

Breaking Out: The Importance of Collaborative Technology in Shaping Emergent Leadership Behaviors

Traci Carte, Kennesaw State University
Nan Wang, University of Oklahoma
Aaron Becker, Texas A&M University
Albert Schwarzkopf, University of Oklahoma

ABSTRACT

We examined task-oriented and socially-oriented emergent leadership behaviors among men and women within computer-mediated teams across two studies. In one study teammates' perceptions of who emerged as leaders were captured and in both studies the participants' actual leadership behaviors were captured. The results of both studies indicate that women engaged in equal or more task- *and* socially- oriented leadership behaviors compared to men, and these differences persisted over time. Further, task-oriented leadership behavior was positively related to being perceived as a leader and both men and women leaders engaging in gender-incongruent leadership behaviors were *more* likely to be perceived as leaders. Thus, the support offered by collaborative technology may provide under-represented groups the freedom to engage in behaviors contrary to social norms (e.g., women engaging in task leadership) – as well as behaviors that conform to social norms – without facing a backlash as they might in a face-to-face setting for deviating from societal expectations.

Keywords: Emergent leadership, leadership perceptions, computer-mediated teams, gender, time

INTRODUCTION

Leadership involves the ability to direct the activities of a group towards shared goals and influence the beliefs of team members as well as team processes (Hemphill & Coons, 1957; Yoo & Alavi, 2004). Prior research distinguishes between formal and emergent leadership; an emergent leader is regarded as an individual who is not formally appointed to be a leader, but gradually earns leadership status through the support, acknowledgement and interactions of the group and is able to exert significant influence on others (Goktepe & Schneier, 1989; Misiolek & Heckman, 2005; Sudweeks & Simoff, 2005).

There have been a number of studies investigating personality traits, knowledge, skills and abilities, behavioral and demographic differences among emergent leaders. For example personality (Kickul & Neuman, 2000), verbal skills, social interaction (Lord, 1977) and gender (Eagly and Karau, 1991) have all been linked to emergent leadership. Both the growing representation of women in the organizational workforce (Baugh & Graen, 1997) and the use of relatively homogeneous teams in investigating group effectiveness in previous empirical studies (Jehn, Northcraft, & Neale, 1999; Lee & Farh, 2004) suggest a need to determine the role of gender in shaping leadership dynamics in groups. A considerable body of research has examined the relationship between gender and emergent leadership in face-to-face contexts, establishing that men tend to emerge more as leaders compared to women in traditional small group settings (e.g., Dobbins, Long, & Dedrick, 1990; Kent & Moss, 1994; Watson & Hoffman, 2004). Such findings have been attributed to society's role expectations as well as the more task-related behaviors engaged in by men (Eagly & Karau, 1991; Karakowsky & Siegel, 1999; Kent & Moss, 1994; Watson & Hoffman, 2004).

Gender role theory suggests that while individuals occupy roles in their workgroups defined by formal positions, they are simultaneously constrained by their gender role (Eagly & Johannesen-Schmidt, 2001; Eagly, Wood, & Diekmann, 2000). In practice, this implies that the reason men are more likely than women to emerge as leaders in a collocated group is because of *perceived* incongruities between leadership roles and female gender roles; groups ascribe leadership to individuals who engage in task leadership, and men are expected to engage in more task leadership than women (Eagly and Karau 1991). While these theories shed some light on the role that gender plays in influencing emergent leadership within groups, there is no clear understanding if gender differences exist in either actual leadership behaviors or perceptions of those behaviors. As a result, past research falls short of identifying the actual source of gender role constraints; i.e., are the constraints externally imposed (wherein a person's behaviors are interpreted by fellow members according to gender roles regardless of the behaviors themselves) or internally imposed (wherein members fashion their behaviors in accordance with their own perceptions of gender roles). Stated another way, do women emerge as leaders less often than men because their behaviors are less likely to be perceived as leadership by their fellow group members, or because they are less likely to engage in actual leadership behaviors?

The environment in which computer-mediated teams operate provides an interesting context for investigating this question. Computer-mediated (CM) teams are those for whom some amount of their interaction takes place using collaborative technologies during which time team members are geographically distributed. Such teams have been referred in the literature as virtual to some degree and/or hybrid (Griffith, Sawyer, and Neale, 2003). The computer-mediated interactions within such teams are often characterized as less rich, filtering out many social status cues and creating an impersonal work environment (Phillips & Santoro, 1989).

These distributed groups are often more diverse than collocated groups (Mortensen & Hinds, 2001). In such environments, group members' internally imposed gender role constraints are likely to be more salient. Consistent with this assertion, prior research has shown that CM teams often experience more equal participation across subgroups such as gender (Bhappu, Griffith, & Northcraft, 1997; Dubrovsky, Kiesler, & Sethna, 1991). Although CM teams have been increasingly recognized as an important facet of organizations and are becoming a common phenomenon (Misiulek & Heckman, 2005), an in-depth understanding of leadership behaviors in such groups is still lacking (Sarker, Grewal, & Sarker, 2002; Zigurs, 2003). A number of antecedents and consequences of leadership behaviors in collocated groups have been previously identified, but successful leadership of CM team interactions likely requires different behaviors (Bell & Kozlowski, 2002).

Finally, any understanding of leadership in this context would be incomplete without a consideration of the role played by time. Leadership takes time to develop (Van Dierendonck, Haynes, Borrill, & Stride, 2004); the very term 'emergent leadership' implies a dynamic – rather than static – phenomenon, and CM teams who rely more on technology and less on face-to-face meetings often need more time than face-to-face groups to develop relationships (Chidambaram, 1996). This suggests any study of emergent leadership in CM teams will require team members to have time to form relationships and opinions in order to recognize emergent leadership. The above discussion raises some important questions that this paper seeks to address:

- 1. *How is emergent leadership behavior in CM teams influenced by gender role constraints (both internal and external)?***
 - a. *Do the emergent leadership behaviors engaged in by men and women differ in CM teams?***
 - b. *Are the emergent leadership behaviors engaged in by men and women perceived differently in CM teams?***

2. How does time influence the relationship between emergent leadership behavior and gender in CM teams?

In the following sections we draw from research on leadership, gender, and virtual or distributed teams to build a theoretical model from which we derive our research hypotheses regarding the relationship between emergent leadership behavior and gender in CM teams, as well as the role of time in moderating that relationship. We then present the findings from two separate studies focused on emergent leadership behaviors in CM teams. The first study involved 22 CM teams with geographically distributed members, allowing us to examine emergent leadership behaviors in a context where only internally imposed gender role constraints were likely to be salient. The second study involved 25 CM teams with geographically collocated members, providing a context in which both internally and externally imposed gender role constraints were equally likely to be salient. Further, the first study was conducted in the US, while the second study was conducted in Sri Lanka, giving us the ability to test the robustness of our theoretical model across different cultures. We conclude with a discussion of the implications of our findings for both research and practice.

LITERATURE REVIEW AND HYPOTHESES

Empirical studies on leadership conducted in face-to-face settings typically utilize one of the following approaches: 1) trait/behavioral, 2) situational, 3) substitutes for leadership, or 4) functionalist (Yang & Shao, 1996). In this paper we employ the functionalist approach, asserting that a CM team leader's – including emergent leader's – main job is to “do, or get done, whatever is not being adequately handled for group needs” (McGrath, 1962, p.5). Thus, team leadership is considered effective if both task accomplishment and group maintenance are adequately addressed (Hackman & Walton, 1986). This dual focus on task and social needs is

consistent with team development literature which suggests that groups may change their focus over time (Gersick, 1988; McGrath, 1991; Dennis, Fuller, and Valacich, 2008).

