaches to studying leadership emergence thus shift the focus from leaders and followers as entities to the fine-grained, unfolding micro-interactions of dyads (Fairhurst & Uhl-Bien, 2012). The structure of leadership takes its form in the patterns of interactions and moment-to-moment contingencies of interpersonal interactions.

An extension of Relational Leadership Theory is Leadership Identity Construction Theory (DeRue & Ashford, 2010), which articulates the socially constructed development of leader-follower relationships through reciprocal intra- and inter-personal processes. Central to this theory, and aligned with social identity theory (van Knippenberg & Hogg, 2003), is the notion that individuals hold and develop both individual and relational (dyadic) identities as leaders and followers in a given context, and these identities are manifested through interpersonal interactions. DeRue and Ashford conceptualize the interactions as “claims” or “grants” of leadership and followership. Claims are the verbal and nonverbal actions taken to affirm one’s own leader or follower identity on another person, whereas grants are the actions taken to bestow one’s leader or follower identity on somebody else. Claiming and granting acts
occur as both initiations or as replies to other claims/grants. When claims of leadership are followed by grants of leadership (and vice-versa), the claimer’s leaders’ and followers’ identities (and in turn behaviors) in relation to one another are reinforced. This idea supports early work by Stogdill (1959), who posited that people informally assume leadership positions when they initiate actions and those actions are reinforced over time by other members’ acquiescence. Over time, through successive and iterative claims and grants, relatively stable patterns of interaction emerge alongside dyadic and group recognition of respective leader-follower relationships (DeRue, 2011). In short, leadership identity construction theory describes that leader-follower relationships are “constituted in relation to others” (Sparrowe, 2005, p. 421), from feedback and reinforcement in social interactional processes at the dyad level.

Leadership Identity Construction Theory maps on well to the input-process-outcome heuristic of leadership as a relational process because the outcome of the process is the leader-follower relationship, and antecedents of the process refer to individual, dyadic or contextual variables, such as individual attributes (Marchiondo et al., 2015), Implicit Leadership and Followership Theories (DeRue, 2011), and social context (Wellman, 2013). Despite this alignment, its prevalence, and its testability, formal empirical tests of leadership identity construction theory are almost absent from published research. One explanation might be the overreliance on static, self-reported, survey methods of leadership. In the next section, I discuss one alternative method that may help to unpack the “black box” of the leadership emergence process.

2.3 – Leadership Process from a Discourse-based Lens

The challenge in conducting process-oriented leadership research is not in the conceptualization and theorizing of leadership; it is in translating the relational process concepts
(e.g., claiming and granting; initiating and acquiescing) into observable, measurable and testable units. The most clearly observable units are behaviors. Behavioral approaches to leadership have long aimed to uncover individual behaviors associated with emergent and effective leadership (e.g., Bass, 1949; Fleishman, 1953). However, in these approaches, the behaviors reside at the individual level as opposed to the relational one. Needed are methods that examine behaviors of individuals in relation to one another, in context and over time. A viable solution is studying interpersonal communication.

The importance of communication for leadership is not a new idea. Tannenbaum, Weschler and Massarik (1961) defined leadership as “interpersonal influence, exercised in a situation, and directed, through the communication process, toward the attainment of a specified goal or goals (p. 24)” and Donelly, Ivancevich, and Gibson (1985) claimed, “Leadership is an attempt at influencing the activities of followers through the communication process and toward the attainment of some goal or goals” (p. 362). These approaches treat communication as the means through which leadership is enacted to accomplish group goals, but more recent conceptualizations view leadership more generally as communication itself. For example, Connaughton, Shuffler, and Goodwin (2011), defined discourse as “the constituting factor of leadership itself” (p. 501). Recent years have witnessed a rise in empirical research that bridges the domains of communication and organizational research. Organizational discourse analysis (ODA; Fairhurst & Uhl-Bien, 2012) is a family of techniques that each rely on various forms of interpersonal communication to better understand, describe, or define organizational phenomena (Alvesson & Kärreman, 2000).

ODA is comprehensive in scope, spanning multiple disciplines (e.g., psychology, sociology, political science, management; Fairhurst & Connaughton, 2014), paradigms (e.g.,
constructionist, post-positivist, critical, postmodern; Fairhurst, 2007) and methodologies (highly qualitative to highly quantitative, Fairhurst, 2007). Specifically with regard to leadership, ODA has been used to study conflict in leaderless groups (Lehmann-Willenbrock & Chiu, 2017), transformational leadership and problem solving (Lehman-Willenbrock et al., 2015), employee voice (Weiss, Kolbe, Grote, Spahn, Grande, 2017); LMX (Fairhurst, 1993), the impact of leadership context (Courtright, Fairhurst, & Rogers, 1989), and leader identity (Alvessor & Spicer, 2011), just to name a few.

Most commonly, these research studies use a form of ODA called interaction analysis, or interaction process analysis (IPA). Whereas critical and post-modern approaches to ODA focus is on understanding Discourse (big D) as a social system of thought that contextualizes and gives meaning to talk (Foucault, 1980), IPA focuses on talk-in-action, or language-in-use. It has its roots in early small group research studies that measured behavioral interactions of group members over time to understand group processes. The first use of the term interaction analysis dates to early work by Bales (1951), who used IPA to model behavioral interactions in groups. Interaction analysis typically uses a priori coding schemes to classify utterances as they unfold over time. The result is a large set of behavioral codes representing individuals’ meaningful utterances directed at other individuals. The set of codes are then analyzed to uncover sequential patterns or configurations of communication that themselves carry meaning or importance for the construct of interest.

Central to interaction analysis is the “interact” (Weick, 1979). The interact is a reciprocal verbal or nonverbal transmission of information from one person to another, that is, a communication from A to B and from B back to A. In this way, interaction analysis represents a relational process-oriented approach of leadership, moving beyond a static relationship to the
pattern of relations among dyads (Fairhurst & Uhl-Bien, 2012). Applied to leadership, interacts can be seen as dyadic, influential organizing sequences that are neither leader-centric, nor follower-centric (Fairhurst & Connaughton, 2014) because they focus not on how one person acts toward another but how one person acts and also how the other responds. Moreover, at the heart of relational perspectives is this process of interaction, dialogue, and communication (Dachler & Hosking, 1995). In sum, interaction analysis is well suited to study leadership processes for three primary reasons: 1) it is aligned with relational approaches; 2) it captures leadership “in the wild” as it is enacted in the social and environmental context (Fairhurst & Uhl-Bien, 2012) from which leadership cannot be separated (Carter et al., 2015); and 3) it is necessarily temporal in nature (Connaughton, et al., 2011). Not only is interaction analysis capable of capturing the moment-to-moment relational dialogue that underlies leadership relationships, but it allows for an understanding of how the dyadic interacts change or combine over time to form meaningful sequences that symbolize the leadership emergence process and result in emergent relationships (Murase, Poole, Asencio, & McDonald, 2017; Shamir, 2011).

Relational Control

Having shown the fit of interaction analysis for leadership research, I next turn to explaining more concretely how interaction analysis can be used to study leadership processes. One type of interaction analysis, called relational control analysis (“relational control”) aims to understand how people use language to exert control and influence on others (Rogers & Escudero, 2004). Every speech act can be characterized as a control move intended to either exert control (one-up; ⬆️), acquiesce control (one-down; ⬇️), or neutralize (one-across; ➔) control toward another person (Fairhurst, Green, & Courtright, 1995). A pair of contiguous control moves represents an interact, and together the pair represent a discernible relational
interaction pattern. A *complementary interact* is defined as a one-up move, followed by a one-down move, or vice versa (e.g., ▲▼; ▲▼). A *competitive symmetrical interact* is defined as a pair of sequential one-up moves (▲▲). A *submissive symmetrical interact* is a pair of sequential one-down moves (▼▼). A *neutralized interact* is a pair of one-across moves (⇔⇔). Finally, a *transitory interact* is a one-up or one-down, followed by a lateral move (▲⇔; ▼⇔; Fairhurst et al., 1995).

Dyadic patterns of relational control correspond well to theories of leadership interaction, such as those put forth by Stodgill (1959) and DeRue and Ashford (2010) because the patterns of assertion and acquiescence of control mirror the initiations and acquiesces of actions and claims and grants of leadership. Fairhurst et al. (1995) previously conceptualized relational control interacts in terms of leadership, but their aim was on understanding relationships between formal leaders and their subordinates, as opposed to the emergence of informal leadership. It should be noted, however that leadership is not synonymous with control (Stein et al., 1979). So in this study, I do not operationalize relational control interacts as leadership itself, rather, I conceptualize them more generally as verbal control moves, the patterns of which are manifestations of the emergence process underlying emergent leader follower relationships.

2.4 – Hypothesis Development

2.4.1 – Dynamics of the process. Inherent in any process is the role of time (Langley, Smallman, Tsoukas, & Van de Ven, 2013), and the leadership process is certainly no exception (Shamir, 2011). Alongside the call for the need for process-oriented leadership research are myriad calls for leadership researchers to better incorporate temporal dynamics (Day, 2014; Fischer et al., 2017, Leenders, Contractor, & DeChurch, 2017; Shamir, 2011). While studying interact patterns partially addresses this issue because it focuses on the fine-grained moment-to-
moment dynamics of consecutive behaviors, most sequential analysis collapse across time (e.g., Lehmann-Willenbrock et al., 2015). This approach provides little insight into the development and dynamic nature of the relational process, or how it changes and unfolds across time.

Kozlowski and Ilgen (2006) demonstrate the dynamic nature of team interactions, stating “that the repeated interactions among individuals that constitute processes tend to regularize, such that shared structures and emergent states crystallize and then serve to guide subsequent process interactions” (p. 81). Recall from Leadership Identity Construction Theory that the formation of leadership identities are iterative processes, manifested in successive claims and grants, which serve to either reinforce or challenge one particular leader/follower identity (DeRue & Ashford, 2010). For example, if person A claims (grant) of leadership on Person B, and person B fails to grant (claim) leadership back to person A, person A will likely re-evaluate his/her identity relative to Person B and subsequently adjust his/her behaviors.

As time progresses, the enactment-feedback-reenactment process of dyads’ interaction iteratively adjusts how each dyad member behaves until the interactions stabilize into a relatively consistent pattern. This is supported by Stein et al.’s (1979) valence model of leadership. Their model posits that all individuals in a working team have “valences” for others’ perceptions of them as leaders. When a team member initiates controlling behaviors, and when such behaviors are responded to with agreement or conformity, the initiator’s leadership valence increases, creating a positive spiral of leadership (DeRue & Wellman, 2009). The more valence people accrue, the more they are perceived as able to lead and the more the “dominance-submission” relationship becomes established among dyads (p. 134). When initiations of control are consistently responded to with subsequent assertions of control, conflict may exist or emerge between the dyad. However, Stein et al.’s empirical study of group interaction over time showed
that such conflict is not sustainable and dissolves. They found such interactions “crystallize” into “dominance-submission” norms and perceptions.

Dominance-submission behaviors can be conceptualized as complementary behaviors, and if dyadic interactions are theorized to stabilize toward them, then it could be argued that dyadic interactions are likely to stabilize toward complementarity. That is, over time, dyads will engage in more complementary interacts. Sociological research rooted in interpersonal circumplex framework (IPC; Horowitz, 2004; Kiesler, 1983) suggests people prefer engaging in complementary behaviors and will gravitate towards doing so. The IPC framework claims social interactions can be characterized by 1) their degree of friendliness and 2) their degree of dominance. People are apt to engage in similar behaviors along the friendliness dimension (friendly behaviors invite friendly behaviors) and complementary behaviors along the dominance dimension (dominant behaviors invite submissive behaviors, and vice versa). One test of this framework is an experiment by Tiedens and Jimenez (2003) who presented participants with particular behavioral scenarios and asked them to judge how they believed they were supposed to and would behave in response to either dominant or submissive behaviors. Results showed a significant preference for subsequent complementary behaviors. Similar findings have been reported in studies measuring actual behavioral interactions, both verbal (Dryer & Horowitz, 1997; Tracey, 2004) and nonverbal (Tiedens & Fragale, 2003), and the authors suggest these behaviors reflect cognitive schemas that behavioral interactions should be complementary (Tiedens et al., 2007).

If dyadic interactions systematically stabilize over time, and people prefer complementary interactions, then dyads’ behavior should stabilize toward complementarity, thus increasing the frequency of complementary interactions. According, I predict:
**H1:** The frequency of complementary interacts will increase over time.

### 2.3.2 – Outcome of the process.
Van Knippenburg and Sitkin (2013) claimed that one “fatal flaw” of leadership research is that the concept of leadership is confounded with its effects, or outcomes, such as effectiveness, satisfaction, or performance (Alvesson & Spicer, 2014; DeRue, 2011). In taking a process-oriented view of leadership, the outcome in this study is the result of the emergence process, or what has emerged (Grand et al., 2016): the mutual recognition of a leader-follower relationship.

Past research has examined emergent leadership relationships as outcomes, especially in the social network approaches to leadership (Carter et al., 2015; “Area 2: Leadership as Networks”). However, the majority of this research has three fundamental limitations. First, with the exception of a few studies (e.g., Holland, 2016), “relationships” are conceptualized as a perception from a single dyadic member. Instead, leadership relationships should be mutually recognized by both partners in order to be considered a true dyadic relationship (Duncan, Kanki, Mokros, & Fiske, 1984; Krasikova & Lebreton, 2012). Second, also with the exception of a select few (e.g., Emery, 2012; Kalish, 2014) antecedents of the relationships are individual characteristics (Anderson et al., 2008) or collective attributes (Zhu et al., 2011) as opposed to dyadic ones. Finally, the intermediately process by which antecedents impact relationship formation is not specified (van Knippenburg & Sitkin, 2013).

In this study, the process of dyadic interaction (as defined by interact patterns) is considered the antecedent to the emergent leader-follower relationships.¹ Morgeson and Hofman (1999) view interpersonal interactions as “the basic building block upon which all larger

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¹ It should be noted here that I understand the complexity of leadership the leadership emergence process involves the concurrent interaction of multiple simultaneous processes. Thus patterns of interpersonal interactions are not intended to represent the complete process of leadership emergence, but rather, gain insight on one of the micro-level processes involved.
collective structures are composed” (p. 252). Morgeson and Hofmann also theorize that actions and reactions among individuals in a collective form a pattern of interaction from which a social collective structure emerges. Moreover, empirical research suggests people have negative feelings toward symmetrical interactions. For example, when dominance is responded to with dominance and when submissiveness is responded to with submissiveness, conflict emerges between interaction partners (Stein, 1979). In particular, symmetry in dominance behaviors is related to power struggles and interpersonal frustrations (Horowitz et al., 2006; Tracey et al., 2001) and ultimately lower productivity (Grant et al., 2011). Furthermore, conflict in leader-follower relationships has been associated with negative outcomes for the dyad members (e.g., Wilheim, Herd & Steiner, 1993), and interpersonal conflict has been found to be negatively associated with the emergence of leadership (Bergman Rentsch, Small, Davenport, & Bergman, 2012). This suggests that, in general, complementary as opposed to symmetrical interactions will be associated with emergent leader-follower relationships. Thus, I predict:

**H2a**: Complementary interacts will be positively associated with the emergence of leader-follower relationships.

**H2b**: Symmetrical interacts will be negatively associated with the emergence of leader-follower relationships.

Whereas dyadic interacts are generally likely to be associated with emergent relationships, research also suggests that how the sequential patterns of dyadic interacts change over time (as predicted in H1) is also likely related to their emergence. The psychological entropy model of uncertainly posits that all social systems at any given time experience some level of psychological entropy, which is a state of “conflicting perceptual and behavioral affordances” (Hirsh, Mar, & Peterson, 2012; p. 304). The systems need to reduce, or dissipate,
psychological entropy in order to survive. They do so by adopting or readopting patterns of self-organization that align cognitive and behavioral affordances and maximize stable, low entropy states. If a system effectively adapts and self-organizes, what emerges is a stable, organized structure. If a system fails to effectively adapt and self-organize into a stable structure, it deteriorates.