A functional leadership approach to addressing the task and social needs of the group is congruent with the concepts of task-oriented and socially-oriented leadership, which were first introduced by Bales (1950) and developed in the Ohio State studies on leadership (Hemphill & Coons, 1957). In these studies, task-oriented leadership included behaviors such as encouraging subordinates to follow rules and procedures, maintaining high standards for performance, and making leader and subordinate roles explicit. Socially-oriented leadership included behaviors such as helping and doing favors for subordinates, looking out for their welfare, explaining procedures, and being friendly and available (Eagly and Johannesen-Schmidt, 2001).

Across most if not all theories of leadership is an acknowledgement that individuals bring with them skills, abilities and experiences that color their leadership behaviors and perceptions. One individual characteristic that has been well studied is gender.

Effects of Gender on Leadership Behaviors: Findings from Face-to-Face Settings

Gender role theory argues that leaders' behaviors are influenced not only by their specific positions within a hierarchy but also by their gender roles – the shared beliefs that apply to individuals on the basis of their gender. Gender roles influence leader behaviors not simply because people react to leaders in terms of gender expectancies, but also because most people have internalized gender roles to some extent, and thus such expectations drive their behavior (Wood, Christensen, Hebl, & Rothgerber, 1997). Gender role theory suggests that women are expected to engage in more socially-oriented behaviors while men are expected to engage in more task-oriented behaviors (Eagly & Johnson, 1990).

Adding empirical support for gender role theory, meta-analyses have concluded men emerge as leaders more often than women and rely on their task leadership behaviors to achieve such status, whereas women who emerge as leaders tend to rely on social leadership behaviors (Eagly and Karau, 1991; Eagly, Karau, and Makhijani, 1995). Other meta-analyses focused on differences in leadership style are consistent with this interpretation as well, finding that women tend to employ transformational and participative styles while men tend to employ transactional and directive styles (Eagly and Johnson, 1990; Eagly, Johannesen-Schmidt, and Van Engen, 2003). Transformational and participative leaders are characterized by behaviors that build interpersonal relationships, emphasize personal charisma, provide individualized consideration, offer intellectual stimulation, promote collaborative decision-making, and empower group members; transactional and directive leadership styles emphasize task-oriented issues and goal-setting, focus on deliverables and deadlines, promote competition, and employ rewards and sanctions (Carless, 1998; Eagly & Johnson, 1990; Gershenoff & Foti, 2003; Maher, 1997)). The meta-analytical findings are summarized in Table 1.

Insert Table 1

While there is some consensus about the how gender influences emergent leadership behaviors and perceptions, the bulk of previous work has been conducted in face-to-face settings. In most of today's organizations teams are supported by technology (i.e., e-mail, chat, collaborative work spaces like SharePoint Server, etc.). As such, it is important to consider the role of the technology-mediated communication environment in determining both behaviors and perceptions of emergent leadership.

Gender Findings in CM Team Research

Collaborative technologies have been touted as a means of leveling the playing field for under-represented groups, allowing individuals to break out of normative constraints and participate at greater levels, resulting in more opportunities to influence team outcomes. Specifically, research focused on gender differences in the virtual teams context suggests collaborative technologies (CTs) minimize inequalities between group members and lead to more balanced levels of influence than those that occur in face-to-face teams (Dubrovsky et al., 1991; Kiesler, Siegel, & McGuire, 1984; Sproull & Kiesler, 1986; Wei, Watson, Clapper, & McLean, 1998). However, there are also contrary findings; CTs may lead team members to engage in even more stereotypical behavior than they might engage in when interacting face-to-face (Postmes & Spears, 2002). We elaborate both arguments below.

There are two explanations most commonly offered for the equalization effect of CT use. First, many CTs enable group members to enter information at the same time and to engage in multiple conversations at once. This capability – sometimes referred to as ‘multiple addressability’ (Rice, 1987), ‘concurrency’ (Valacich, Paranka, George, & Nunamaker, 1993), or ‘simultaneous input’ (Zigurs & Buckland, 1998), but most often as ‘parallelism’ (Dennis, 1996; Dennis, Wixom, & Vandenberg, 2001)– eliminates the need for group members to take turns, thus enabling members to contribute their ideas the moment that they have them, rather than forgetting them while waiting for their turn to speak (a phenomenon referred to as ‘production blocking’) (Diehl & Stroebe, 1987, 1991; Gallupe, Bastianutti, & Cooper, 1991; Valacich, Dennis, & Connolly, 1994). This ability to contribute at any time may facilitate greater participation from women who generally are less willing than men to interrupt their teammates in face-to-face team discussions (Smith-Lovin & Brody, 1989), and greater participation has been linked to leader emergence (Mullen, Salas, & Driskell, 1989). However, task-oriented

participation has been more clearly linked to leader emergence than socially-oriented participation (Eagli and Karau, 1991). So simply improving participation rates will not likely lead to greater leader emergence among women; the *way* they participate may also need to change.

Many CTs reduce or eliminate the social cues available in face-to-face interactions, providing group members with a degree of anonymity (Hollingshead, 1996; Sproull & Kiesler, 1992). This ability of CTs to provide anonymous communication has been shown to reduce users' evaluation apprehension and pressure to conform, thus leading to greater participation by group members (Dennis, 1996; Nunamaker, Dennis, Valacich, Vogel, & George, 1991; Reinig & Shin, 2002). While anonymity can take many different forms, perhaps the most critical factor in increasing participation within diverse groups is the CTs ability to provide visual anonymity, due to its ability to mask surface-level diversity (such as gender, age, and race) amongst group members (Carte & Chidambaram, 2004). To be clear, visual anonymity is a feature provided by CTs based on the inherent leanness of the media – i.e., there are no visual cues that accompany text-based communication. Such anonymity provides CM team members the freedom to participate in ways that may violate social norms. As such, anonymity may afford women a perceived freedom to engage in the task-oriented behaviors that are associated with emergent leadership, or it may afford a disconnect for men in a team between the message content and the message sender even if he knows the sender is female.

Both of these explanations (i.e., visual anonymity and parallelism) for the equalization that occurs in computer-mediated contexts are rooted in certain capabilities of the underlying CT enabling the communication (see

Table 2 below). More specifically, both visual anonymity and parallelism are reductive capabilities – CT capabilities that remove elements from standard face-to-face communication patterns (Carte and Chidambaram, 2004). There is another reductive CT capability which might serve as an additional explanation of the equalization phenomenon associated with CT use: asynchronous communication. Many CTs provide group members the ability to communicate asynchronously, eliminating the demand for an immediate response that is typical of face-to-face interactions. Removing this demand not only enables members to contribute according to their own schedules (which increases their opportunities to participate), but it also provides them with both more time to craft their communications (Trevino & Webster, 1992) and the ability to influence their fellow members’ perceptions of themselves by engaging in selective self-presentation (Walther, 1992, 1995, 1996). As such, CTs provide the potential to level the playing field for those who might otherwise be considered lower-status team members by creating the context for greater and non-stereotypical participation.

Insert

Table 2

Considerable effort has been expended on empirically substantiating this “equalization hypothesis” (e.g., Dubrovsky et al., 1991; Kiesler & Sproull, 1992) in general and specific to gender. In a meta-analysis of computer-mediated communication, Rains (2005) found that CM teams experience greater equality in both participation and influence compared to their face-to-face counterparts. More specifically regarding gender, another study found face-to-face teams paid more attention to in-group/out-group differences in terms of gender than those in CM teams

(Bhappu et al., 1997; Dubrovsky et al., 1991). Finally, while women have anecdotally been reported as having greater computer anxiety than men, studies of CM teams (e.g., Rains 2005) have not supported such assertions.

However, the social identity model of de-individuation effects (SIDE) provides a counterargument to the above claims of equalization (Postmes & Spears, 2002). SIDE suggests that in computer-mediated contexts, stereotypes can become more accentuated and even lead to greater stereotypic behaviors than in face-to-face settings. The relatively anonymity offered by CTs limits the ability of group members to differentiate the contributions of other members and to identify individual behaviors, thereby making social category information (e.g., gender) even more salient than in face-to-face settings (Postmes & Spears, 2002). This de-individuation encourages members to engage in normative behaviors for the salient category, promoting stereotyping by themselves and others (Postmes, Spears, & Lea, 1998). Researchers have found general support for SIDE (Postmes et al., 1998; Postmes & Spears, 2002), with men engaging in more stereotypically male behaviors (i.e., their comments are more autonomous) when the task is “masculine”, and women engaging in more stereotypically female behavior (i.e., their comments are more relational) when the task is “feminine” (Postmes & Spears, 2002). Such findings suggest that while the technology feature of parallelism may afford greater participation, anonymity likely will not free participants from stereotypes because they are self-imposed.

In summary, existing research appears to be somewhat split regarding the “equalization hypothesis.” On one hand, there is ample empirical evidence to suggest that equalization does, in fact, occur within groups in a computer-mediated context. On the other hand, there is also empirical support for SIDE, which argues that stereotypes may be more internally imposed resulting in more stereotypical behaviors among CM team members. In the following section, we

argue that by adequately accounting for time, the apparent conflict between these two positions can be resolved, resulting in a synthesis which more accurately describes the role of gender in influencing emergent leadership behaviors within CM teams over time.

The Moderating Effect of Time

There are a number of reasons it is important to study emergent leadership among men and women in CM teams over time. First, leadership takes time to develop (Van Dierendonck et al., 2004). For example, while some individuals within a team may engage in leadership behaviors immediately upon the team's formation others may step up as the team's needs change. As groups form, evolve, and mature, their leadership needs vary, indicating a need for different leadership behaviors over time (Barry, 1991). In addition, teammates' perceptions of other's leadership behaviors take time to form. Second, CM teams often need more time than face-to-face groups to develop relationships (Chidambaram, 1996); as such, other emergent processes are likely to be delayed as well. Third, and perhaps most importantly for this study, demographic characteristics such as gender are likely more salient early in a team's interactions (Harrison, Price, Gavin, & Florey, 2002).

Given the absence of individuating information, stereotyping is more likely to be the basis of one's opinion about teammates early in a team's lifecycle (Lea & Spears, 1991), and if social category information (e.g., gender) is known, the saliency of that information results in a tendency for one to enact behaviors associated with the social category (Postmes et al., 1998; Postmes & Spears, 2002). While reductive CT capabilities may allow CM team members to contribute anonymously, in many cases members do not maintain complete anonymity. Gender can occasionally be gleaned from the usernames within the CT, while some CM teams actually engage in limited face-to-face communication (sometimes formally – as with a 'project kickoff'

meeting – and sometimes informally). Further, teammates may even ascertain one another's gender based on their linguistic styles (Koh, Liu, and Lim 2011). Therefore, even fully computer-mediated (i.e., fully virtual) members can become aware of the gender of their teammates. As such, we expect men and women to adopt gender-stereotypic leadership behaviors during the initial phases of CM team interactions. However, as the team project progresses towards completion, the effects of gender on emergent leadership behaviors in CM teams are likely to decline. Within a purely CM environment it is often the case that the messages exchanged are the primary (and perhaps only) form of interaction – in essence, the messages and their content are surrogates for the team members. Over time additional information becomes available for evaluating teammates – information drawn from actual interactions with teammates, rather than merely social category information – thereby overriding initial categorical information (Harrison et al., 2002).

Consistent with other models of group development (e.g., Gersick, 1988), research on CM teams has shown that over time, they tend to shift their focus to task performance (Chidambaram and Bostrom, 1993), thereby reducing the importance of demographic differences (Sarker, Nicholson, & Joshi, 2005). Further, after gaining acceptance and status via behaving consistent with gender role expectations, team members may become more comfortable with engaging in some gender-inconsistent leadership behaviors (Hollander, 1958), especially when team members all shift their focuses towards the task and there exists a need to coordinate the workflow and integrate information as the task reaches its completion (Kanawattanachai & Yoo, 2007). Further, due to the lack of visual cues in the CM environment, team members may feel less constrained by gender norms. As such, both male and female team members may engage in whatever leadership behaviors they perceive to be useful for completing the task (either task-

oriented or socially-oriented leadership behaviors) without being concerned about whether their behavior is consistent with gender role expectations. Thus, over time, it is entirely reasonable to expect the equalization hypothesis to hold true; men and women will have equal opportunity to exercise influence over CM teams. Collaborative technology, rather than favoring one gender over the other, simply enables both men and women to lead unconstrained by gender-based stereotypes. Therefore, we hypothesize:

***HI:** In CM teams, gender differences in emergent leadership behaviors will be stereotypical early in the groups' interactions, and these differences will dissipate over time.*

STUDY 1

Subjects

In order to examine this question empirically, twenty-two largely 5-person teams¹ were assembled from 107 students enrolled in an introductory database course at three US-based universities. Teams were assembled in such a way that all teams were made from members from different schools. Further, gender make up was not left to random assignment, instead teams of all women, all men, and mixed gender teams were created. While some members may have been at the same school, no members were in the same class. As part of their course assignments the teams were given the task of developing a database. The project was worth 20 percent of the students' grades. The assignment was completed in five phases over 13 weeks (as described in Table 3).

Insert

Table 3

The task was directly relevant to the students' experience and course of study, consistent with DeSanctis'(1988) suggestion that any concerns about the use of student respondents are

¹ There were three four-person teams.

lessened if the students are performing relevant tasks within their experience (in this case, MIS majors developing database systems for a database class). No formal leaders were assigned.

Participant demographics are provided in

Table 4.

Insert
Table 4

Research Procedures

The project teams used *Yahoo! Groups*, a commercially available web-based groupware tool, to communicate with each other and to post project deliverables. Yahoo IDs were assigned to each participant; they were labeled user001, user002, etc. Each team had a shared workspace in *Yahoo! Groups*, similar to a discussion board that was accessible only to those team members and instructors. The specific team workspaces included threaded discussion boards as well as a shared file space that students could use to create directories, upload files, and post their final deliverables for instructor evaluation.