Applied to this study, entropy may represent uncertainty in groups’ perceptions of emergent leadership. As the groups are leaderless, there exists large amount of uncertainty and entropy in the perceptions and behaviors of leadership initially. As dyads interact, they aim to reduce this uncertainty to achieve alignment in perceptions and behaviors of leadership and followership, characterized by stable and structured leader-follower relationships. If dyads fail to achieve these stable states of emergent leadership and followership, uncertainty increases, and mutual leader-follower relationships cannot emerge. Bales (1999) discussed a similar notion that there exist dual forces in groups that drive people to form either cooperative or conflicting relationships, and conflicting relationships either stabilize to form cooperative ones or degenerate completely (Stein, 1979). A final comparable notion is that of positive and negative spirals of dyads, as put forth in Leadership Identity Construction Theory. Accordingly, I expect dyads whose interactions stabilize into complementary and cooperative interactions (those that increase over time) reflect self-organization toward low levels entropy and will be positively related to the emergence of leader-follower relationships. Thus,

\[ H3: \text{The pattern of increasing complementary interacts over time (positive slope) will be associated with the emergence of leader-follower relationships.} \]

2.4.3 – Antecedents of the process. Studying the interactional process and emergent structure of leadership relations on their own is not enough to study the process of leadership. As
Antonakis made clear in his exchange with Fairhurst (Fairhurst & Antonakis, 2012), dyadic relations, no matter how they are conceptualized (e.g., communication, perceptions, etc.), are endogenous variables. These endogenous variables in process models have exogenous antecedents that cause their existence. In order for process models to be useful, Antonakis claimed, the antecedents of the relationship must be modeled completely. In this case, interactional patterns of control arise from one or more variables occurring at one or more levels. So, to fully understand the process of leadership emergence, we must understand the antecedents of those processes. Applied to emergence theory, antecedents of the leadership emergence process may represent some of the “core concepts” involved in the process (Grand et al., 2016), and the dyadic interactional processes represent the mechanisms through which the “core concepts” impact emergent leader-follower relationships.

In general, antecedents of leadership are most commonly studied at the individual level, particularly focusing on individual attributes, behaviors or perceptions. In addition, a great deal of leadership research has focused on macro-level predictors, such as context (Zaccaro, Green, Dubrow, & Kozle, 2018). In the leadership domain, dyadic level antecedents are rare, at best (Krasikova & LeBreton, 2012). Yammarino and Gooty (2017) claimed the dyad is “the most neglected and poorly understood level analysis in leadership research” (p. 229). This is surprising given leadership is inherently dyadic (Uhl-Bien, 2006). If understanding the relational process of leadership necessitates studying how a pair of individuals form patterns of interaction, then the antecedents of these interactional processes must also focus at the very least on characteristics of a pair of individuals. Thus, in this section, I heed calls to build the study of leadership at the dyadic level (e.g., Carter et al., 2015; Krasikova & Lebreton, 2012, Uhl-Bien & Fairhurst, 2012) by developing hypotheses that extend traditional individual level antecedents of
leadership outcomes to dyadic level antecedents of dyadic relational control processes.

In particular, I make the case for complementarity, or dissimilarity, in individual differences among dyads as predictive of complementarity in relational communication patterns. In leadership research, the predominant belief is that dyadic similarity predicts (effective) leader-follower relationships and positive outcomes. Theories claim individuals are more attracted to similar others (Attraction-Similarity Theory; Bryne, 1971; Attraction-Similarity-Attrition Paradigm; Schneider, 1987). However, turning to research outside the leadership field reveals the potential importance of dyadic dissimilarity, or complementarity, especially regarding relational processes. For example, in teams research, there is a growing recognition of the importance of compilation models, which emphasize the differences among team members. The positive effects of dissimilarity in team composition have been studied across a variety of constructs, including individual differences in personality (e.g., Barrick, Stewart, Neubert, & Mount, 1998; Humphrey, Hollenbeck, Meyer, & Ilgen, 2007), demographics (e.g., Jackson, Brett, Sessa, Cooper, Julin, & Peyronnin, 1991), and knowledge (Shin & Zhou, 2007). In addition, in the sociology and social psychological literature, interpersonal theory suggests people often prefer interpersonal complementarity, or dissimilarity (Carson, 1969), especially with when working on interpersonal tasks (e.g., Dryer & Horowitz, 1997; Tiedens et al., 2007). Accordingly, I examine the role that dyadic complementarity plays in the leadership process.

**Dominance.** Dominance is consistently found to be one of the strongest predictors of the emergence of leaders in groups (Judge et al. 2002; Lord et al., 1986). This is likely because dominant people prefer to control and master others in a group (Horowitz et al., 2006), and this inclination drives assertive and domineering behaviors toward group members (Tiedens & Fragale, 2003). For example, in an interaction-based lab study by Lock and Saddler (2007), two
individuals were instructed to complete a decision-based task, which required a significant amount of interaction. They each rated themselves on dominance efficacy, which resembled self-report measures of dominance, and then completed the task. Behavioral interactions were recorded and coded for the degree to which they were domineering, or controlling in function. Results showed a positive relationship between dominance efficacy and domineering behaviors toward the task partner. This suggests dominant people tend to enact domineering and controlling behaviors.

At a relational level, the similarity and dissimilarity in dominance between two individuals may impact their interactional patterns (Tiedens & Jimenez, 2003). A dominant expression can be followed by either a submissive expression or another dominant expression (Tiedens & Fragile, 2003). If two individuals are high on dominance they are likely to both express dominance behaviors toward each other, resulting in a power struggle (Schmid Mast, 2010). The close relationship between dominance and control would suggest the same for relational control patterns. Individuals both high on dominance are likely to engage in symmetrical competitive dyadic interacts. Symmetrical competitive interacts represent a series of challenges and counterchallenges, reflecting competition for control of the social hierarchy (Muniz de la Pena, Friedlander, Escudero, & Heatherington, 2012). Since dominant individuals aim to keep control of their social position or status (Grant et al., 2011), they are likely to respond to threats of dominance with domineering behaviors. This is also aligned with leadership identity construction theory, which states that if one identifies as a leader, as is often the case with dominant individuals (Judge, Piccolo, & Kosalka, 2009), he/she is likely to respond to claims of leadership with subsequent claims (DeRue & Ashford, 2010).

On the other hand, individuals low on dominance tend to engage in submissive
interactions in a group, where they often defer to others to make decisions and resolutions (Dryer & Horowitz, 1997) and engage in non-dominant behaviors (Lock and Saddler, 2007). Thus, the behavioral patterns of dyads with members who both score low on dominance are likely characterized by successive expressions of non-dominance, or grants of leadership (DeRue & Ashford, 2010). In terms of relational control, these represent symmetrical moves that both acquiesce of control, or, in other words submissive symmetry, whereby each defers to the other to decisions and resolutions.

Finally, when one dyad member is high on dominance, and one dyad member is low on dominance (i.e., they are dissimilar), the highly dominant member, inclined to exert leadership and control, is likely to do so, and the non-dominant member is likely to submit to such behaviors. That is, non-dominant individuals are likely to respond to assertions of control with acquiescence or seek responses of control. These types of exchanges are called complementary interacts and are aligned with dominance complementary theory (Kiesler, 1983) and research suggesting most individuals have preferences to engage in dyadic interactions characterized by behavioral complementarity (Carson, 1969; Dryer & Horowitz, 1997; Tiedens & Fragale, 2003; Tiedens & Jimenez, 2003). I therefore hypothesize:

*H4a: Dyads’ dissimilarity in levels of dominance will be positively associated with the frequency of complementary interacts.*

*H4b: Dyads’ similarity in levels of dominance will be positively associated with the frequency of symmetrical interacts.*

**Leadership self-efficacy**

Leadership self-efficacy (LSE) is one’s own self-conceptions as to his/her abilities to be effective as a leader (Chemers, Watson, & May, 2000; Murphy & Eshner, 1999). LSE has been
found to be positively associated with a variety of leadership outcomes (Ng et al., 2008; Paglis, 2010). For example, a study Chemers, et al. (2000) examined the relationship between leader emergence and performance in a group of military cadets and individual leadership self-efficacy. Results showed leadership self-efficacy predicted ratings of cadet leadership potential by the cadets’ instructors. Similarly, a study by Anderson and colleagues (2008) found managers’ levels of LSE to be positively associated with ratings of leadership effectiveness.

While the vast majority of research examining LSE has been conducted at the individual level, existing theory and research suggests similarity and dissimilarly of LSE between dyad members likely impact dyadic interactions. First, evaluations of the self are inherently relational, as posited by Social Comparison Theory (Festinger, 1954), which suggests that evaluations or perceptions of the self (e.g., LSE) can only be made by comparing the self to others in social situations. Furthermore, if individual LSE is a key antecedent of how an individual behaves in a group (Social Cognitive Theory; Bandura, 2001), then it follows that a key antecedent of how a dyad behaves is likely a conceptualization of LSE at the dyad level. The importance of considering LSE at the dyad level was emphasized by Hannah, Avolio, Luthans, and Harms (2008) in the development of their multilevel and multivariate model of LSE. As part of their model, Hannah et al. argued outcomes of LSE can manifest at the dyad level. I propose one of such outcomes is dyadic behavior.

Empirical research shows there is a positive relationship between individual levels of LSE and attempts to assume leadership roles, for both working adult samples (Paglis & Green, 2002) and student samples (McCormick, 2002). Similarly, Paglis and Green’s (2002) research suggests these leadership attempts are related to the finding that those with high LSE are more likely to see situations as controllable and act accordingly. If those with high LSE are likely to
engage in behaviors to exert control, and those with low LSE are likely to behave the opposite way, then behavioral exchanges between dyads where members have dissimilar levels of LSE are likely to be characterized by patterns of exertion (from high LSE member) and acquiescence (from low LSE member) of control. This complementary pattern of interaction is likely to perpetuate, since research shows interpersonal and social feedback from others reinforces LSE beliefs (Hannah et al., 2008). As the exertions of control from those with high LSE are responded to with acquiesces of control by those with low LSE, the self-perceptions of each individual’s abilities to lead in a situation are reinforced and strengthened (Quigley, 2013), then likely subsequently manifested in complementary interacts. In addition, research shows the more similar dyads are in LSE, the less likely they are to share cooperative goals and rate their relationship positively. (Chen et al., 2015). If dyads do not share cooperative goals, and if goals guide behavior, then it is likely that dyads that share more similar levels of LSE are more likely to engage in symmetrical interacts. Accordingly, I predict:

\( \text{H5a: Dyads’ dissimilarity in levels of LSE will be positively associated with the frequency of complementary interacts.} \)

\( \text{H5b: Dyads’ similarity in levels of LSE will be positively associated with the frequency of symmetrical interacts.} \)

\textbf{Implicit Leadership and Implicit Followership Theories}

While I have conceptualized leadership as an inherently perceptual and relational process, the majority of the discussion thus far has focused more so on the behavioral interaction components of relations rather than their cognitive components. However, the cognitive components of relations have long held importance in the study of leadership (Dinh, Lord, Gardner, Meuser, Liden, & Hu, 2014). In fact, research on implicit theories of leadership and
followership suggests that the process of leadership emergence begins with cognitive
components, specifically, with cognitive schemas and prototypical representations that people
hold of leaders and followers. These representations are referred to as implicit leadership theories
(ILTs; Lord et al., 1984; Lord & Maher, 1991) and implicit followership theories (IFTs; Sy,
2010). As with other natural cognitive categorization (Rosch, 1977), people use the cognitive
heuristics of ILTs and IFTs to respectively categorize others as leaders and followers (Lord &
Maher, 1991). The more closely the characteristics one perceives in another match the
characteristics contained in the perceiver’s ILT (IFT), the more likely the perceiver is to
categorize the other person as a leader (follower). Because ILTs and IFTs are theories about
people in their entirety, a stream of ILT/IFT research takes a pattern-oriented approach to
identify profiles of ILTs and IFTs (e.g., Foti, Bray, Thompson, & Allgood, 2012). Research
shows there likely exist four ILT profiles (Prototypical, Laissez-faire, Autocratic, and Anti-
prototypical) and four IFT profiles (Exemplary, Pragmatic, Isolated and Passive), which are
discussed in further detail in Appendix A and below.

ILTs and IFTs are important for understanding how people interact with one another for
multiple reasons. First, because people behave as leaders and followers in accordance with the
ILTs and IFTs they hold for those roles (Lord & Maher, 1991), ILTs and IFTs guide how people
behave as leaders and followers generally (van Gils et al., 2010). Second, ILTs and IFTs give
meaning and sense to the behaviors of others (Shondrick & Lord, 2010); they frame how
behaviors are interpreted. Thus, ILTs and IFTs are important for interpreting others’ behaviors.
Finally, ILTs and IFTs influence how people choose to respond to certain behaviors (DeRue &
Ashford, 2010), depending on how one categorizes the self and the others involved in the dyad.
Thus, dyad members’ ILTs and IFTs are inextricably linked to how the dyad interacts,
underscoring the importance of studying ILTs and IFTs at the dyad level.

While the vast majority of ILT and IFT research has been conducted at an individual level (assessment of either ILTs or IFTs from one dyad member’s point of view) a growing body of research has extended ILT and IFT research to the dyad level (Epitropaki, Sy, Martin, Tram-Quan, & Topakis, 2013). Most commonly, ILT and IFT research at the dyad level focuses on congruence, or alignment, of ILTs and IFTs. Congruence of ILTs and IFTs has been studied in various ways. First, intra-personal congruence concerns the alignment of ILTs and/or IFTs within a person. One intra-personal approach, though rarely conducted, examines the patterns, or alignment, of one’s ILT and IFT. For example, Coyle and Foti (2015) found people who hold prototypical ILTs are most likely to hold exemplary IFTs, and people who hold autocratic ILTs are most likely to hold pragmatic IFTs. Another type of intra-personal congruence approach examines the degree to which one’s implicit leadership or followership theory aligns with his/her explicit rating of another person on that same ILT or IFT scale. For example, Epitropki and Martin (2005) showed that the more congruent employees’ explicit perception of their managers were with their own ILT, the higher the quality of the dyads’ relationship (LMX).