Dependent Variables

Our measures of task-oriented and socially-oriented leadership behavior were coded from exchanges that took place on *Yahoo! Groups*. The communication exchanges on *Yahoo! Groups* were archived and downloaded for coding. Messages were read and incidents of leadership behaviors were identified within each message. Thus, the coding unit of analysis was an incident of actual leadership behavior within each message. As such, a single message could contain multiple behaviors. In all, 3,972 messages were exchanged and subsequently coded. A primary

coder evaluated all messages in all 22 teams. A second coder was used to check the primary coding. Because gender might influence coder perceptions (Lord, Phillips, & Rush, 1980), the second coder was the opposite gender of the primary coder. The second coder evaluated two randomly selected teams and inter-rater reliability [measured as $1 - (\text{number of disagreements} / (\text{number of messages} \times \text{number of behaviors}))$] was 93.8%, which is above the suggested 0.8 cut-off (Krippendorff, 2012); moreover, such a high inter-rater reliability suggest that having more coders code the data is unnecessary (Krippendorff, 2004) and that the coder's gender does not influence our coding results. Therefore, the first coder's coding of messages for incidents of leadership behaviors was used (e.g., Strong & Volkoff, 2010).

The Leaderplex model (see Figure 1) was used to guide our coding because previous work had been done to develop a coding scheme along these eight dimensions (see Carte, Chidambaram, & Becker, 2006). Following this coding scheme, as well as prior efforts to develop a two-factor solution (i.e., Vilkinas & Cartan, 2006), we coded behaviors engaged in by our participants as socially-oriented if they demonstrated properties of facilitating, mentoring, or innovating. We coded behaviors as task-oriented if they demonstrated properties of brokering, producing, directing, coordinating, or monitoring. The final measure of task-oriented and socially-oriented leadership behaviors is simply a sum of the total number of task- and socially-oriented leadership behaviors that each individual engaged in for each of the five time periods.

Insert Figure 1

Control Variables

The relative proportion of men and women in a group is a critical determinant of group behavior (Kanter, 1977), including leadership emergence (Andrews, 1992). While findings in

this area are somewhat inconsistent, in most cases previous work suggests that as men decrease in proportion in a group they often exert more influence while women in decreasing numbers exert less (Johnson & Schulman, 1989). Thus we coded for gender composition, which we defined as the proportion of men in an individual's group (i.e., a lower number indicates fewer men in the group; a higher number indicates more men).

Data Analysis and Results

Our hypothesis focuses on the relationship between gender, time and observed leadership behaviors. Data collection utilized the same individuals over five time periods yielding a repeated-measure design using counts of leadership behavior (task or social) as the dependent variables, gender and time and their interactions as independent variables, controlling for gender composition. We applied a generalized linear model (GLZ) analysis (e.g., Littell, Stroup, & Freund, 2002; Nelder & Wedderburn, 1972). GLZ allows the application of traditional linear model analysis to count data by estimating the nonlinear link function $g(E(y))$ of the expected outcome of the original count data. The link function is chosen so that the maximum likelihood estimator of the transformation for a given distribution family is a linear function of the independent variables. In the case of the negative binomial distribution family which is appropriate for our data, the link function is $\text{Log}(y)$ and the software estimates both the linear coefficients and the variance of the underlying distribution. We confirmed the appropriateness of the negative binomial model by plotting the projected negative binomial frequencies generated by a theoretical process with mean and dispersion matching our base model (model with no independent variables) and found general agreement. We also checked for zero inflation (too many zeros) by comparing the percentage of zeros in the observed responses with the percentage expected from the negative binomial distribution and found no evidence of zero-inflation.

An autoregressive covariance model was assumed for the repeated responses by individuals over time – e.g., leadership behavior was modeled to depend on its own previous values. Time was treated as a class variable. The results of likelihood ratio statistics for type 3 analysis produced by SAS PROC GENMOD are shown in

Table 5.

Insert

Table 5

Type 3 analysis results indicate whether dropping a variable from the model will significantly change the model fit and are independent of the order in which variables are dropped. Results show that for both task- and socially-oriented leadership behaviors, dropping gender or time will significantly worsen the model but dropping the interaction between gender and time will not. Hence, H1 was not supported. Instead, there is a persistent (rather than gradually dissipating) gender difference in leadership behaviors among the men and women in our study. However, type 3 analysis does not show the direction of gender difference, i.e. whether women engage in more or less leadership behaviors than their counterparts. For the direction of gender difference, we turn to the plots (Figure 2 and Figure 3), which show that women engaged in more task-and socially-oriented leadership behaviors than men.

Study 1 Discussion

Arguing for an internally imposed gender role, we hypothesized that according to gender role theory men would engage in more task leadership behaviors while women would engage in more social leadership behaviors and that these differences would dissipate over time (H1). Examining the actual leadership behaviors engaged in we found no support for gender role

theory. The women in our study engaged in more task-oriented and socially-oriented leadership behaviors than men in general (no time-based differences). We conducted a follow-up analysis to determine whether the women in our study simply posted more messages than their male counterparts. We found marginally significant differences; women did post more messages. However, the women also exhibited a higher ratio of leadership behaviors to messages posted. While previous studies have typically found that inequalities in influence opportunities tend to favor men in face-to-face contexts (Eagly et al., 1992), our CM teams exhibited the opposite trait: the women in our studies were more influential—ultimately engaging in more task leadership and social leadership behaviors than their male counterparts.

The Role of Technology: The CM working environment tends to filter out many social status cues, making individuals feel anonymous, which can result in more equal participation across many subgroups including gender (Bhappu et al., 1997; Dubrovsky et al., 1991). That the women in our study would appreciate the equalized environment offered to them by the CT is congruent with other research showing that women are typically more satisfied with their CM teams than both men in CM teams and women in face-to-face teams (Lind, 1999). Further, women employ strategies to maintain that CM environment, rather than trying to replicate face-to-face communication as observed in men (Weber, Wittchen, & Hertel, 2009).

The Impact of Time on Behaviors

While not explicitly hypothesized, it is worth noting that there was an overall tendency for both men and women to exhibit fewer task- and socially-oriented leadership behaviors towards the end of the project. Some group development researchers have attempted to understand the temporal patterning of group interactions using a concept known as the “shadow of the future” (Robert, 1984). The shadow of the future covers all expected future interaction and

shared outcomes, with long shadows at the beginning of a team's lifecycle translating to greater effort and shrinking shadows as the endpoint approaches potentially leading to reduced efforts (Bouas & Arrow, 1996). For computer-mediated teams, previous research has suggested that the shadow of the future impacts team members' efforts to develop relational ties such that temporary or project-based distributed teams are less likely to do so than on-going distributed teams (Saunders & Ahuja, 2006). Our participants maintained somewhat consistent leadership behaviors over the first four time periods and then fell off drastically at the end.

Study 2

At first, the findings from study 1 appears to run counter to the findings of prior meta-analyses and current prevailing thought that men emerge as leaders more often than women (e.g., Koh, Liu, & Lim, 2011). However, a closer look reveals that many studies do not clearly tease out leadership behaviors from leadership perceptions. One might argue that all leadership is perceived (i.e., in the eye of the beholder). However, within the CM context we are uniquely positioned to attempt to distinguish between actual behaviors (i.e., messages posted) and perceptions. In Study 2, we retested our hypothesis from Study 1, but we included assessments of both leadership behaviors and team members' leadership perceptions.

In addition, we made some changes to our design to examine the robustness of the findings in Study 1. In Study 2, data were collected in a different country – Sri Lanka – in order to determine whether the behavior-related findings from Study 1 are sufficiently robust to generalize across different cultures. Sri Lankan culture has been characterized as high on power distance, high on uncertainty avoidance, collectivist (rather than individualist) and nurturing (versus assertive) (Weathersby, 1993); these are virtually the opposite of the United States (Hofstede, 1980). High power distance and uncertainty avoidance have been found to create

resistance to empowerment and self-managed teams (Randolph & Sashkin, 2002). Further, the teams were MBA students with significant work experience, enabling us to determine if our findings apply only to novice team members or whether experienced team members also exhibit similar behaviors. Study 2 used team members who were co-located, but using a CT, enabling us to determine whether the findings from Study 1 were a product of geographic dispersion or CT use. We also included additional controls – most notably personality – in an effort to rule out individual differences as an explanation for our findings. Finally, we used a different task. While Study 1 participants developed a database, in Study 2 our teams wrote a series of case notes.

The Role of Leadership Perceptions

Behavior is an important baseline measure of leader effectiveness; however, it is also important that followers actually perceive the leader as leading (DeRue & Ashford, 2010; Yoo & Alavi, 2004). While behaviors are likely guided by internal assessments of what an individual thinks is expected of him or her, perceptions of leadership are externally imposed – i.e., they are the perceptions of others about one’s behaviors. Past meta-analytical findings suggest that gender-congruent behaviors were perceived more positively than incongruent behaviors (Eagly, Karau, & Makhijani, 1995). As such, men are perceived as leaders when engaged in task leadership and women as leaders when engaged in social leadership (Eagly et al., 1991). These differences have been shown to dissipate over time (Eagly and Karau, 1991).

The meta-analytical findings are all derived from face-to-face studies. CTs offer a number of capabilities to make surface-level differences like gender less salient (previously referred to as reductive capabilities (Carte and Chidambaram, 2004)). Features such as anonymity likely will impact even externally imposed assessments of leadership. For CM teams the messages exchanged are often the leading physical manifestation of team members (i.e., the message *is* the member). One explanation given for previous findings that men emerge as leaders

more often is that they are more likely to engage in task leadership behaviors (Eagly et al., 1995, Eagly et al., 1991). Absent other information (i.e., awareness of gender) it is likely task leadership will drive perceptions of leadership.

H2: Regardless of gender, individuals engaging in task leadership will be perceived as leaders

However, over time gender information may be determined through meetings or even information disclosed in messages. As such expectations of gender stereotypical behaviors will likely impact teammates' perceptions:

H3a: Over time, men who engage in task-oriented leadership behavior will be more likely to be perceived as leaders in CM teams compared to women engaged in similar levels of task leadership.

H3b: Over time, women who engage in socially-oriented leadership behavior will be more likely to be perceived as leaders in CM teams compared to men engaged in similar levels of social leadership.

Methods

The sample for this second study comprised 132 students (male=85, female=47) enrolled in an MBA course within a premier MBA program in Sri Lanka. This program attracts high-quality, experienced managers and all courses are taught in the evening so that students may maintain their fulltime employment while completing their MBA. As such, the use of these students does not come with some of the usual concerns about using students as surrogates for managers. Each subject was assigned to one of 25 groups; 18 five-member groups and 7 six-member groups. During their Introduction to MIS course the groups were asked to complete four case write-ups over eight weeks with the deliverables equally spaced – two weeks apart. Though previous research has suggested that assigned tasks may make gender more or less salient (Wagner & Berger, 1997), writing assignments were commonly made within this MBA program and such assignments were unlikely to be perceived as either masculine or feminine. An initial

survey was administered to collect demographic data, and a final survey was conducted to capture leadership perceptions at the conclusion of the eight week period. Consistent with our first study, each group had a shared workspace in *Yahoo! Groups*, accessible only to group members and the instructor. While these groups were collocated, they were asked to complete the assignment using only *Yahoo! Groups*.

Leadership behaviors: The communication exchanges within each group on *Yahoo! Groups* were archived and coded. Because these groups were collocated, it was possible to meet face-to-face resulting in potentially incomplete data about leadership behaviors. As such, we asked participants to what extent the tasks were completed using *Yahoo! Groups*. The responses indicated that the groups used the collaborative technology for the majority of their interactions,² consistent with current characterizations of computer-mediated teams that move away from purely computer-mediated or purely collocated, and instead focus on degrees of virtualness (Griffith, Sawyer, & Neale, 2003).

Similar to the first study, our measures of task- and socially-oriented leadership behaviors were coded from communication exchanges. Each message was examined for incidents of leadership behaviors – again, an individual message could contain multiple behaviors. In all, 2,742 messages were exchanged and subsequently coded. Coding was conducted by two coders – one male and one female – and inter-rater agreement was sufficient with a Cohen’s Kappa above .80. Task and social leadership were represented by the total number of task- and socially-oriented leadership behaviors each individual engaged in within each of the four time periods. The ratings of the first coder were used.

² The participants were asked what percentage of their team’s interactions occurred using phone calls, face-to-face meetings, and/or impromptu meetings. Respondents indicated that their teams used these alternative channels for less than 10% of their interactions and more than 90% of interactions took place over *Yahoo! Groups*.

Leadership perceptions: In the final survey, participants were asked which member(s) of their team they thought emerged as leaders. Specifically, they were asked: How would you describe the leadership within your group for this assignment? 1) This group had no leadership, 2) All members equally led this group, or 3) One or more members stepped forward and took the lead, if so who (please give full names). The number of times each participant was named as a leader was then counted (the result could vary from zero to five or six (based on the group size) because individuals could name themselves).

Controls: Two control variables were included in our analysis. Consistent with our first study, we controlled for gender composition. Further, because personality has been previously linked to emergent leadership behavior (Cogliser, Gardner, Gavin, & Broberg, 2012), we captured personality using the Big 5 personality items (Robbins & Judge, 2007).

Results

We first tested if results of Study 1 (which used a US-based sample) would be replicated in the Sri-Lanka based sample. We used the same analysis and went through the same process to confirm the appropriateness of the negative binomial model as we did in Study 1. Likelihood ratio statistics of type 3 analysis results are shown in

Table 6. The results indicated that a significant gender difference only existed for task-oriented leadership behavior. Further, for task-oriented leadership behaviors, dropping the interaction between gender and time produced a deterioration that was significant at 0.1, while for socially-oriented leadership behaviors, dropping the interaction between gender and time did not significantly change the model.

Insert Table 6

Once again, we turn to plots (Figure 2 and Figure 3) to understand gender differences and the interaction between gender and time for task-oriented leadership behaviors. Figure 2 shows that men and women engaged in similar amount of task-oriented leadership behaviors at the beginning of the team's lifecycle. This decreased over time, but it decreased faster for men. Over time, women engaged in more task-oriented leadership behaviors than men. That is, although both showed a decreasing pattern, women were more persistent than men in engaging in task-oriented leadership behaviors. Figure 3 shows that men and women engaged in similar amounts and consistent patterns (i.e. decreasing over time) of socially-oriented leadership behaviors throughout their team's interactions. We then reran the above analysis to test H1 for Study 2 including the personality data as an additional control. Results (Appendix A) are quite consistent, with the exception that dropping gender for task-oriented leadership behavior reduced the significance to 0.1 (rather than 0.05). Overall, H1 was not supported for Study 2.