The second broad category of ILT/IFT congruence is inter-personal congruence. The most common inter-personal congruence method focuses on the match between dyad members’ ILTs or IFTs. For example, Engle and Lord (1997) as well as Coyle and Foti (2014) found that when dyad members hold similar ILTs, they tend to rate their relationship quality higher. This is likely because when people hold different ILTs and IFTs they accordingly hold differential expectations, perceptions, and attributions of the other dyad members (Coyle & Foti, 2015; Engle & Lord, 1997; van Gils et al., 2010). If one dyad member’s schema of a leader is the same as the other dyad member’s, then the expectations that both have of a follower are similar and
aligned. Thus, when one dyad member behaves in accordance with what he/she believes is a follower role, for example, the other dyad member will also perceive those behaviors as follower-like and as exertions of follower identity (Coyle & Foti, in press; van Gils et al., 2010).

One step beyond inter-personal congruence on either ILTs of IFTs is inter-personal congruence on both ILTs and IFTs. This approach takes a truly relational perspective because it measures both ILTs and IFTs from both dyad members. To my knowledge, there is only one study investigating this concept, and it is focused on the effectiveness of the relationship between dyad members in formally designated leader and follower roles, as opposed to their emergence (Coyle & Foti, under review). However, a similar premise holds for emergence as for effectiveness: when dyad members hold the same (or similar) conceptualizations of what constitutes a leader and what constitutes a follower, they not only mutually and similarly understand the roles of leadership and followership, but they likely behave in similar ways in response to and initiation of leadership and followership.

Take, for example, a situation where both dyad members share full interpersonal congruence on ILTs and IFTs, meaning they both hold the same ILT and IFTs. That is, Person A and Person B both hold autocratic ILTs and passive IFTs. If Person A initiates an autocratic behavior, Person B will perceive that behavior as leader-like. Then, according to Leadership Identity Construction Theory, Person B has the opportunity to “claim” or “grant” leadership back toward Person A. If the Person B decides to assume a followership relational identity toward Person A, he/she will likely respond with a passive behavior. Person A will likely interpret this behavior as follower-like, since Person A also holds a passive IFT. In this way, both dyad members understand each other’s roles relative to the other and act accordingly, and a pattern of complementary interactions likely follows. Alternatively, if Person B decides to claim leadership
back on Person A, then he/she will likely enact an autocratic behavior in accordance with his/her ILT. Following the hypothesis described above, since Person A would have accurately perceived Person B’s autocratic behavior as leader-like, they each understand each others’ roles and aim to reduce conflict by gravitating toward complementary interactions. In both situations, role clarity makes it more likely that dyads engage in complementary interactions. If dyad members were only congruent on ILTs, only IFTs, or on neither (full interpersonal incongruence), dyad members would share less of an understanding of each other’s roles relative to the other and would thus engage in less complementary behavior. Accordingly, I predict:

\[ H6: \text{Dyads’ with more inter-personal ILT and IFT congruence will be positively associated with the frequency of complementarily interacts.} \]

In sum, Chapter 2 focused on the motivation for this dissertation, how it contributes to the science of leadership emergence, relevant literature and theory, and predictions. I discussed the misalignment of the theory-method of leadership emergence as a process as well as the need to understand the micro-level interactional process mechanisms that underlie emergent leaders and followers. I reviewed relevant literature leading to my hypotheses and conceptual model, which are depicted in Figure 1 and Figure 2. In the next chapter, I discuss the method for testing these hypotheses.
3.1. – Data Source

Data for this study was collected as part of a larger dataset and funded in part by the Virginia Tech Graduate Student Assembly (GSA). Data was collected in a naturalistic classroom setting for twelve weeks over three semesters: Fall 2015, Spring 2016, and Fall 2016. The course was an ideal setting for this study because it included a team project component, where students were assigned to groups to collectively work on three projects throughout the course of the semester. The class met three days per week for 50 minutes, one of which (Wednesdays) was devoted to working together in their teams to complete the projects. While intra-team interaction data were collected in person in the classroom one day per week for twelve weeks, only the first four weeks of data- corresponding to the first project- were included in this study.

3.2. – Participants

The initial sample of participants included 127 undergraduate students (68% female) from three introductory Industrial/Organizational Psychology courses at a large southeastern university. All students from all three courses (100%) consented to participate in the study and were compensated up to 12 extra credit points for their participation. For each class, participants were stratified based on gender and academic major, then randomly assigned to teams of four to six. This stratification ensured group heterogeneity based on gender and academic major. Each group included at least one male and at least two students with majors outside of Psychology. This process was intended to yield a total of 25 four to six person teams. However, due to a technical malfunction with a voice recorder, two weeks of audio data were unable to be coded for one group. This group was thus dropped from the analysis. Final sample size included 24 teams, 119 individuals, and 238 dyads.
3.3 – Procedure

On the first day of class, the class professor explained to the students the structure of the course and the team project component. At the end of the first class, the researcher made a presentation to each class, recruiting their participation in a “team interaction project.” Students were informed that if they participated, the data collection would span twelve weeks (one class per week, and two additional surveys) and included the opportunity to receive one point of extra credit for each week they participated (up to 12 points). They were informed that aside from the extra credit, their participation would have no impact on their grades or assessment in the course. After the researcher’s presentation, students were administered and completed informed consent forms (Appendix B). Next, all consenting participants were sent a link to complete an online Qualtrics survey measuring individual difference characteristics, which included measures of Dominance, Leadership Self-efficacy (LSE), Implicit Leadership Theories (ILT), and Implicit Followership Theories (IFT). In the meantime, the researcher randomly assigned participants to teams, but stratified them such that at least one male and at least two non-Psychology majors were included in each team. Additionally, in an attempt to prevent assignment of friends to the same group, individuals sitting next to each other (semester 1) or at the same table (semester 2 and 3) were not assigned to the same group. Students received their team assignments prior to the following week (the first week of data collection).

The following week (second week of class and first week devoted to team projects), the class instructor explained their first project, which they were to work on and complete over the next four weeks. This project entailed conducting a job analysis of one team member’s previously held job. It included four actionable sub-tasks: 1) assembling an action planning

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2 Note: this questionnaire also included a questionnaire to measure Leadership Structure Schemas, which was not included in this study.
worksheet, outlining what the team aimed to accomplish each week; 2) conducting a structured interview of the person holding the job and a post-interview assessment in order to gather information on job tasks and relevant KSAOs; 3) gathering information regarding comparable jobs from O*NET; and 4) assembling a job summary report to turn in to be graded. For the remainder of the four weeks, teams worked together in class for 50-minutes once per week to complete the project. Throughout this time, verbal interactions between team members were recorded using audio recorders that were placed on each team’s table. As soon as all team members arrived, each team member identified his/herself verbally (e.g., “Hi my name is X, and I am here today”), so that voices could be matched with names during the coding process.

At the end of each class, participants were administered a questionnaire, which included questions about team member attendance, leadership and followership, and team productivity. As a potential control, the first of these questionnaires included a single item asking whether any of the team members were previously friends or acquaintances prior to the first day of class. Only the attendance and friendship data from these questionnaires were used for this study. Finally, at the end of the semester, all participants were sent a link to a questionnaire that included multiple measures of team states (e.g., team viability, psychological safety) not included in this study, as well as two single-item questions regarding who in the team the individual led and whom he/she followed throughout the semester.

3.4. – Measures

3.4.1. – Antecedent measures.

Dominance. Dominance was measured using the dominance subscale of the California Psychological Inventory (CPI; Gough, 1990), which is included in Appendix C. It has previously been found to be reliable (α=.88; Foti & Hauenstein, 2007) and includes 46 true/false items such
as, “I like to give orders and get things moving” or “Taking charge comes easy to me.” Item responses of “false” were coded as “0,” and item responses of “true” were coded as “1,” and the reversed scoring was conducted for the negative items. Item responses were summed to produce the total dominance score.

**LSE.** LSE was measured with the Paglis & Green’s Leadership Self-Efficacy Scale (Paglis & Green, 2002), which assessed one’s own perceptions of his or her abilities to succeed as a leader. The LSE measure has previously been found to be reliable (α=.85; Wellman et al., 2014) and is included in Appendix D. Participants rated their self-confidence in 11 leadership abilities on a 7-point scale (Extremely Unconfident to Extremely Confident). Example items include, “planning ability,” “setting direction,” and “overall leadership effectiveness.” Item responses were summed to produce the total LSE score.

**Dyadic similarity and dissimilarity in dominance and LSE.** Dyad members’ similarity and dissimilarity on dominance and LSE were each calculated using the absolute difference scores between dyad members’ respective levels of each attribute. While difference scores have been used in recently published leadership and followership research to operationalize levels of dyadic similarity (e.g., Venkataramani, Green, & Schleicher, 2010; Wang & Peng, 2016), I recognize the methodological limitations associated with them (Edwards, 1994). Due to restrictions of sample size, ideal methods to calculate similarity (i.e., polynomial regression; Edwards, 2001) were not possible. These limitations will be discussed in more detail in the Results section.

**ILTs.** ILTs were measured with Epitropaki & Martin’s 31-item ILT scale (2004), which is a shortened version of the original 41-item scale developed by Offermann, Kennedy and Wirtz (1994), included in Appendix E. The measure asks participants rate how descriptive each of the
31 characteristics were of their typical leaders. Each of characteristics, presented without definitions, were rated on a 9 point scale, with 1 representing not at all characteristic and 9 representing extremely characteristic. The scale consists of the following six factors: sensitivity (n= 8 items), intelligence (n= 6 items), dedication (n= 3 items), dynamism (n= 5 items), tyranny (n= 7 items), and masculinity (n= 2 items). Cronbach’s alpha demonstrated adequate internal reliability for each of the factors (sensitivity $\alpha = .867$; intelligence $\alpha = .838$; dedication $\alpha = .780$; dynamism $\alpha = .694$; tyranny $\alpha = .870$; masculinity $\alpha = .845$) and for the overall scale ($\alpha = .874$).

IFTs. IFTs were measured with Sy’s 18-item ILT scale (2010), included in Appendix F. Each of characteristics, presented without definitions, were rated on a 9 point scale, with 1 representing not at all characteristic and 9 representing extremely characteristic. The scale consists of the following six factors, each with three items: industry, incompetence, conformity, enthusiasm, insubordination, and good citizen. Cronbach’s alpha demonstrated adequate internal reliability for each of the factors (industry $\alpha = .909$; incompetence $\alpha = .805$; conformity $\alpha = .799$; enthusiasm $\alpha = .800$; insubordination $\alpha = .814$; good citizen $\alpha = .797$) and for the overall scale ($\alpha = .925$).

Dyadic congruence in ILTs and IFTs. To measure dyads’ congruence on ILTs and IFTs, I followed a sequence of three steps. First, I measured participants’ ILTs and IFTs. Second, based on profile combinations previously identified by Coyle and Foti (2015), I assigned participants’ ILTs to one of four different profiles and participants’ IFTs to one of four different profiles. Patterns of factor combinations for each profile are included in Appendix A. ILTs include four profiles: Prototypical, laizzez-faire, autocratic, and antiprototypical; and IFTs include four profiles: Exemplary, pragmatic, isolated, and passive. To assign individuals to ILT and IFT profiles, I conducted a k-means cluster analysis, specifying four clusters. Since cluster
analyses require large sample sizes, I supplemented the ILT and IFT participant data from this study ("study data") with an archival data set (n = 555) acquired form the Virginia Tech SONA system ("supplemental data"). Individuals in the supplemental data set resembled individuals in the study data, as they were also undergraduate students from the same university, enrolled in at least one Psychology course. Table 1 includes the results of both the ILT and the IFT k-means cluster analyses run on the combined sample (study data and supplemental data), as well as factor means within each cluster and cluster n-sizes. Table 2 represents results from the same analyses, with the only difference being factor means and n-sizes calculated for the study data only. Once profile assignments were made, the third step involved assigning dyads to ILT/IFT congruence categories. Dyads were assigned to one of four dyadic congruence classes, based on whether or not dyad members’ ILTs and IFTs aligned. Following Coyle and Foti (under review) and Van Gils et al. (2010), dyads can show 1) full interpersonal congruence on both ILTs and IFTs (i.e., each hold the same profiles of both ILTs and IFTs); 2) full interpersonal incongruence on both ILTs and IFTs (i.e., each hold the different profiles of both ILTs and IFTs); 3) congruence on only ILTs (i.e., each hold the same profiles of ILTs but different profiles of IFTs); or 4) congruence on only IFTs (i.e., each hold the same profiles of IFTs but different profiles of ILTs). Numeric dummy codes were assigned to each of the four categories.

3.4.2 – Process measure.

**Dyadic interacts.** As described above, dyadic interacts include a pair of mutually directed verbal interactions. Coding interacts was a three-step process: 1) coding sense units; 2) transforming sense units into *moves*; 3) combining moves into interacts. The coding scheme for these interacts (See Appendix G) is an amended version of Fairhurst’s Relational Control Coding Scheme (1989), which has previously been used as a means to operationalize leadership
Assigning codes to sense units. Only task-relevant verbal units of communication, or “sense units” (Bales, 1951; Lehmann-Willenbrock & Allen, 2017; Weiss et al., 2017) were coded. A sense unit was defined as any utterance representing one complete thought, or an attempt at a complete thought (in the case of interruptions). Each sense unit was assigned four different codes: the speaker, the recipient, the form, and the mode. The speaker represented who expressed the sense unit and can include any one of the team members. The recipient represented to whom the sense unit was directed. The recipient could include any one of the team members, plus the team in its entirety (c.f., “talking to the room,” Kolbe et al., 2014). The form represented the structural nature of the sense unit and included the codes question, assertion, and talk-over (successful and unsuccessful). The mode represented the function of the sense unit in conversation and included the codes support, nonsupport, extension, instruction. For example, a single sense unit might have been coded as Speaker 1-Speaker 2-Assertion-Instruction.

A sense unit could range in length from a single word, to a phrase of multiple words, to multiple sentences. In addition, any change in any of the four corresponding codes within a single utterance required an additional independent code. That is, if Speaker 1 directed a question of nonsupport to Speaker 2, and then continuously proceeded to direct an assertion of support to Speaker 3, two codes were assigned to the single utterance from Speaker 1. An example transcript of codes is included in Appendix H.

Aside from non-task related utterances, there were instances when utterances and sense units were excluded from this study’s analysis. If an attempt at an utterance was made and no meaningful sense could be determined from the utterance (i.e., no form and/or mode could be assigned), the utterance was not coded and thus excluded. If the voice of a speaker or recipient of
a sense unit was not identifiable, the utterance was assigned the code “ambiguous” for speaker or recipient and thus excluded. If the code did not fit into a particular form or mode category, it was coded as “other” and thus excluded. Finally, while it was initially proposed to conduct analyses in two ways, once including utterances directed toward the group (each team member becomes a recipient) and once excluding utterances directed toward the group, issues with data aggregation in the coding program prevented the ability to assign all team members as recipients. Thus, utterances directed toward the group were excluded from analyses.