H2, H3a, and H3b examine the relationship between leadership behaviors and leadership perceptions. We used gender composition and big-five personality as control variables; independent variables included the main effect of gender, socially-oriented leadership behavior, task-oriented leadership behavior, and the interaction of gender and socially/task-oriented leadership behavior. The dependent variable for this set of hypotheses was the number of times an individual was named as a leader in the survey. These scores ranged from 0 to 5 for each individual. We combined all individuals who received any leadership comments (i.e. leadership perception > 0) into a single category since most individuals did not receive any. H2 and H3 were tested using binomial logistic regression (i.e. leadership perceptions = or > 0). The results are presented in

Table 7. The resulting generalized linear analysis compares the probabilities of >0 indicators to the base class of 0 observation. Thus positive regression coefficients indicate an increased probability of the base class. That is, positive coefficients indicate a correlation with fewer perceived leadership behaviors. The negative (and significant) coefficients for task-oriented leadership behaviors are properly interpreted to mean that greater numbers of task-oriented leadership behaviors in Time 1 and Time 4 were correlated with a greater likelihood of being perceived as a leader lending partial support for H2. Interestingly, although not hypothesized, socially-oriented leadership behaviors in Time 1 were also correlated (marginally significant) with leadership perceptions.

Insert

Table 7

The results for gender*socially/task-oriented leadership tell us the differences between female groups and the male referent group. At Time 1, the positive coefficients for gender*socially-oriented leadership indicate that men who showed equal numbers of socially-oriented leadership behaviors compared to women were more likely than their female counterparts to be perceived as leaders. Similarly, the negative results for gender*task-oriented leadership (significant at $p=.055$) indicate that women who showed equal numbers of task-oriented leadership behaviors compared to men were more likely than their male counterparts to be perceived as leaders. Finally, the influence of gender and leadership behaviors on perceived leadership disappeared in Times 2, 3, and 4. These results are contrary to expectations, thus H3a and H3b are not supported.

STUDY 2 DISCUSSION

Re-examining the actual leadership behaviors engaged in by men and women, we found a significant interaction between gender and time for both task-oriented and socially-oriented leadership. Over time, women in our study generally engaged in greater amounts of both task and social leadership behaviors than their male counterparts, as illustrated in Figure 2 and Figure 3. However, for our more experienced, co-located teams, women and men started out engaging in similar patterns of behavior but over time the behavior of the women remained fairly consistent while the engagement of the men in leadership behaviors declined more rapidly. We conducted a follow-up analysis to determine whether the women in our study simply posted more messages than their male counterparts. We found significant differences; women did post more messages. However, the women also exhibited a higher ratio of leadership behaviors to messages posted. Again, the women in our study were more influential– ultimately engaging in more task leadership and social leadership behaviors than their male counterparts.

Gender, Technology and Leadership Perceptions: In addition, we investigated leadership perceptions arguing that these represent externally imposed gender role expectations. As such, gender differences in emergent team leadership may be the result of women being perceived differently than men. Our H2 suggested that gender would be less relevant than task behavior and accordingly task-oriented leadership would benefit both men and women in being perceived as leaders. Our results confirm this. CM teams offer women an opportunity to engage in task leadership and have that behavior positively perceived thus leveling the playing field and allowing more task-related participation by minority group members. This is consistent with prior studies where greater equality of participation among high-status and low-status members has been reported (Dubrovsky et al., 1991).

Stereotypical Behaviors and Perceptions: Further, in our investigation of perceived leadership, both H3a and H3b –concerning the relationship between leadership behaviors and the perceptions of those behaviors by group members– were unsupported. In fact, we found the opposite of what gender role theory predicts. The significant interaction effects indicate that when men and women engaged in role incongruent leadership behaviors (i.e., women in task-oriented leadership behaviors and men in socially-oriented leadership behaviors) they were perceived to have led. One possible explanation for this may be found in Expectation Disconfirmation Theory (EDT).

EDT, originally created by a marketing researcher to improve understanding of customer satisfaction, suggests that a person's satisfaction with a product is a function of the degree to which his/her expectation of the product is met (Oliver, 1980). Later work by an information systems researcher drawing upon EDT empirically verified the impact of confirmed expectations not only on satisfaction, but also upon perceptions (Bhattacharjee, 2001). Applied to our research context, EDT suggests that group members' perceptions of emergent leaders may, to some degree, be augmented by the confirmation/disconfirmation of their gender-role expectations. The contrast perspective of EDT suggests that both confirmation and positive disconfirmation (i.e. better than expected) have a positive impact on perception, while negative disconfirmation (i.e. worse than expected) has a negative impact (Sherif & Hovland, 1961). This perspective has been employed in prior investigations of gender roles. While not explicitly drawing upon EDT for their arguments, Heilman and Chen (2005) found that engaging in altruistic citizenship behavior – generally expected to be part of the female gender role – enhanced men's performance evaluations and recommendations for rewards but did not affect those of women. On the other hand, a lack of altruistic citizenship behavior was detrimental to performance evaluations and

reward recommendations of women but did not affect those of men. The logic underlying Heilman and Chen's (2005) explanation for these findings is consistent with EDT: because altruistic citizenship behavior is expected from women, women engaging in altruistic citizenship behavior are unlikely to be recognized. On the other hand, because men are not expected to engage in as much altruistic behavior, men engaging in altruistic citizenship behavior are more likely to be recognized.

The Role of Technology: The manner in which stereotypes impact perceptions may depend on when they become salient. Carte and Chidambaram (2004) argue that diverse teams may benefit from visually anonymous computer-mediated interactions provided by collaborative technologies early in their development so that individual perceptions are limited to individual contributions. However, once initial opinions are formed, diverse teams may benefit from identified interactions (i.e., those that result in greater awareness of differences, such as gender) that enable more personal communication without the risk of one's opinion of teammates being unduly influenced by demographic differences. Even if individuals engage in some "guessing" about the gender of a teammate, it is likely less salient in CM teams because the messages exchanged are so much more central to one's perception of teammates due to the extreme task focus within most virtual teams (Jarvenpaa, Knoll, & Leidner, 1998). Thus, assessments of differences that are delayed to the point that at least some messages have been exchanged will likely attenuate the negative impacts of gender-specific disconfirmation but heighten the positive impacts. This provides some insight into a potential benefit of CTs: women who engage in task-oriented leadership or men who engage in socially-oriented leadership can break out of their gender roles by using the technology to overcome ingrained gender-role perceptions.

The Impact of Time on Perceptions: Study 2 also revealed differences in leadership perceptions over time. The interaction effects of gender and task/socially-oriented leadership present in Time 1 disappeared in later time periods, indicating that as time went by, the impact of behavior on leadership perception disappeared in our CM teams. A possible explanation for this finding can be found in cognition research: Fisk and Taylor (1991) emphasized the role of salience (i.e. a property of stimuli in context) as an important driver of attention. That is, women/men engaging in gender-incongruent leadership behavior are more salient and hence are more likely to capture team members' attention. Hence, stronger memories associated with leadership behaviors remain in observers' (i.e. team members) cognitions (see Lockhart & Craik, 1990 for a review). As expectations adjust over time, the disconfirmation (i.e. being unusual) is gone, and hence the salience is gone. As a result, leadership behaviors at Time 1, with which strong memories are associated, have the biggest influence on leadership perception when individuals were asked to name a leader at the end of team interactions.

OVERALL DISCUSSION

Although much research has been conducted to examine leadership and gender dynamics in traditional settings, our understanding of gender differences in computer-mediated settings, especially as they relate to leadership is comparatively in its infancy. Prior studies of gender and leadership have found that men emerge as leaders in task-oriented situations and women emerge as leaders in socially-oriented situations (Eagly and Karau, 1991). As such, our findings should be viewed as a first step in understanding the role of technology in creating a more balanced engagement in task- and socially-oriented leadership by men and women alike. The results of our hypothesis testing are presented in Table 8. Probably the most interesting result is that very little of the previous work on gender and leadership was supported in our findings. One could argue

that previous theory and empirically supported differences simply do not apply anymore, or, one might argue that gender differences have been exaggerated in the literature (Hyde, 2005).

However, our data does not suggest that gender differences no longer exist; it instead suggests that men and women behave and are even perceived differently in technology-mediated environments – but in ways that are inconsistent with gender role theory.

Insert Table 8

Gender, Technology and Leadership Behaviors

Gender role theory suggests – and prior empirical evidence supports –there have been gender differences in leader emergence among members of face-to-face groups (Eagly and Karau 1991). We examined the actual leadership behaviors engaged in by men and women in two different computer-mediated contexts, both involving teams tasked with projects that required phased deliverables.

Task-Oriented Leadership Behaviors: In both studies, H1 was rejected and our significant findings are contrary to gender role theory. The men and women in our studies engaged in task leadership behaviors that dissipated over time; however, women generally engaged in more task leadership than men. In Study 2, a significant interaction between gender and time was found for task-oriented leadership behaviors. However, the pattern (seen in Figure 2) does not reflect a dissipation of differences. Though the two contexts differed in terms of geographic distribution, culture, task, and individual experience, the pattern of behavior exhibited by the subjects was similar: over time, women generally engaged in greater amounts of task-oriented leadership behaviors than their male counterparts. However, for our more experienced, co-located teams, women and men started out engaging in similar patterns of behavior but over time the behavior

of the women remained fairly consistent while the engagement of the men in leadership behaviors declined more rapidly.

Insert Figure 2 and Figure 3

Socially-Oriented Leadership Behaviors: Previous work, largely focused on face-to-face teams, has highlighted the extra effort often engaged in by women to foster relational ties within a group, including leadership behaviors focused on social needs (Eagly and Karau, 1991). Consistent with this previous work, the women in our studies, perhaps engaging in self-categorization, engaged in more socially-oriented leadership than their male counterparts. The women in Study 2 did not initially engage in more socially-oriented leadership behaviors than the men, but as the study progressed they engaged in more than their male counterparts.

The Role of Technology: The pattern of behaviors engaged in by the men and women in our studies generally supports the equalization hypothesis, inasmuch as the CT provided a context within which lower status group members could be heard. In fact, the consistency of findings across our studies suggests that the use of collaborative technology has benefits to teams whether they are geographically distributed (and visual anonymous) or collocated. Much of the previous literature on the equalization hypothesis has been predicated on anonymity. The members of our Study 2 teams were not anonymous yet the women still benefited from the technology use in the form of opportunities to influence the team both in terms of task performance and social well-being.

The critical role of time in the outcomes of these studies has implications for technology use. Early leadership behaviors engaged in by our participants had the greatest impacts on leadership perceptions. One potential managerial prescription that may be derived from this is

the early introduction of collaborative technologies. This is consistent with some existing work on diverse teams. Carte and Chidambaram (2004) articulate a theory of accelerated technology deployment that recommends early use of collaborative technology for more diverse teams. They argue that early introduction of reductive capabilities may reduce or delay social categorization behaviors that create in-group/out-group categorizations based on surface traits (like gender). As such, more consistent use of CTs (rather than reverting to face-to-face meetings) may help create a level playing field for both genders to engage in a balanced set of leadership behaviors.

Developing greater participation among members of lower status sub-groups may improve the team's well-being (e.g., cohesion and team identity), but previous work also suggests that the behaviors we have measured (i.e., task and social leadership behaviors) also correlate with improved team performance (Carte et al., 2006). However, that the women also engaged in higher levels of socially-oriented leadership behaviors provides some support also for the SIDE model inasmuch as stereotypical behaviors are salient (although perhaps not amplified) in computer-mediated settings.

The Impact of Time on Behaviors

The patterns of task- and socially-oriented leadership behaviors in both of our studies indicated a significant reduction in leadership at each project's conclusion (as evidenced by highly significant results for time in the analyses of each study) – consistent with the shadow of the future predictions. However, the “future” for the participants in each study was different. The participants in Study 1 were geographically distributed and extremely unlikely to ever work together again, but the participants in Study 2 were at the beginning of a two-year MBA program and very likely to work together again. The participants in Study 1 maintained somewhat consistent leadership behaviors over the first four time periods and then fell off drastically at the

end. In Study 2 only the female participants maintained a level of leadership through the first three time periods; the number of leadership behaviors engaged in by men started to fall almost immediately. This difference may best be explained by the opportunity for participants in Study 2 to engage in face-to-face conversation. Although the self-report data suggests otherwise, it is certainly possible.

Finally, it is worth noting we hypothesized that any initial differences in leadership behaviors between men and women would dissipate over time. In fact, the pattern of behavior in both studies was that the differences varied over time but persisted rather than dissipating. This effect was even more pronounced in Study 2, where differences between men and women's engagement in socially- and task-oriented leadership behaviors were initially insignificant, but increased over time, the women ultimately engaging in significantly more task- and socially-oriented leadership behaviors than men. Thus, the men and women in our studies did not become more alike in their leadership behaviors over time but less alike.

CONCLUSION

In summary, our results suggest that the context of computer-mediated teams provides for emergent leadership outcomes that deviate from gender role theory. Our findings suggest that CTs can provide women an opportunity to engage in assertive behaviors potentially outside of their gender role expectations. In previous face-to-face studies of emergent leadership, women were more likely to engage in less assertive, socially-oriented leadership while men engaged in more assertive, task-oriented leadership at least partially due to gender role expectations. This was not the case in our studies. The women in our studies engaged in both socially- and task-oriented leadership behaviors at levels equivalent to or greater than their male counterparts. Further, the women in our studies were able to overcome potential gender-role biases in the way

they were perceived by their teammates. In fact, gender seemed to play a small role in comparison to actual behaviors when team members identified emergent leaders from their groups.

Given the access to face-to-face interactions for participants in Study 2 and the likely salience of gender in such interactions, this finding should be interpreted as great news for assembling mixed gender teams and leveraging members' knowledge and abilities. This is particularly important because of the increasing number of women in the workforce, as well as the rapid increase in the use of computer-mediated teams by organizations. This finding provides further evidence that CTs may level the playing field for minority team members, creating an opportunity for managers to better leverage existing resources.

One limitation of this paper, which offers a potential direction for future research, is that we are unable to examine the impact of team size on leadership behavior and perception: among the 47 teams in our studies, 36 teams had 5 members, 8 teams had 4 members, 2 teams had 6 members and 1 team had 3 members. While we believe team size had little impact on our results because all but 3 teams in our study had either 4 or 5 members, future researchers may want to examine how team size affects the leadership behaviors of men and women and the chance for them to be perceived as leaders.

Finally, this paper adds to our understanding of the role of CTs in enabling computer-mediated teams to accomplish their tasks. By arguing that CM teams are constantly engaged in two tasks (the primary task and the collaboration task) and mapping those tasks to specific capabilities of collaborative technology, we have opened the door for future studies to better evaluate the true value of CTs. Such future studies could shed important light on both the communication processes within computer-mediated teams and the coordination processes that

are vital to the execution of the primary task. Particularly for teams with long life expectancies, the dual focus on task completion and relationship development is important to team development (McGrath, 1991).