**Transforming sense units into relational control moves.** As shown in Appendix G, the combination of the form and the mode produced one of three relational control codes, best denoted with arrows. A one-up move (↑) indicated an attempt to verbally assert control toward the recipient(s); a one-down move (↓) indicated an attempt to verbally acquiesce control toward the recipient(s); and a lateral move (→) indicated an attempt to neither assert nor acquiesce, but neutralize control toward the recipient(s). Upon completion of coding, the form and mode of each coded sense unit was recoded into one of the relational control arrow moves, so that each sense unit included a speaker, a recipient and a relational control move.

**Combining moves into interacts.** The final step entailed combining sequential pairs of relational control moves between dyad members into dyadic interacts. As defined in past relational control research (de la Pena et al., 2012; Fairhurst, et al., 1995), a complementary interact was defined as a one-up move, followed by a one-down move, or vice versa (↑↓; ↑↑). A symmetrical interact was defined as a pair of sequential one-up moves (↑↑) or as a pair of sequential one-down moves (↓↓). For the purposes of this study, interacts including lateral moves were not analyzed. Because dyads engaged in different amounts of communication, the raw frequency counts of complementary and symmetrical interacts were
standardized by the total number of interacts dyads engaged in throughout each time point (T1-T4). The result was a percentage of all interacts that were complementary and symmetrical.

*Training the coders and the coding process:* All verbal interactions were coded directly from the audio recordings, as opposed to transcriptions of the interactions. Research shows coding based on video and audio observations more accurately captures interpersonal processes than coding based on transcriptions of data alone (Nicolai, Demmel, Farsch, 2010). All coding was conducted using INTERACT software (Mangold, 2010), a coding and statistical analysis program that provides a platform to develop codebooks, code behavioral data, and analyze interaction based data (Figure 3). Coding was primarily (~83%) conducted by two undergraduate research assistants studying Psychology and one graduate I/O Psychology Ph.D. student, all blind to the hypotheses of this study. Due to timing constraints, I coded 17% of the audio data.

Prior to coding, coders engaged in extensive training, practice and feedback, codebook refinement and tests of agreement. Formal training included the following: approximately 10 hours (2 weeks) of education of literature on leadership communication (e.g., Lehman-Willenbrock et al., 2015) and relational leadership processes (e.g., DeRue & Ashford, 2010); approximately 15 hours (3 weeks) of education on relational control coding and research (e.g., Courtright et al., 1989) and definitions of the codes included in the codebook; and approximately 25 hours (4 weeks) of coding practice and feedback, both independently and as a group. Throughout this time, inclusion criteria for what to code, definitions of codes and the decision tree for coding were refined.

Upon completion of training, pairwise agreement was calculated among all 6 pairs of coders. Given coding required first identification of an utterance as a code-able sense unit (unitizing) and then assigning form and mode codes to each sense unit, calculating agreement
among coders required multiple steps, as recommended for sequential behavioral observation research for this type of data (Bakeman, Quera, & Gnisci, 2009; Lehmann-Willenbrock & Allen, 2017).

The first step consisted of testing agreement on the unitization of utterances, or whether an utterance was considered a task relevant sense unit and thus “code-able” (i.e., subsequently coded for relational control). To do so, two separate segments of audio data were selected. For each segment, I recorded the start and stop time of every utterance made throughout the time sequence. I purposefully parsed apart some utterances that could be perceived as containing multiple sense units. Next, all coders independently rated whether or not they considered each utterance as a task-relevant, code-able sense unit (“1”) or not (“0”). The second step consisted of testing agreement on the form and mode codes. To do so, two separate and different samples of audio data were selected. For each segment, I coded the start and stop time of every task-relevant, code-able sense unit. Next, all coders independently coded each utterance for form and for mode. Finally, agreement indices were calculated for each of the three coding categories. Since there were four coders, agreement for each coding category (i.e., unitization, form, mode) was calculated using Light’s Kappa (1971), with is an algebraic mean of all pairwise kappa values. Results showed adequate agreement across all three coding categories ($k = .83$ for unitization; $k = .76$ for form, and $k = .68$ for mode). In an attempt to maintain levels of agreement, coders met bi-weekly throughout the coding process (~20 weeks) to collectively discuss questions, concerns or idiosyncrasies. Following recommendations by Omerod & Ball (2017) to check for coding “drift” in agreement after substantial periods of time, I replicated the previous procedure upon completion of 2/3 of the audio recordings. Results of this coding drift study revealed higher Light’s Kappa values for all three coding categories ($k = .77-.84$), likely a
result of bi-monthly coding discussions.

3.4.3 – Outcome measure.

Emergent leader-follower relationships. At the end of the semester, participants were asked to reflect back on their semester and list the names of their team members they relied on most for leadership and the team members they led the most (Appendix I). Following suggestions to measure and operationalize leadership relationships from both the perspective of the emergent leader and emergent follower (Gooty et al., 2012), and following research on perceptual disconnects in leadership relationships (Holland, 2015), an emergent leader-follower relationship was operationalized as an instance when both dyad members agreed that one member was the leader and one member was the follower. Because dyad members could agree and disagree with regard to dyadic leadership and followership, each dyad was capable of being characterized by one of the following six scenarios shown in Table 3: 1) both dyad members agreed they both led each other (“shared leadership relationship”); 2) both dyad members agreed the did not lead each other (“naught leadership relationship”); 3) both dyad members agreed that only one dyad member led and only one dyad member followed (“complementary leader-follower relationship”); 4) both dyad members agreed that one of the dyad members followed, but they disagreed about the other dyad member (“partial agreement, follower”; 5) both dyad members agreed that one of the dyad members led, but they disagreed about the other dyad member (“partial agreement, leader”); and 6) both dyad members disagreed on both members leadership and followership (“complete disagreement”). Although dyad members’ agreement and disagreement on who led and who followed is an interesting question in itself, the outcome of interest in this study was a complementary leader-follower relationship (i.e., one dyad member led and one dyad member followed), not agreement or disagreement in that relationship. Thus,
only results pertaining to the first three scenarios (shared leadership relationship, naught leadership relationship, and complementary leader-follower relationship) were reported in the results.

3.4.4 – Control measure.

*Friendship/acquaintances.* In order to control for previous (leadership) relationships or behaviors due to friendship or liking, students were administered a sociometric measure stating, “Please select your relationship status with each of your team members prior to this class: friend, acquaintance, did not know him/her.”

In sum, chapter 3 focused on specifying the process through which data for this study were collected, operationalized, and coded. I discussed the quasi-naturalistic nature of the study context and participants’ teams included in the study, the process for preparing the data for analyses, and coding the longitudinal interaction process data. In the next chapter, I review the process for analyzing the collected data and results from the analyses.
Chapter 4 – Results

4.1 – Descriptive Statistics, Correlations, and Reliability

Table 4 presents intercorrelations of study variables collected at the individual level, as well as their respective means, standard deviations and reliabilities. Cronbach’s alpha values = for all individual difference scales (dominance, LSE, ILT, IFT) showed they were adequately reliable (α = .783-.93). The variables “up moves sent” and “down moves sent” refer to their respective percentage of individuals’ coded sense units directed toward a team member. In place of scale reliabilities, the diagonals of these variables represent the range of initial Light’s Kappa statistics. Finally, the “leader claims” and “follower claims” refer to the quotient of the number of team members reported having led/followed and the total number of team members minus 1. Given both were single-item scales, no reliabilities are reported.

There exist significant intercorrelations of individual level variables. Most notably LSE and dominance were highly positively correlated (r = .650, p < .001), which is consistent with previous research (e.g., Foti & Hauenstein, 2007). Neither the percentages of up or nor down moves were correlated with individual differences at the individual level of analysis. However, relationships did exist between individual differences and leader claims. Leader claims, were positively correlated with both dominance (r = .214, p < .05) and LSE (r = .325, p < .05). Finally, follower claims were positively associated with down moves (r = .200, p < .05), and negatively associated with lateral moves (r = -.191, p < .05).

For dyadic level variables, intercorrelations, means, and standard deviations of continuous variables are presented in Table 5. As with the individual level, difference scores for dominance and LSE were positively correlated (r = .490, p < .01). In addition, dyads’ percent of symmetrical interactions was negatively correlated with dyadic difference scores for LSE (r = -
.180, p < .01). This suggests the more dissimilar dyad members were in the levels of LSE, the less frequently they engaged in symmetrical interactions.

Table 6 shows the means of dyadic dissimilarity on dominance and LSE by each category of ILT-IFT congruence, and Table 7 shows the means of dyadic dissimilarity on dominance and LSE by each category of leader-follower relationship congruence. For ILT-IFT congruence, most dyads (n = 127) were fully incongruent, meaning dyad members did not have the same ILT, nor the same IFT. The smallest category was the fully congruent group, where dyad members shared the same ILTs and the IFTs. This group also had the smallest mean levels of dyadic dissimilarity on dominance and LSE. For all categories of ILT-IFT congruence, the mean levels of percent symmetrical interacts were higher than the percent complementary interacts. Of the 95 dyads who agreed on each others’ roles, the majority (n = 59) agreed one dyad member led and the other dyad member followed (complementary leader-follower relationship). Of the groups that agreed, the smallest group contained dyads who agreed neither led each other (naught leadership; n = 16). This group also had the smallest mean level of complementary and symmetrical interacts (.095 and .088, respectfully).

**Reliability of Difference Scores.** At the dyadic level, I used absolute difference scores to capture the degree of similarity and dissimilarity between dyad members on levels of dominance and LSE. The use of difference scores in statistical analyses has long been scrutinized for the methodological problems they present (e.g., Cronbach & Furby, 1970; Edwards & Parry, 1993; Johns, 1981). Of primary concern is whether the difference scores are reliable (Johns, 1981), more specifically, if the difference scores are more reliable than their component measures together (Edwards, 2001). In this case, the question is whether the dyadic, absolute difference scores of dominance and LSE are more reliable than the individual dominance and LSE scores.
Edwards (1994) discussed ways to test this question for different kinds of difference measures using linear regression and a set of constraints. Edwards’ approach has been used by previous published leadership research in an attempt to justify the reliability of difference score measures (e.g., Coyle & Foti, 2015).

The approach entails running a multivariate linear regression on the differences scores with five predictor terms in the model. I conducted this test using two models, one for the dominance attribute and one for the LSE attribute. The first two terms in the model were the individual scores of each of the dyad members (member 1 dominance/LSE, member 2 dominance/LSE). The third term was a dummy variable (W1) assigning a code of “0” to dyads where member 2’s dominance/LSE score was less than or equal to dyad member 1’s score and a code of “1” to dyads where member 2’s dominance/LSE score was greater dyad member 1’s score. The final two terms were interactions of W1 with the individual member’s scores (W1* member 1 dominance/LSE and W1*member 2 dominance/LSE). The set of constraints imposed by this regression model are the following: 1) the coefficients of each of the component measures (individual dominance/LSE scores) are “equal in magnitude but opposite in sign;” 2) the coefficients of each of the interaction variables (W1* member 1 dominance/LSE and W1*member 2 dominance/LSE) are “equal in magnitude but opposite in sign;” 3) the coefficient of each interaction variable is 2 times the magnitude of its component variable coefficient, but opposite in sign; 4) the coefficient of W1 is zero. Results for this analysis conducted on both dominance and LSE difference scores is included in Table 8. All constraints were met for both models. Thus, according to Edwards (1994), I believe there is valid justification in interpreting the differences scores for dominance and LSE as dissimilarity between dyad members in dominance and LSE.
4.2 – Hypothesis Tests

Hypothesis 1 proposed that the frequency of dyadic, complementary interacts would increase over time, with each time point being one of the four, 50-minute, consecutive class periods. While the initial intention was to conduct all analyses at the dyadic level, the test of Hypothesis 1 was conducted at the individual level, for the following reasons. Approximately 30% of the dyads (n = 69) did not engage in any complementary interacts over all four class periods, and approximately 65% engaged in four or fewer complementary interacts over the four time periods. When divided across all four time periods, this suggests the cell sizes for a very large portion of dyads would be 0, limiting the ability to calculate meaningful change over time. Thus, in place of analyzing the change in dyadic interacts over time, I explored the change in individual relational control moves from one dyad member to the other dyad member over time. While this type of analysis is dyadic in a general sense in that it focuses on how one person directs moves toward another person, it does not consider the sequential responses to each move by the other dyad member, as initially proposed. In this way, studying individual directed communication over time is substantively and theoretically different than studying dyadic interactional communication over time. However, since complementary interacts are composed of one up move and one down move, examining change in individual moves over time may provide some insight as to whether individuals, but not necessarily dyads, changed in how they communicated with dyadic partners over time. The outcomes of the frequency of up relational control moves and down relational control moves were standardized by the total frequency of an individual’s total relational control moves for each time point.

Since no formal hypothesis was proposed for this analysis, it was treated as exploratory in nature. To do so, the data were modeled using two-level hierarchical linear modeling
(Raudenbush & Bryk, 2002), where four waves of time (T1, T2, T3, T4) were nested within every dyad. A total of four models were run, two for each of the two types of relational control moves (up and down) using the statistical program HLM 7 (SSI, 2017), using full maximal likelihood estimation. Following procedures recommended by Bliese and Ployhart (2002), first an unconditional means model, Model A, was run to determine if there existed individual differences in percentages of each type of move. Results for Model A are included in Table 9. Using the variance components, intraclass correlation coefficients (ICCs) were calculated to determine the percentage of the total variability that lay between people. ICCs for both types of control moves suggested a considerable amount of variance was due to the individual. ICC was .324 for up moves and .143 for down moves, meaning approximately 32% and 14% the variation in up, and down moves, respectively, was attributable to the individuals. This signifies there existed meaningful variance in each of the moves and justified continuing to the unconditional growth model, or Model B.

In Model B, the time variable was added to the Level 1 model. Doing so modeled the average starting point and average rate of change for each outcome type of move (fixed effects), as well as if there existed meaningful differences in both (random effects). Results for Model B are included in Table 9. The linear trend was significant and negative for both up moves ($\beta_{10} = -0.016, p < .01$) and down moves ($\beta_{10} = -0.009, p < .01$), suggesting that the percentages of both types of moves tended to decrease over time. Chi-square difference tests for deviance scores showed Model B was a better fit to the data than Model A. In sum, this exploratory analysis showed that as time progressed, individuals engaged in a lower percentage of directed communication toward dyad members that served to assert or acquiesce control. It is important to note that these data did not include any communication from individuals directed toward the
group in its entirety, so results are restricted to include communication where the recipient of the communication was one particular team member.

Next, I turn to tests of Hypotheses 2a and 2b regarding the effect of complementary and symmetrical interactions on the outcome of leader-follower relationship emergence. Hypotheses 2a predicted that the percentage of dyadic complementary interacts, collapsed across time, would be positively associated with the emergence of a leader-follower relationship. Hypotheses 2b predicted that the percentage of dyadic complementary interacts, collapsed across time, would be negatively associated with the emergence of a leader-follower relationship. To test these hypotheses, ICCs were first calculated to determine the degree of nonindependence of the dyadic outcome variable. The ICC was .060; meaning 6% of the variance in the outcome was due to team membership. This value is well below the average ICC estimate of .21 reported in the teams literature (Woehr, Loignon, Schmidt, Loughry, & Ohland, 2015) and is considered a small effect of variance due team membership (Bliese, 2000; Woehr, et al., 2015). Thus, Hypotheses 2a and 2b were not conducted in a multi-level framework. Next, I conducted a multiple multinomial logistic regression, where leader-follower relationship emergence was regressed upon both the percent of complementary interacts and the percent of symmetrical interacts, each collapsed across time. Recall there were six categories of leader-follower relationships, but only the three relevant categories are reported: 1) shared leadership (both members agreed they both led; 2) naught leadership (both dyad members agreed they both followed; and 3) complementary leadership-followership (both dyad members agreed that one dyad member led and one dyad member followed. Odds compare the effect of the antecedent on the probability of each possible outcome category relative to the other. For instance, one the odd ratio in this study represents the probability that the antecedent (complementary or symmetrical interacts) increased/decreased the
likelihood that dyad formed a leader-follower complementary relationship *as compared to a* shared leadership relationship.

Table 10 presents the odds for all pairwise combinations of the three outcomes of interest. Results showed that while controlling for percent symmetrical interacts, the percentage of complementary interacts was not significantly related to the odds of any outcome combinations. Thus, a dyad’s percent complementary interacts was not significantly related to the odds that they formed a complementary leader-follower relationship, and Hypothesis 2a was not supported. As for Hypothesis 2b, a dyad’s percent symmetrical interacts was also not significantly related to the odds that they formed a complementary leader-follower relationship as compared to any other type of relationship. Thus, Hypothesis 2b was not supported. However, a significant relationship did emerge between the percentage of symmetrical interacts and the odds of forming a shared leadership relationship versus a naught leadership relationship. That is, while controlling for complementary interacts, with every one unit increase in the percentage of symmetrical interacts, the odds that dyads formed a shared leadership relationship were significantly higher than the odds that they formed a naught leadership relationship \( (B = 7.634, p < .05) \). It should be noted that the odd ratio for this comparison was questionably large. Thus, as a confirmation of this finding, a one-way analysis of variance was conducted to test for mean differences in between leadership relationship groups. Similar results were found for relevant variables \( (F(5, 231) = 3.375, p < .05) \) and are presented in Appendix J.

Hypothesis 3 proposed that the rate of change in complementary interacts over time (slope) would predict the emergence of leader-follower relationships. However, since Hypothesis 1 was not able to be tested at the level of dyadic interacts, and the theoretical justification for Hypothesis 3 was based on dyadic interaction, Hypothesis 3 was not able to be tested.
Before testing Hypotheses 4-6, which examined the effect of dyadic attributes on the percent of complementary and symmetrical interactions, ICCs were first calculated on the interaction variables to determine the degree of nonindependence. The ICC for percent complementary interacts was .130, and the ICC for percent symmetrical interacts was .260, meaning approximately 13% and 26% of the variance in percent complementary and symmetrical interacts, respectively, were attributed to team membership (Model A). Given these are both relatively high ICC levels, tests of hypothesis 4-6 were conducted in a multi-level framework, where dyads were nested in teams. To test the effect of each of the dyadic attributes independently on percent complementary and percent symmetrical interacts, I first added each of dyadic attributes to the models on their own (Models B-D), then I added all to the models together (Model E; “full model”). I compared changes in deviances to determine if the full model was a better representation of the data than each of the individual variable models. Since Hypotheses 4a, 5a, and 6a all pertained to complementary interacts, and Hypotheses 4b, 5b, and 6c pertained to symmetrical interacts, I first discuss the results of the regressions with complementary interacts as the outcome, then I discuss the results of the regressions with symmetrical interacts as the outcome.

Results of regressions of the dyadic level variables on dyads’ percent complementary interacts are presented in Table 11. Hypothesis 4a predicted that dissimilarity in levels of dominance would be positively associated with complementary interacts. Results showed that when dominance dissimilarity levels were modeled on their own, they did not predict the percent of complementary interacts (Model B; $\beta_{10} = .002, p > .05$), suggesting no support for Hypothesis 4a. Hypothesis 5a predicted that dissimilarity in levels of LSE would be positively associated with the percent of complementary interacts. Results showed that when LSE dissimilarity levels
were modeled on their own, they did not predict the percent of complementary interacts (Model C; \( \beta_{10} = .001, p > .05 \)), suggesting no support for Hypothesis 5a. Finally, Hypothesis 6, predicted that more inter-personal ILT and IFT congruence would be positively associated with the percent of complementarily interacts. Results showed that when ILT-IFT congruence was modeled on its own, it did not predict the percent of complementary interactions (Model D; \( \beta_{10} = -.034, p > .05 \)), suggesting no support for Hypothesis 6. Next, I entered in all the dyadic variables into one parsimonious model (Model E). Chi-square difference tests of the deviance (-2*Log likelihood) between each of the individual models and the full model showed that the full model (Model E) was a better fit than each of the individual models. Results of this model (Table 11) aligned with the individual models, showing that neither dominance dissimilarity (\( \beta_{10} = .002, p > .05 \)), LSE dissimilarity (\( \beta_{10} = .001, p > .05 \)), nor ILT-IFT congruence (\( \beta_{10} = -.034, p > .05 \)) predicted percent complementary interacts, failing to support Hypotheses 4a, 5a, and 6.

Turning next to tests of Hypotheses 4b and 5b, pertaining to the outcome of symmetrical interacts. Results are presented in Table 12. Hypothesis 4b predicted that similarity in levels of dominance would be positively associated with symmetrical interacts. Results showed that when dominance dissimilarity was modeled on its own, it was negatively predictive of percent symmetrical interacts (Model B; \( \beta_{10} = -.003, p < .05 \)). This finding suggests that the less dissimilar (more similar) two dyad members were on dominance, the more likely they were to engage in symmetrical interacts, and it provides preliminary (dependent on full model) support for Hypothesis 4b. Hypothesis 5b predicted that similarity in levels of LSE would be positively associated with the percent of symmetrical interacts. Results showed that when LSE dissimilarity was modeled on its own, it was negatively predictive of percent symmetrical interacts (Model C; \( \beta_{10} = -.002, p < .05 \)). This suggests that the less dissimilar (more similar) two dyad members were
on LSE, the more likely they were to engage in symmetrical interacts, and it provides preliminary (dependent on full model) support for Hypotheses 5b. While no hypothesis was made regarding the effect of ILT-IFT congruence on symmetrical interacts due to lack of theory, I conducted an exploratory test of this relationship. Results showed that when ILT-IFT congruence was modeled on its own, it did not predict the percent of symmetrical interactions ($\beta_{10} = .002, p > .05$). As with tests of complementary interacts, I next entered in all the dyadic variables into one parsimonious model (Model E). Chi-square difference tests of the deviance (-2*Log likelihood) between each of the individual models and the full model showed that the full model (Model E) was a better fit than each of the individual models. Results from of this model (Table 12) did not align completely with the individual models, showing that dominance dissimilarity was not a significant predictor of symmetrical interacts ($\beta_{10} = -.001, p > .05$). LSE dissimilarity, however remained a significant predictor ($\beta_{10} = -.002, p < .05$), and ILT-IFT congruence ($\beta_{10} = .002, p > .05$) remained non-significant. Thus, Hypothesis 5a was not supported, but 5b was supported.

The finding that LSE dissimilarity predicted symmetrical interacts is interesting in that it showed the more similar people were, the more likely they were to respond to particular communications with the same type of communication. However, the finding on its own provides little insight into whether the finding stems from both dyad members being high on LSE or low on LSE. To shed more light on this question, I conducted a correlation between the mean level of dyad members’ LSE and their difference scores. Results yielded a significantly negative correlation ($r = -.527, p < .01$), meaning the lower the dissimilarity level (higher the similarity levels) between dyad members, the higher their mean level of LSE. Accordingly, it is likely the relationship between LSE similarity and symmetrical interacts is likely driven by both
dyad members scoring high on LSE.

In sum, in Chapter 4, I described the data collected in this study, established reliability for all appropriate variables, and presented the results of the tests of the study hypotheses. Unanticipated issues associated with test of Hypotheses 1 and 3 were also discussed. In the next chapter, I summarize the overall findings in relation to relevant literature and discuss implications for advancing the science of leadership emergence, as well as limitations and opportunities for future research.
Chapter 5 – Discussion

5.1 – Summary of Findings and Contributions

The purpose of this study was to advance the science of leadership emergence by taking a process-oriented approach aligned with the conceptualization of leadership as a socio-relational process. The overwhelming majority of leadership emergence research focuses on individual attributes, individual behaviors, and individual perceptions of either leaders or followers (Yammarino & Gooty, 2017). However, none of these individual factors can feasibly be the underlying mechanisms of leadership emergence because they make up only one half of the equation. If informal leaders are only leaders insofar as they are perceived to be so by one or more others, then understanding how and why leadership emerges in collectives requires a focus on dyads’ attributes, dyads’ behaviors, and dyads’ perceptions of each other. Such was the primary focus of this study. By capturing verbal communication patterns among dyads in teams as they work together in situ, over time, this study is one of the first to test the conceptual linkage between dyadic attributes, dyadic micro-level interactional processes, and the emergence of mutual leadership and followership perceptions at a relational level. Results of this study provide evidence that dyadic attributes, particularly similarity, impact patterns of interactions among dyad members, and that these patterns of interactions impact mutual perceptions of leadership and followership, at least within this sample. In addition, this study shows that within this sample and this context, individuals tended to decrease the frequency with which they directed control moves (assertion or acquiesce of control) to their peers over time.

Specifically, findings suggest that people in this sample who were more similar in terms of their self-efficacy as leaders were more likely to engage in symmetrical types of interactions. In other words, they were more likely to respond to each other’s verbal assertions of control with
subsequent assertions of control and to respond to acquiescence of control with subsequent acquiescences. Furthermore, the more dyads engaged in such symmetrical exchanges, the more likely they were to both see each other as leaders, than to both not see each as leaders. These two findings -when taken together with the negative correlation between the mean and dissimilarity levels of LSE as well as the higher frequency of assertions relative to acquiesces of control- suggest they are both largely driven by people who both score high on LSE. They likely accordingly engage in “competitive symmetrical” interactions and thus both see each other as leaders.

The term “competitive symmetry” carries a negative connotation, as a traditional sense of “competition” would suggest that dyad members were rivaling over resources, goals or attempts to be the leader (Deutsch, 1949), or were trying to beat each other toward those leadership positions (Festinger, 1954). However, the finding that both members selected each other as leaders potentially changes the connotation from negative competition to positive sharing. Rather than treating these interactions as competitions for leadership positions, the argument could be made that “competitive symmetrical” interactions are manifestations of dyads sharing leadership positions. An explanation for this notion may be found in the Attraction-Similarity Hypothesis (Bryne, 1961) in conjunction with Social Exchange Theory (Emerson, 1976). The Attraction-Similarity Hypotheses claims similar others are attracted to each other and have outcomes for the individual and team (e.g., Woehr, Arciniega, & Poling, 2013) because their similarity allows for them to act in trait consistent ways (Bell & Brown, 2015).

Thus, in this study, it is possible that dyads similar in LSE afforded each other the opportunity to exert assertions of control, or manifestations of their efficacy to lead. Then, when these assertions were in turn reciprocated with assertions, Social Exchange Theory would
suggest that such reciprocal exchanges facilitated positive attraction and toward each other with regard to leadership potential and task-related rewards (Emerson, 1976). The result of this process may have likely been the emergence of a shared leadership relationship.

Researchers have advocated for the need for a clearer conceptualization of “shared leadership,” since its current conceptualization is characterized by numerous slightly different possible forms of plural leadership (e.g., coordinated leadership, distributed leadership, sequential leadership) and few consistent measurement approaches (Maupin, McCusker, Slaughter, Ruark, in preparation). Single item measures of shared leadership provide little insight into whether leadership is consistently held by both dyad members (i.e., co-leadership; Rittner & Hammons, 1992) or whether it dynamically shifts between dyad members depending on situational circumstances (Klein, Ziegert, Knight, & Xiao, 2006). However, as Klein et al. (2006) show in their study of medical action teams, and as supported with this study, behavioral observation of leadership as it unfolds in real time provides a fruitful opportunity for understanding how and when leadership is shared and could provide more insight into aggregate measures of shared leadership. In addition, understanding how dyads communicate, antecedents of their communication patterns, and resulting patterns of leadership can be useful for fulfilling organizations’ selection, promotion or training goals. For example, for organizations seeking to facilitate a shared leadership structure, training employees to engage in symmetrical forms of communication or selecting employees who have high leadership self efficacy may be opportune means to do so. Future research examining the relationship between training dyads’ communication patterns and individual/organizational outcomes has high potential utility for achieving such organizational goals.

While the relationship between LSE similarity and symmetrical interacts as well as the
relationship between symmetrical interaction and leadership emergence have so far been discussed in a positive light, it is important clarify the importance of context and the interactions of attributes in context. Research shows different traits are relevant, expressed and important in different contexts (Tett & Burnett, 2003). For example, in high stake situations, or in situations where only one leader was able to emerge, symmetry in interactions may represent a more competitive and conflict-based orientation and would likely prevent sharing of leadership roles. Similarly, different, more contextually relevant attributes might emerge as important for interactions, such as need for achievement (Spangler, Tikhomirov, Sotak, & Palrecha, 2014). The context may also be one explanation for the lack of significance of dyadic dissimilarity in dominance. Given the task allowed for multiple leaders to assume and share leadership, there was no strong need or demand for dyads to form complementary leader-follower relationships continuously. Thus, Trait Activation Theory (Tett & Burnett, 2003) would suggest that the strength of the situation (Michel, 1976) did not elicit the activation that dominance be expressed.

Even given the context, it is still curious that dominance at the dyadic level was not predictive of interpersonal interactions, as dominance is one of the strongest predictors of leadership emergence (Judge et al. 2002; Lord et al., 1986). However, the majority of the studies that have found these effects have neglected the role of time, and research shows that time matters for the relationship between attributes and leadership emergence. For example, Bendersky and Shah (2013) showed that people high on extroversion were initially perceived as leaders, but this perception diminished over time as the extroverts failed to meet expectations of leadership. Similarly, Kalish and Luria (2016) found that “surface level characteristics” predicted leadership emergence early on in the teams lifespan, but “deep level characteristics” predicted leadership emergence in later time periods. With regard to verbal interactions, dominance is a
surface level characteristic because dominance is expressed in frequency and type of communication and is easily perceived by others. Dominant people were likely to assert control early on in this study, and this may have explained the decrease in assertions of control (up moves) over time. While dyads’ comparative levels of dominance may have been important predictors of dyads’ interactions at this time, this study could not examine the relationship between individual or dyadic variables at different points in time. Rather, this study looked across time to extend research on surface and deep level characteristics in leadership emergence to the dyad level. This study shows that for attributes at the dyad level, surface level characteristics, such as dominance, may not be as important as deep level characteristics, such as LSE, in predicting dyadic perceptions of leadership.

An opportunity for future research is to replicate this study with different individual difference variables, using different individual difference variables unaccounted for in this study, in particular deep level variables such as identity. Individual and relational leader/follower identity is considered by some to be two are the strongest underlying mechanisms of leadership emergence (Lord, Gatti, & Chiu, 2016), and they are of central focus in relational identity construction theory (DeRue & Ashford, 2010).

As for the lack of support for ILT and IFT congruence on dyadic interactions, one explanation might be regarding the way that “congruence” was conceptualized. In this study, ILT-IFT congruence was conceptualized as dyads having the same profile of ILT, the same profile of IFT, or both. While having similar ideas of what a leader should be like and what a follower should be like may be important for leader-follower relationships because it allows for a shared understanding of leadership and followership (Van Gils, et al., 2010). Perhaps what is more important for the emergence of dyadic interactions is the complementarity between a
particular ILT profile and a particular IFT profile. For example, those who hold authoritarian ILTs may also hold passive IFTs and thus interact differently with those they perceive as fitting one or both of their schemas. Examining the patterns of dyadic congruence in ILTs and IFTs (Coyle & Foti, Under Review), as well as the impact of such congruence on dyadic interactions may be fruitful opportunity for future research.

Finally, one explanation for the lack of findings for any complementary interactions may be their low prevalence, as they made up the smallest portion of coded interactions between dyad members. This low prevalence does not necessarily suggest that complementary interactions occurred this infrequently; rather, it means that verbal complementary interactions occurred relatively infrequently. Take, for example, an assertion of control that is the instruction, “Hey, Joe, save the document on the shared drive, so that we can all work on it.” Next, Joe shares the document as he was instructed without verbalizing anything. Unless Joe responded, something along the lines of “Sure, I’ll do that right now,” the acquiescence of control would not have been verbally captured. Such is a limitation of relying solely on verbal communication to capture interactional processes and presents an opportunity to expand this research to include additional forms of communication, such as nonverbal behavior (e.g., facial expression, physical gesture and posture) and other paralinguistic features of communication (e.g., communication flow, time speaking, pitch, tone, and tempo) that can be captured to characterize complementarity in interactions (Rosen, Kazi, Khaleghzadeh, Dinh, Paoletti, Oswald, & Salas, 2018).

5.2 – Limitations, Strengths, and Future Research

While this study addresses some of the major problems associated with previous leadership emergence research, it not without its limitations. First, participants for this sample were undergraduate university students in a classroom, whose individual differences,
interactions, and perceptions may differ from working adults in an organization. Thus, generalizability is of concern. However, with a sacrifice in generalizability comes a substantial advantage in standardization and control over a number of potentially confounding variables, such as group size, interaction time, task, context, and context-social (e.g., group composition, friendship) and environmental. In addition, the relatively unobtrusive nature of audio coding within the setting of a classroom was more closely aligned with a naturalistic work-related setting, thus mitigating to a certain extent issues associated with external validity.

Second, although this study moves beyond the traditional cross-sectional leadership emergence research by including four data points, several temporal issues require acknowledgement. The inability to examine interacts cross time points prevented the ability to make a cohesive integration between the first hypotheses and the remaining ones. Perhaps replicating this research so that communications could be directed toward the group might increase the number of interacts and allow for a longitudinal examination of interacts over time. Additionally, this study did not control for the time lag between each directed utterance. Instead, I examined the overall sequential patterns of communication between dyad members without regard for time, similar to previous sequential discourse-based leadership research involving leadership in teams (Lehmann-Willenbrock et al., 2015). Since the purpose was to understand how dyads communicate generally, and excluding interacts from the analysis due to time lag restrictions would have limited the sample more so, I believe the approach taken in this study addresses the research question while maximizing power. Lags and pauses between verbal control moves pose interesting questions related to dyadic communication more broadly (Rosen et al., 2018) and presents an interesting avenue for future research.

Lastly regarding to time, I treated time as four discrete time points, as opposed to a
continuously unfolding temporal process occurring within each weekly class. This is aligned with the vast majority longitudinal research, mainly because most longitudinal methods have not afforded researchers to ability to treat time otherwise. However, with recent and novel advancements in technology and dynamic modeling analytical techniques, researchers are quickly gaining the tools to treat time as a continuous stream of events (Murase et al., 2017; Wang, Zhang, & Zhou, 2016). One such approach is Relational Event Modeling (Marcum & Butts, 2015), which could be applied this study. REM a temporally based social network technique that has the ability to treat all streams of communication within teams as a continuously unfolding set of directed events and exchanges between dyads. Furthermore, under the social network framework, additional limitations of dyadic dependences not controlled for in this study could be measured and accounted for (e.g., triadic effects, popularity effects).

As previously addressed, difference scores between dyad members carry methodological complications, and this is an issue that has long plagued dyadic level research. While my supplemental analyses showed adequate reliability based on the recommended strategies, issues regarding difference scores remain (Edwards, 2010). Unfortunately, the alternative to difference scores requires large amounts of data that are often challenging to collect and analyze under the process-oriented communication model of this study. However, collecting other forms of inherently dyadic data (as opposed to individual differences), such as other dyadic relationships (e.g., liking, trust) could be incorporated into this study, mitigating difference score problems while still advancing dyadic level research.

In addition to the future research opportunities discussed so far, this study opens doors for additional opportunities to conduct exciting future research at additional levels of analysis. For example, at the team level, interpersonal communication is well recognized as a critical
mechanism underlying team phenomena (Mathieu et al., 2008), yet the majority of research capturing communication at the team level focuses on surface-level communication processes such as frequency. Capturing the content and meaning of micro-level interactional processes among all group may provide insight into how leadership is structured in a group (Rosen et al., 2018) and address more nuances questions about how such leadership structures hinder or facilitate other critical team processes and states, such as conflict, psychological safety and cohesion.

5.3 – Conclusion

This study advances the leadership emergence field of research beyond individual, static, and a-contextual methods that provide little insight into the micro-level interactional processes underlying the emergence of leadership and followership. Grounded in the notion that leadership is a socio-relational and perceptual process between dyad members, this study blends qualitative behavioral coding with quantitative analysis techniques aligned with this conceptualization to address “how” and “why” questions of leadership emergence. Findings suggest that particular patterns of dyadic interactions result in different patterns of dyadic leadership relationships, attributes of dyads impact such interactions, and certain types of interactions may change over time.
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75
Appendix A

ILT and IFT Profile Configurations

<table>
<thead>
<tr>
<th>ILT Configurations</th>
<th>Prototypical</th>
<th>Laissez-Faire</th>
<th>Autocratic</th>
<th>Anti-protypical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Intelligence</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Dedication</td>
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<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Dynamism</td>
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<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Tyranny</td>
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<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Masculinity</td>
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<td>Low</td>
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</table>

<table>
<thead>
<tr>
<th>IFT Configurations</th>
<th>Exemplary</th>
<th>Pragmatic</th>
<th>Isolated</th>
<th>Passive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Enthusiasm</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Good Citizen</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Conformity</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Insolubility</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Incompetence</td>
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<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>
Appendix B
Informed Consent Form

Title of Study: Team Interaction Processes
Principal Investigator: Neil Hauenstein, Ph.D., Associate Professor, Department of Psychology, Virginia Tech
Co-Investigator: Maureen McCusker, Graduate Student, Department of Psychology, Virginia Tech

Thank you for your willingness to participate in my study! Please read the information below carefully. If you agree to all the terms of the study and would like to proceed, please sign your name at the bottom of the page to acknowledge your willingness to participate. Thank you very much!

I. Purpose of this study
The study aims to examine the team processes in groups over time. We aim to collect information on the interactions and behaviors exhibited by group members as they develop over the course of the semester.

II. Procedures
For your class requirements, it is necessary for you to complete all aspects of the two group project that has been assigned by your instructor. Please ask your instructor for guidelines for the project if you have not already received them or if you need another copy. If you choose to participate in this study, your interactions with your group members will be recorded using an audio recording during class time devoted to working on your group projects. In addition, you will be asked to complete a series of brief questionnaires that includes the following: a questionnaire regarding personal demographics and attributes, a questionnaire summarizing specific events and perceptions from your group, an end-of-the-year project assessment. You will be given time in class to complete each of these, and they will each take less than 15 minutes to complete.

III. Risks
There are no more than minimal risks associated with participation in this study.
IV. Benefits

The results of the study will enhance our understanding of group processes and their effects on various group-related outcomes.

V. Extent of Anonymity and Confidentiality

Your participation in this study will remain confidential. If you elect not to participate in this research, you will not be penalized (e.g., grade impact, class standing), and if you elect to participate, your responses will not impact your grades. Your name will not appear anywhere in any study report or publication. Any personal information that may reveal your identity (i.e. consent form) will be separated from your responses to maintain that survey responses remain anonymous, and only the co-investigator will have access to this information. The research team will retain all data five years post publication and destroy thereafter.

VI. Compensation

No compensation is being offered for participation.

VII. Freedom to Withdraw

If at any point in the study, you do not feel comfortable continuing, you may withdraw without penalty. If you choose to withdraw, you will not be penalized by reduction in points or course grade. You are free not to respond to questions without penalty.

VIII. Permission

If you have read the conditions of this project and voluntary agree to participate in the study, please sign and date at the bottom of the page.

By signing my name, I acknowledge that I have read the statement and agree to participate in the study.

______________________________  ______________________________
Name                               Date

Neil Hauenstein, Ph.D.            540-231-5716/ nhauen@vt.edu
Principle Investigator

Maureen McCusker                 540-231-5410/Mem66@vt.edu
Co-Investigator
Appendix C
Dominance Subscale

Directions: Please rate the following statements as either “true” or “false”:

1. I doubt whether I would make a good leader.
2. I think I would enjoy having authority over other people.
3. I have sometimes stayed away from another person because I feared doing or saying something that I might regret afterwards.
4. When in a group of people, I have trouble thinking about the right things to talk about.
5. School teachers complain a lot about their pay, but it seems to me that they get as much as they deserve.
6. I don’t blame anyone for trying to grab all (s)he can get in this world.
7. Every citizen should take the time to find out about national affairs, even if it means giving up some personal pleasures.
8. I should like to belong to several clubs or lodges.
9. I am certainly lacking in self-confidence.
10. When I work on a committee I like to take charge of things.
11. If given the chance, I would make a good leader of people.
12. Sometimes at elections I vote for people about whom I know very little.
13. I very much like hunting.
14. A person does not need to worry about other people if only (s)he looks after him/herself.
15. I can honestly say that I do not really mind paying my taxes because I feel that’s one of the things I can do for what I get from the community.
16. When prices are high, you can’t blame a person for getting all (s)he can while the getting is good.
17. In school, I find it very hard to talk in front of the class.
18. I am a better talker than a listener.
19. We should cut down on our use of oil, if necessary, so that there will be plenty left for the people 50-100 years from now.
20. When the community makes a decision, it is up to a person to help carry it out even if (s)he had been against it.
21. I would rather have people dislike me than look down on me.
22. I must admit, I try to see what others think before I take a stand.
23. People should not have to pay taxes for the schools if they do not have children.
24. In a group, I usually take the responsibility for getting people introduced.
25. There are times when I act like a coward.
26. I must admit I am a pretty fair talker.
27. I have strong political opinions.
28. I think I am usually a leader in my group.
29. Disobedience to any government is never justified.
30. I enjoy planning things and deciding what each person should do.
31. I would rather not have very much responsibility for other people.
32. I usually have to stop and think before I act, even in trifling matters.
33. It is pretty easy for people to win arguments with me.
34. I have not lived the right kind of life.
35. I have a natural talent for influencing people.
36. I like to give orders and get things moving.
37. I am embarrassed with people I do not know well.
38. The one to whom I was most attached and whom I most admired as a child was a woman (mother, sister, aunt, or other woman).
39. I am not the type to be a political leader.
40. People seem naturally to turn to me when decisions have to be made.
41. I dislike to have to talk in front of a group of people.
42. I have more trouble concentrating than others seem to have.
43. I find it hard to keep my mind on a task or a job.
44. I would be willing to give money myself in order to right a wrong, even though I was not mixed up in it in the first place.
45. I would be willing to describe myself as a pretty "strong" personality.
46. I seem to do things I regret more often than other people do.
## Appendix D

**LSE Scale**

Directions: Please rate how confident you are in your own abilities on each of the following:

<table>
<thead>
<tr>
<th></th>
<th>Extremely Unconfident (1)</th>
<th>Unconfident (2)</th>
<th>Slightly Unconfident (3)</th>
<th>Neutral (4)</th>
<th>Slightly Confident (5)</th>
<th>Confident (6)</th>
<th>Extremely Confident (7)</th>
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<td>Setting direction (2)</td>
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<td>Delegating and assigning tasks (3)</td>
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<td>Confidence to lead a team (10)</td>
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</tbody>
</table>
Appendix E

ILT Scale

Directions: Please take a moment to think about your idea of a typical LEADER in terms of the characteristics listed below. Then rate how descriptive the characteristics presented are.
of your idea of a typical LEADER using the scale presented below where 1 is "not at all characteristic" and 9 is "extremely characteristic."
<table>
<thead>
<tr>
<th></th>
<th>1 (1)</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>7 (7)</th>
<th>8 (8)</th>
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<td>Sincere (2)</td>
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<tr>
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<td>Sensitive (5)</td>
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<td>Sympathetic (7)</td>
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Directions: Please take a moment to think about your idea of a typical FOLLOWER in terms of the characteristics listed below. Then rate how descriptive the characteristics presented are of your idea of a typical FOLLOWER using the scale presented below where 1 is "not at all"
characteristic" and 9 is "extremely characteristic."
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</table>
Inexperienced (18)
Appendix G
Relational Control Codebook

Form Definitions:

1. **Assertion**: Any completed referential statement expressed in either the declarative or imperative format, i.e., a message that has a subject and a verb.
2. **Question**: Any message that takes an interrogative form.
3. **Successful Talk-over**: Any interruption or verbal intervention made while another person is speaking, and successful because the first speaker "relinquishes the floor" after the second speaker starts talking.
4. **Unsuccessful Talk-over**: Any interruption or verbal intervention made while another person is speaking, and not successful because the first speaker continues talking despite the second speaker's attempt to interrupt.

Mode Definitions:

1. **Support**: Any utterance giving or asking for agreement, acceptance, encouragement, approval and/or opinion
2. **Non-support**: Any utterance expressing opposition through resistance, disagreement, challenge, or rejection
3. **Extension**: Any utterance continuing the flow or theme of the preceding message, without containing any control orientation; *unsolicited* information sharing or asking for information.
4. **Instruction**: Any utterance giving a command, directive, order, or *unsolicited* suggestion.
5. **Answer Support**: Any response to a question that gives or seeks agreement acceptance, encouragement and/or approval
6. **Answer Non-support**: Any response to a question that expresses opposition through resistance, disagreement, challenge, or rejection.
7. **Answer Extension**: Any response to a question that continues that contains no control orientation and/or gives information.
8. **Answer Instruction**: Any response to a question that gives a command, directive, order, or suggestion.
Decision Tree: Form

1. Is the utterance task-related?
   a. Yes: Go to #2
   b. No: Do not code

2. Is the utterance an interruption?
   a. Yes: Go to #3
   b. No: Go to #4

3. Did the speaker who interrupted take control of the conversation/the floor of the discussion?
   a. Yes: Code as Successful Talk-over
   b. No: Code as Unsuccessful Talk-over

4. Is the utterance in question, or interrogative, form?
   a. Yes: Code as Question
   b. No: Go to #5

5. Is the utterance in a declarative form?
   a. Yes: Code as Assertion
**Decision Tree: Mode**

1. Is the utterance an answer to a question?
   a. Yes: Go to #6
   b. No: Go to #2

2. Is the utterance agreeing, approving or encouraging someone, or is it asking for approval, opinion, or acceptance?
   a. Yes: Code as *Support*
   b. No: Go to #3

3. Is the utterance disagreeing, disapproving, challenging, or rejecting, or is it confronting/questioning judgments or ideas?
   a. Yes: Code as *Nonsupport*
   b. No: Go to #4

4. Is the utterance a demand, command, order, or *unsolicited* suggestion; is it an announcement of one’s taking the initiative to do something (e.g., I’m going to do upload this.)
   a. Yes: Code as *Instruction*
   b. No: Go to #5

5. Is the utterance in a continuation of a previous utterance, containing no indication of asserting or relinquishing control; is it just giving information for the sake of sharing information; is it asking for information (not asking for opinion or ideas)?
   a. Yes: Code as *Extension*
   b. No: Code as *Other*

6. Is the utterance answering a question by agreeing, approving or encouraging the previous statement, or is it asking for approval, opinion, or acceptance?
   a. Yes: Code as *Answer Support*
   b. No: Go to #7

7. Is the utterance answering a question by disagreeing, disapproving, challenging, or rejecting, or is it confronting/questioning judgments or ideas?
   a. Yes: Code as *Answer Nonsupport*
   b. No: Go to #8

8. Is the utterance answering a question with a demand, command, order, or suggestion?
   a. Yes: Code as *Answer Instruction*
   b. No: Go to #9

9. Is the utterance answering a question by giving the requested information or by asking for more information?
   a. Yes: Code as *Answer extension*

*Code “I don’t know” as *Assertion-Answer Extension*
### Exemplary utterances

<table>
<thead>
<tr>
<th>Support</th>
<th>Nonsupport</th>
<th>Extension</th>
<th>Instruction</th>
<th>Answer Support</th>
<th>Answer Nonsupport</th>
<th>Answer Extension</th>
<th>Answer Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assertion</strong></td>
<td>-I agree with Sam</td>
<td>-Eh, I don’t really agree with that</td>
<td>-Okay so it’s due Monday.</td>
<td>-I’ll finish this tonight.</td>
<td>-What if you do question 1?</td>
<td>-Where are the powerpoint slides?</td>
<td>-Where are the powerpoint slides?</td>
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<tr>
<td></td>
<td>-Nice find!</td>
<td>-No way, we’ll fail.</td>
<td>-She sent us an email</td>
<td>-Lets do job #2.</td>
<td>--I think it would be better for Sam to do it.</td>
<td>--I will pull them up.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-I like that idea</td>
<td>-I don’t know, I feel like she doesn’t want that</td>
<td>-I think we have to type on the doc.</td>
<td>-I think your job is he best one.</td>
<td></td>
<td></td>
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<tr>
<td><strong>Question</strong></td>
<td>-Can I help you do that?</td>
<td>-Are you sure that’s a good idea?</td>
<td>-When is his due?</td>
<td>-How about you do the first part?</td>
<td>-What if you do question 1?</td>
<td>-What if you do question 1?</td>
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<td></td>
<td></td>
<td>-Is it though?</td>
<td>-Is this online?</td>
<td>-I have an idea.. how about we do your job?</td>
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<td>--Why not?</td>
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<td></td>
<td></td>
<td>-What if we did this instead of what you suggested?</td>
<td>-Why is mine not working?</td>
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<tr>
<td><strong>Successful talk-over</strong></td>
<td>-I think we should do that first because…</td>
<td>-I think we should first do…</td>
<td>-I think we should first do…</td>
<td>-Are you all okay with first doing…</td>
<td>-Are you all okay with first doing..</td>
<td>-Are you all okay with first doing..</td>
<td></td>
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<tr>
<td></td>
<td>-Yeah good call.</td>
<td>-Eh, I think it’d be better to do that last.</td>
<td>-The action planning sheet.</td>
<td>-Yeah I’m cool with it.</td>
<td>-Ah, I don’t think so.</td>
<td>-You should do it.</td>
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<tr>
<td><strong>Unsuccess. talk-over</strong></td>
<td>-I think we should do that first because…</td>
<td>-I think we should first do…</td>
<td>-I think we should first do…</td>
<td>-Are you all okay with first doing..</td>
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<td>-Are you all okay with first doing..</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Yeah good…</td>
<td>-Eh, I think it’d be…</td>
<td>-The action…</td>
<td>-Pull up the…</td>
<td>-Like doing the task?</td>
<td>-Like doing the task?</td>
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<td></td>
<td>…because that’s what she said.</td>
<td>-…the planning sheet.</td>
<td>-the interview.</td>
<td>-the interview.</td>
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## Relational Control Arrows (Moves)

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<th>Instruction</th>
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<th>Answer Nonsupport</th>
<th>Answer Instruction</th>
<th>Answer Extension</th>
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<td>↑</td>
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<td>→</td>
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<td>↑</td>
<td>↓</td>
<td>↑</td>
<td>↑</td>
<td>→</td>
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<tr>
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<td>↑</td>
<td>↑</td>
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<td>↓</td>
<td>↑</td>
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<td>↑</td>
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Appendix H

Example Transcript of Audio Coded Data

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<th>Speaker</th>
<th>Recipient</th>
<th>Form</th>
<th>Mode</th>
<th>Arrow /Move</th>
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<tr>
<td>Person 4</td>
<td>Group</td>
<td>“So, let’s figure out what we need to do tod-”</td>
<td>Assertion</td>
<td>↑</td>
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<td>Person 1</td>
<td>Person 4</td>
<td>“We need to do the job interview.”</td>
<td>Talk-over Successful</td>
<td>↑</td>
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<td>Person 1</td>
<td>Person 2</td>
<td>“Okay so do you just want to talk about your job and I’ll write about it?”</td>
<td>Question</td>
<td>↑</td>
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<tr>
<td>Person 2</td>
<td>Person 1</td>
<td>“Yeah that’s fine.”</td>
<td>Assertion</td>
<td>Answer Support ↓</td>
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<tr>
<td>Person 3</td>
<td>Group</td>
<td>“Wait did she say we have to, like, write the whole thing down?”</td>
<td>Question</td>
<td>Extension ➔</td>
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<td>Person 2</td>
<td>Person 3</td>
<td>“Yeah she said it at the beginning of class.”</td>
<td>Question</td>
<td>Answer Extension ➔</td>
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<td>Person 3</td>
<td>Person 2</td>
<td>“I think she said we don’t have to write it down.”</td>
<td>Assertion</td>
<td>Nonsupport ↑</td>
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<td>Person 3</td>
<td>Group</td>
<td>“I feel like that would take a lot more time than we have, maybe we should just write down the main points.”</td>
<td>Assertion</td>
<td>Instruction ↑</td>
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<td>Person 1</td>
<td>Person 2</td>
<td>“That works, too.”</td>
<td>Assertion</td>
<td>Support ↓</td>
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<tr>
<td>Person 1</td>
<td>Person 4</td>
<td>“Sounds good.”</td>
<td>Assertion</td>
<td>Support ↓</td>
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Appendix I

Sociometric Leader-follower Relationship Measures

1. Directions: Thinking back throughout this past semester, please list the names of the group member(s) you relied on most for leadership. If you did not rely on anyone for leadership, please type "n/a."

2. Directions: Thinking back throughout this past semester, please list the names of the group member(s) you led the most. If you did not lead anyone, please type "n/a."
Appendix J

Analysis of Variance of Leader-Follower Relationship Emergence on Symmetrical Interacts

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<td>.033</td>
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<td>Complementary Leader-Follower Relationship</td>
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<td>.043</td>
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<td>Naught Leadership</td>
<td>Naught Leadership</td>
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<td>.036</td>
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*p < .05; Pairwise comparisons conducted using Tukey HSD.
Full Results of Multiple Multinomial Logistic Regression of the Effect of Dyadic Interacts on Leader-Follower Relationship Emergence

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<td>Exp (β)</td>
<td>B (SE)</td>
<td>Exp (β)</td>
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<td>Complete disagreement vs. Symmetrical Followership</td>
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<td>Complementary Leadership-Followership vs. Shared leadership</td>
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<td>Complete disagreement vs. Complementary Leadership-Followership</td>
<td>.506</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Partial agreement; leadership vs. Partial agreement; followership</td>
<td>.123</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Complete disagreement vs. Partial agreement; followership</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Partial agreement; followership vs. Complete disagreement</td>
<td>.304</td>
</tr>
</tbody>
</table>

*Note. N = 254; *p < .05, **p < .01 model χ2(10) = 20.547, p < .05; –2 log likelihood = 597.768. Pseudo R² = 0.088.
Appendix L

Glossary of Study Variables

**Competitive Symmetrical Interact:** A pair of sequential one-up moves (↑↑)

**Complementary Interact:** A one-up move, followed by a one-down move, or vice versa (↑↓; ↓↑)

**Complementary Leader-follower Relationship:** both dyad members agreed that only one dyad member led and only one dyad member followed

**Complete Disagreement:** both dyad members disagreed on both members leadership and followership

**Congruence on IFT Only:** Dyad members held the same IFT, but held different ILTs

**Congruence on ILT Only:** Dyad members held the same ILT, but held different IFTs

**Follower Claims:** The number of team members individuals reported they followed, divided by the total number of team members minus 1

**Full Interpersonal Congruence in ILTs and IFTs:** Dyad members held the same ILT and the same IFT

**Full Interpersonal Incongruence in ILTs and IFTs:** Dyad members held neither the same ILT, nor the same IFT

**Leader Claims:** The number of team members individuals reported they led, divided by the total number of team members minus 1

**Naught leadership relationship:** Both dyad members agreed the did not lead each other

**Neutralized interact:** A pair of one-across moves (➡➡)

**One-down move (down move):** A single sense unit attempting to verbally acquiesce control toward the recipient (⬇)
One-lateral move: A single sense unit attempting neither to neutralize control toward the recipient (⇒)

One-up move (up move): A single sense unit attempting to verbally assert control toward the recipient (↑)

Partial agreement, follower: Both dyad members agreed that one of the dyad members followed, but they disagreed about the other dyad member

Partial agreement, leader: Both dyad members agreed that one of the dyad members led, but they disagreed about the other dyad member

Shared leadership relationship: Both dyad members agreed they both led each other

Submissive symmetrical interact: A pair of sequential one-down moves (⇓⇓)

Transitory interact: A one-up or one-down, followed by a lateral move (↑⇒; ⇓⇒)
Table 1

Results of K-mean Cluster Analysis for ILT and IFT of Entire Sample

<table>
<thead>
<tr>
<th></th>
<th>1 (N= 92)</th>
<th>2 (N= 129)</th>
<th>3 (N= 160)</th>
<th>4 (N= 295)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>6.40</td>
<td>7.29</td>
<td>5.73</td>
<td>6.92</td>
</tr>
<tr>
<td>Intelligence</td>
<td>7.32</td>
<td>8.11</td>
<td>6.79</td>
<td>7.14</td>
</tr>
<tr>
<td>Dedication</td>
<td>8.00</td>
<td>8.71</td>
<td>7.89</td>
<td>8.37</td>
</tr>
<tr>
<td>Dynamism</td>
<td>7.10</td>
<td>7.90</td>
<td>6.30</td>
<td>6.50</td>
</tr>
<tr>
<td>Tyranny</td>
<td>5.23</td>
<td>4.69</td>
<td>4.40</td>
<td>2.75</td>
</tr>
<tr>
<td>Masculinity</td>
<td>7.20</td>
<td>3.50</td>
<td>4.10</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IFT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>3.827</td>
<td>8.048</td>
<td>6.068</td>
<td>6.860</td>
</tr>
<tr>
<td>Enthusiasm</td>
<td>4.128</td>
<td>6.811</td>
<td>5.169</td>
<td>6.288</td>
</tr>
<tr>
<td>Good Citizen</td>
<td>5.297</td>
<td>8.021</td>
<td>6.948</td>
<td>7.160</td>
</tr>
<tr>
<td>Conformity</td>
<td>7.436</td>
<td>4.136</td>
<td>6.028</td>
<td>7.095</td>
</tr>
<tr>
<td>Insubordination</td>
<td>3.096</td>
<td>1.532</td>
<td>2.124</td>
<td>4.173</td>
</tr>
<tr>
<td>Incompetence</td>
<td>4.259</td>
<td>1.999</td>
<td>2.544</td>
<td>5.272</td>
</tr>
</tbody>
</table>

*Note.* n= 666.
### Table 2

*Results of K-mean Cluster Analysis for ILT and IFT of Study Sample Only*

<table>
<thead>
<tr>
<th></th>
<th>ILT</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 (N= 16)</td>
<td>2 (N= 35)</td>
<td>3 (N= 32)</td>
<td>4 (N= 39)</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>5.780</td>
<td>7.330</td>
<td>5.710</td>
<td>7.130</td>
</tr>
<tr>
<td>Intelligence</td>
<td>7.420</td>
<td>8.160</td>
<td>7.060</td>
<td>7.860</td>
</tr>
<tr>
<td>Dedication</td>
<td>8.000</td>
<td>8.600</td>
<td>7.640</td>
<td>8.670</td>
</tr>
<tr>
<td>Dynamism</td>
<td>7.080</td>
<td>7.950</td>
<td>6.460</td>
<td>6.940</td>
</tr>
<tr>
<td>Tyranny</td>
<td>5.480</td>
<td>4.700</td>
<td>4.370</td>
<td>2.840</td>
</tr>
<tr>
<td>Masculinity</td>
<td>6.700</td>
<td>3.910</td>
<td>4.360</td>
<td>1.400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>IFT</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 (N= 26)</td>
<td>2 (N= 50)</td>
<td>3 (N= 34)</td>
<td>4 (N= 13)</td>
</tr>
<tr>
<td>Industry</td>
<td>3.810</td>
<td>8.120</td>
<td>5.980</td>
<td>6.490</td>
</tr>
<tr>
<td>Enthusiasm</td>
<td>4.060</td>
<td>6.830</td>
<td>5.100</td>
<td>5.650</td>
</tr>
<tr>
<td>Good Citizen</td>
<td>5.550</td>
<td>8.220</td>
<td>7.240</td>
<td>7.290</td>
</tr>
<tr>
<td>Conformity</td>
<td>7.670</td>
<td>4.210</td>
<td>6.410</td>
<td>5.840</td>
</tr>
<tr>
<td>Insubordination</td>
<td>2.770</td>
<td>4.430</td>
<td>1.980</td>
<td>2.070</td>
</tr>
<tr>
<td>Incompetence</td>
<td>5.140</td>
<td>2.270</td>
<td>2.930</td>
<td>3.400</td>
</tr>
</tbody>
</table>

*Note.* n=122 for ILT; n= 123 for IFT.
Table 3

*Categories of Outcome Variable of Leader-follower Relationship*

<table>
<thead>
<tr>
<th>Dyad Member 1</th>
<th>Leads Member 2</th>
<th>Follows Member 2</th>
<th>Disagrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leads Member 1</td>
<td>1. Shared Leadership Relationship*</td>
<td>3. Complementary Leader-Follower Relationship*</td>
<td>5. Partial Agreement, Leadership Relationship</td>
</tr>
</tbody>
</table>

*Note.* *Relationships relevant to study results.*
Table 4

Means, Standard Deviations, Intercorrelations and Reliability Coefficients for Individual Level Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dom</td>
<td>27.843</td>
<td>6.302</td>
<td>.783</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. LSE</td>
<td>60.148</td>
<td>10.375</td>
<td>.650**</td>
<td>.913</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ILT</td>
<td>6.329</td>
<td>1.044</td>
<td>-.080</td>
<td>-.015</td>
<td>.874</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. IFT</td>
<td>6.908</td>
<td>.925</td>
<td>-.177</td>
<td>-.216*</td>
<td></td>
<td>(.925)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Up Moves Sent</td>
<td>.184</td>
<td>.266</td>
<td>.074</td>
<td>.050</td>
<td>-.028</td>
<td>.082</td>
<td>(.680-.832)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Down Moves Sent</td>
<td>.141</td>
<td>.221</td>
<td>.144</td>
<td>.174</td>
<td>-.084</td>
<td>.143</td>
<td>-.115</td>
<td>(.680-.832)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Total Number Utterances</td>
<td>127.586</td>
<td>90.063</td>
<td>.181</td>
<td>.063</td>
<td>-.045</td>
<td>.108</td>
<td>.024</td>
<td>.027</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Leader Claims</td>
<td>.613</td>
<td>.420</td>
<td>.214*</td>
<td>.325**</td>
<td>-.100</td>
<td>-.120</td>
<td>.072</td>
<td>-.006</td>
<td>.269**</td>
<td></td>
</tr>
<tr>
<td>9. Follower Claims</td>
<td>.516</td>
<td>.256</td>
<td>-.065</td>
<td>.039</td>
<td>.052</td>
<td>-.093</td>
<td>.093</td>
<td>.200*</td>
<td>-.012</td>
<td>.147</td>
</tr>
</tbody>
</table>

Note. N= 119; *p < .05, **p < .01. Up, Down, and Lateral Moves Sent = total number of directed relational control utterances, collapsed across time. Reliability coefficients are in parentheses on the main diagonal. Reliabilities for attributes are coefficient alpha. Reliabilities for arrow types refer to range of Light’s Kappa calculated for all coding. “Leader Claims” and “Follower Claims” refers to the number of team members individuals reported they led and followed, respectively, divided by the total number of team members -1.
Table 5

*Means, Standard Deviations, and Intercorrelations for Dyadic Level Continuous Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dominance Dissimilarity</td>
<td>7.170</td>
<td>5.043</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. LSE Dissimilarity</td>
<td>11.31</td>
<td>10.913</td>
<td>.490**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3. Percent Complementary</td>
<td>.123</td>
<td>.123</td>
<td>-.033</td>
<td>-.089</td>
<td>-</td>
</tr>
<tr>
<td>Interacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Percent Symmetrical Interacts</td>
<td>.161</td>
<td>.151</td>
<td>-.089</td>
<td>-.180**</td>
<td>.235**</td>
</tr>
</tbody>
</table>

*Note.* N= 233; *p < .05 ,**p < .01
Table 6

Means of Dyadic Dissimilarity of Dominance and LSE and Percent of Complementary and Percent of Symmetrical Interacts by ILT-IFT Congruence Categories

<table>
<thead>
<tr>
<th>ILT-IFT Congruence</th>
<th>Dyadic Dissimilarity</th>
<th>Dyadic Interacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Dominance</td>
</tr>
<tr>
<td>Full incongruence</td>
<td>127</td>
<td>6.760</td>
</tr>
<tr>
<td>Congruence on ILT only</td>
<td>53</td>
<td>6.770</td>
</tr>
<tr>
<td>Congruence on IFT only</td>
<td>44</td>
<td>8.410</td>
</tr>
<tr>
<td>Full congruence</td>
<td>14</td>
<td>6.140</td>
</tr>
</tbody>
</table>
Table 7

Means of Dyadic Dissimilarity of Dominance and LSE and Percent of Complementary and Percent of Symmetrical Interacts by Leader-follower Relationship Categories

<table>
<thead>
<tr>
<th>Leader-Follower Relationship</th>
<th>Dyadic Dissimilarity</th>
<th>Dyadic Interacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Dominance</td>
</tr>
<tr>
<td>Shared Leadership Relationship*</td>
<td>20</td>
<td>7.200</td>
</tr>
<tr>
<td>(Agreed both led)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Naught Leadership Relationship*</td>
<td>16</td>
<td>6.140</td>
</tr>
<tr>
<td>(Agreed neither led)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complementary Leadership-Followership*</td>
<td>59</td>
<td>6.730</td>
</tr>
<tr>
<td>(Agreed only one led &amp; one followed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial Agreement, Follower Relationship</td>
<td>46</td>
<td>7.540</td>
</tr>
<tr>
<td>(Agreed one did not lead, disagreed on other)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial Agreement, Leader Relationship</td>
<td>62</td>
<td>7.980</td>
</tr>
<tr>
<td>(Agreed one did lead, disagreed on other)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete Disagreement</td>
<td>30</td>
<td>6.200</td>
</tr>
<tr>
<td>(Disagreed on both)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. * Relationships relevant to study results
Table 8

Results of Regression Analysis Testing Reliability of Dyadic Attribute Difference Scores.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member 1’s Dominance</td>
<td>1.000**</td>
</tr>
<tr>
<td>Member 2’s Dominance</td>
<td>-1.000**</td>
</tr>
<tr>
<td>$W_1$</td>
<td>0</td>
</tr>
<tr>
<td>$W_1 \times$ Member 1’s Dominance</td>
<td>-2.000**</td>
</tr>
<tr>
<td>$W_1 \times$ Member 2’s Dominance</td>
<td>2.000**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member 1’s LSE</td>
<td>1.000**</td>
</tr>
<tr>
<td>Member 2’s LSE</td>
<td>-1.000**</td>
</tr>
<tr>
<td>$W_1$</td>
<td>0</td>
</tr>
<tr>
<td>$W_1 \times$ Member 1’s LSE</td>
<td>-2.000**</td>
</tr>
<tr>
<td>$W_1 \times$ Member 2’s LSE</td>
<td>2.000**</td>
</tr>
</tbody>
</table>

Note. $N = 233$; **$p < .01$
Table 9

Results of Hierarchical Linear Regression of Change in Relational Control Moves over Time

<table>
<thead>
<tr>
<th></th>
<th>Model A</th>
<th>Model B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Up</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>Intercept ($\beta_{00}$)</td>
<td>.184**</td>
</tr>
<tr>
<td></td>
<td>(SE)</td>
<td>(.008)</td>
</tr>
<tr>
<td></td>
<td>Linear Trend ($\beta_{10}$)</td>
<td>-.016**</td>
</tr>
<tr>
<td></td>
<td>(SE)</td>
<td></td>
</tr>
<tr>
<td>Variance Components</td>
<td>Intercept ($r_{0i}$)</td>
<td>.023**</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(.152)</td>
</tr>
<tr>
<td></td>
<td>Linear Trend ($r_{1i}$)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Level-1 ($e_{1i}$)</td>
<td>.048</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(.220)</td>
</tr>
<tr>
<td>Deviance</td>
<td></td>
<td>149.105 (3)</td>
</tr>
<tr>
<td>(\Delta) Deviance</td>
<td></td>
<td>15.690**</td>
</tr>
<tr>
<td><strong>Down</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>Intercept ($\beta_{00}$)</td>
<td>.141**</td>
</tr>
<tr>
<td></td>
<td>(SE)</td>
<td>(.006)</td>
</tr>
<tr>
<td></td>
<td>Linear Trend ($\beta_{10}$)</td>
<td>-.009*</td>
</tr>
<tr>
<td></td>
<td>(SE)</td>
<td></td>
</tr>
<tr>
<td>Variance Components</td>
<td>Intercept ($r_{0i}$)</td>
<td>.007**</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(.083)</td>
</tr>
<tr>
<td></td>
<td>Linear Trend ($r_{1i}$)</td>
<td>.001*</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Level-1 ($e_{1i}$)</td>
<td>.042</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(.205)</td>
</tr>
<tr>
<td>Deviance</td>
<td></td>
<td>-401.886 (3)</td>
</tr>
<tr>
<td>(\Delta) Deviance</td>
<td></td>
<td>7.38*</td>
</tr>
</tbody>
</table>

Note. N = 466; Model A tests if there exist individual differences in the average frequency of move type, generally; Model B tests if there exist differences in the change in frequency of move type over time.
Table 10

*Results of Multiple Multinomial Logistic Regression of the Effect of Dyadic Interacts on Leader-Follower Relationship Emergence*

<table>
<thead>
<tr>
<th></th>
<th>Complementary Interacts</th>
<th>Symmetrical Interacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exp ($\beta$)</td>
<td>B (SE)</td>
</tr>
<tr>
<td>Complementary Leadership-Followership vs. Naught Leadership</td>
<td>.231</td>
<td>4.075 (3.355)</td>
</tr>
<tr>
<td>Complementary Leadership-Followership vs. Shared Leadership</td>
<td>.067</td>
<td>-2.697 (2.877)</td>
</tr>
</tbody>
</table>

N = 254; *p < .05, **p < .01 model $\chi^2(10) = 20.547, p < .05; -2 \text{ log likelihood} = 597.768$. Pseudo $R^2 = 0.088$. 
Table 11

Results of Hierarchical Linear Regression of Dyadic Complementary Interacts on Dyadic Attributes of LSE Dissimilarity, Dominance Dissimilarity, and ILT-IFT Congruence

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Model A (Dom Diff)</th>
<th>Model B (LSE Diff)</th>
<th>Model C (ILT-IFT)</th>
<th>Model D (All)</th>
<th>Model E (All)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept ($\beta_{00}$)</td>
<td>.683** (.023)</td>
<td>.673** (.032)</td>
<td>.673** (.032)</td>
<td>.711** (.031)</td>
<td>.180** (.022)</td>
</tr>
<tr>
<td>Dom Difference ($\beta_{10}$)</td>
<td>-.002 (.003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSE Difference ($\beta_{10}$)</td>
<td></td>
<td>.001 (.002)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ILT-IFT Congruence ($\beta_{10}$)</td>
<td></td>
<td></td>
<td>-.034 (.020)</td>
<td></td>
<td>.034 (.020)</td>
</tr>
</tbody>
</table>

| Variance Components           |                   |                   |                   |               |               |
| Intercept ($\tau_{00}$)       | .007** (.086)      | .006** (.079)     | .006** (.076)     | .008** (.089) | .006** (.076) |
| Level-1 ($e_{1i}$)            | .049 (.223)        | .047 (.217)       | .047 (.218)       | .047 (.216)  | .046 (.215)  |

Deviance: -16.930 (3) -27.411 (4) -27.750 (4) -28.220 (4) -32.156 (6)

$\Delta$ Deviance: 10.451** 10.820** 11.29** 15.226**

N = 254; Model A tests if there exist differences in the mean frequency of complementary interacts, generally; Model B, C, and D test the effect of the dyadic attributes of Dom, LSE, or ILT-IFT congruence on complementary interacts, respectively and individually. Model E tests the effect of each of the dyadic attributes on complementary interacts, while controlling for all other dyadic attributes in the model. $\Delta$ Deviance = deviance of estimated model from Model A.
Table 12

Results of Hierarchical Linear Regression of Dyadic Symmetrical Interacts on Dyadic Attributes of LSE Dissimilarity, Dominance Dissimilarity, and ILT-IFT Congruence

<table>
<thead>
<tr>
<th></th>
<th>Model A (Dom Diff)</th>
<th>Model B (LSE Diff)</th>
<th>Model C (ILT-IFT)</th>
<th>Model D (All)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept ($\beta_{00}$)</td>
<td>.161* (.018)</td>
<td>.021** (.017)</td>
<td>.177** (.020)</td>
<td>.157** (.020)</td>
</tr>
<tr>
<td>Dom Dissimilarity ($\beta_{10}$) (SE)</td>
<td>-.003* (.001)</td>
<td>-.002** (.001)</td>
<td>-.001 (.001)</td>
<td>-.002** (.001)</td>
</tr>
<tr>
<td>LSE Dissimilarity ($\beta_{10}$) (SE)</td>
<td></td>
<td>-.002** (.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ILT-IFT Congruence ($\beta_{10}$)</td>
<td></td>
<td>.0021 (.006)</td>
<td>.0021 (.006)</td>
<td></td>
</tr>
<tr>
<td>Variance Components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept ($r_{0i}$)</td>
<td>.006** (.077)</td>
<td>.005** (.070)</td>
<td>.005** (.069)</td>
<td>.006** (.080)</td>
</tr>
<tr>
<td>Level-1 ($e_{1i}$)</td>
<td>.017 (.131)</td>
<td>.012 (.109)</td>
<td>.012 (.108)</td>
<td>.014 (.118)</td>
</tr>
<tr>
<td>Deviance</td>
<td>-232.973 (3)</td>
<td>-302.110 (4)</td>
<td>-306.106 (4)</td>
<td>-267.859 (4)</td>
</tr>
<tr>
<td>$\Delta$ Deviance</td>
<td>69.137**</td>
<td>73.133**</td>
<td>34.886**</td>
<td>79.490**</td>
</tr>
</tbody>
</table>

Note. Model A tests if there exist differences in the mean frequency of symmetrical interacts, generally; Model B, C, and D test the effect of the dyadic attributes of Dom, LSE, or ILT-IFT congruence on symmetrical interacts, respectively and individually. Model E tests the effect of each of the dyadic attributes on symmetrical interacts, while controlling for all other dyadic attributes in the model. $\Delta$ Deviance = deviance of estimated model from Model A. $^1$ Hypothesis for the effect of ILT-IFT congruence on symmetrical interacts was not proposed; thus, this test is considered exploratory.
Figure 1. Depiction of conceptual model and study Hypotheses 1 and 3.
Figure 2. Depiction of conceptual model and study Hypotheses 2; 4-6.
Figure 3. Image of coding platform of Mangold Interact program (Mangold, 2010).
Figure 4. Longitudinal trajectory of percent of relational control moves sent from individuals to dyadic partners.