REFERENCES

- Andrews, P. H. 1992. Sex and Gender Differences in Group Communication. *Small Group Research*, 23(1): 74-94.
- Bales, R. F. 1950. Interaction process analysis. *Cambridge, Mass.*
- Barry, D. 1991. Managing the bossless team: Lessons in distributed leadership. *Organizational Dynamics*, 20(1): 31-47.
- Baugh, S. G., & Graen, G. B. 1997. Effects of Team Gender and Racial Composition on Perceptions of Team Performance in Cross-Functional Teams *Group & Organization Management*, 22(3): 366-383.
- Bell, B. S., & Kozlowski, S. W. 2002. A typology of virtual teams implications for effective leadership. *Group & Organization Management*, 27(1): 14-49.
- Bhappu, A. D., Griffith, T. L., & Northcraft, G. B. 1997. Media Effects and Communication Bias in Diverse Groups. *Organizational Behavior and Human Decision Processes*, 70(3): 199-205.
- Bhattacharjee, A. 2001. Understanding information systems continuance: an expectation-confirmation model. *Management Information Systems Quarterly*, 25(3): 351-370.
- Bouas, K. S., & Arrow, H. 1996. The development of group identity in computer and face-to-face groups with membership change. *Computer Supported Cooperative Work* 4(2-3): 153-178.
- Carless, S. A. 1998. Gender differences in transformational leadership: An examination of superior, leader, and subordinate perspectives. *Sex roles*, 39(11-12): 887-902.
- Carte, T., & Chidambaram, L. 2004. A capabilities-based theory of technology deployment in diverse teams: Leapfrogging the pitfalls of diversity and leveraging its potential with collaborative technology. *Journal of the Association for Information Systems*, 5(11): 17.
- Carte, T. A., Chidambaram, L., & Becker, A. 2006. Emergent leadership in self-managed virtual teams. *Group Decision and Negotiation*, 15(4): 323-343.
- Chidambaram, L. 1996. Relational development in computer-supported groups. *Mis Quarterly*, 20(2): 143-165.
- Cogliser, C. C., Gardner, W. L., Gavin, M. B., & Broberg, J. C. 2012. Big Five Personality Factors and Leader Emergence in Virtual Teams Relationships With Team Trustworthiness, Member Performance Contributions, and Team Performance. *Group & Organization Management*, 37(6): 752-784.
- Dennis, A. 1996. Information exchange and use in group decision making: you can lead a group to information, but you can't make it think. *Management Information Systems Quarterly*, 20(4): 433-457.

- Dennis, A. R., Wixom, B. H., & Vandenberg, R. J. 2001. Understanding fit and appropriation effects in group support systems via meta-analysis. *Management Information Systems Quarterly*: 167-193.
- DeRue, D. S., & Ashford, S. J. 2010. Who will lead and who will follow? A social process of leadership identity construction in organizations. *Academy of Management Review*, 35(4): 627-647.
- DeSanctis, G. 1988. Small group research in information systems: Theory and Method.
- Diehl, M., & Stroebe, W. 1987. Productivity loss in brainstorming groups: Toward the solution of a riddle. *Journal of Personality and Social Psychology*, 53(3): 497-509.
- Diehl, M., & Stroebe, W. 1991. Productivity loss in idea-generating groups: Tracking down the blocking effect. *Journal of Personality and Social Psychology*, 61(3): 392-403.
- Dobbins, G. H., Long, W. S., & Dedrick, E. J. 1990. The Role of Self-Monitoring and Gender on Leader Emergence: A Laboratory and Field Study *Journal of Management*, 16(3): 609-618.
- Dubrovsky, V. J., Kiesler, S., & Sethna, B. N. 1991. The equalization phenomenon: Status effects in computer-mediated and face-to-face decision-making groups. *Human-Computer Interaction*, 6(2): 119-146.
- Eagly, A. H., & Johannesen-Schmidt, M. C. 2001. The leadership styles of women and men. *Journal of Social Issues*, 57(4): 781-797.
- Eagly, A. H., & Johnson, B. T. 1990. Gender and leadership style: A meta-analysis. *Psychological Bulletin*, 108(2): 233.
- Eagly, A. H., & Karau, S. J. 1991. Gender and the emergence of leaders: A meta-analysis. *Journal of Personality and Social Psychology*, 60(5): 685-710.
- Eagly, A. H., Karau, S. J., & Makhijani, M. G. 1995. Gender and the effectiveness of leaders: A meta-analysis. *Psychological Bulletin*, 117: 125-125.
- Eagly, A. H., Wood, W., & Diekmann, A. B. 2000. Social role theory of sex differences and similarities: A current appraisal. *The Developmental Social Psychology of Gender*: 123-174.
- Fiske, S. T., & Taylor, S. E. 1991. Social cognition, 2nd. NY: **McGraw-Hill**.
- Gallupe, R. B., Bastianutti, L. M., & Cooper, W. H. 1991. Unblocking brainstorms. *Journal of Applied Psychology*, 76(1): 137.
- Gershonoff, A. B., & Foti, R. J. 2003. Leader Emergence And Gender Roles in All-Female Groups A Contextual Examination. *Small Group Research*, 34(2): 170-196.
- Gersick, C. J. 1988. Time and transition in work teams: Toward a new model of group development. *Academy of Management Journal*, 31(1): 9-41.
- Goktepe, J. R., & Schneier, C. E. 1989. Role of sex, gender roles, and attraction in predicting emergent leaders. *Journal of Applied Psychology*, 74(1): 165.
- Griffith, T. L., Sawyer, J. E., & Neale, M. A. 2003. Virtualness and knowledge in teams: Managing the love triangle of organizations, individuals, and information technology. *MIS Quarterly*: 265-287.
- Hackman, J. R., & Walton, R. E. 1986. Leading groups in organizations. *Designing effective work groups*.
- Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. 2002. Time, teams, and task performance: Changing effects of surface-and deep-level diversity on group functioning. *Academy of Management Journal*, 45(5): 1029-1045.

- Heilman, M. E., & Chen, J. J. 2005. Same behavior, different consequences: reactions to men's and women's altruistic citizenship behavior. *Journal of Applied Psychology*, 90(3): 431-441.
- Hemphill, J., & Coons, A. 1957. Development of the leader behavior description questionnaire. *Leader behavior: Its description and measurement*: 6-38.
- Hofstede, G. 1980. *Culture's consequences: International differences in work-related values*: sage.
- Hollander, E. P. 1958. Conformity, status, and idiosyncrasy credit. *Psychological Review*, 65(2): 117.
- Hollingshead, A. B. 1996. Information suppression and status persistence in group decision making the effects of communication media. *Human Communication Research*, 23(2): 193-219.
- Hyde, J. S. 2005. The gender similarities hypothesis. *American Psychologist*, 60(6): 581.
- Jarvenpaa, S. L., Knoll, K., & Leidner, D. E. 1998. Is Anybody Out There? Antecedents of Trust in Global. *Journal of Management Information Systems/Spring 1998*, 4(4): 29-64.
- Jehn, K. A., Northcraft, G. B., & Neale, M. A. 1999. Why Differences Make a Difference: A Field Study of Diversity, Conflict, and Performance in Workgroups. *Administrative Science Quarterly*, 49: 741-763.
- Johnson, R. A., & Schulman, G. I. 1989. Gender-role composition and role entrapment in decision-making groups. *Gender & Society*, 3(3): 355-372.
- Kanawattanachai, P., & Yoo, Y. 2007. The impact of knowledge coordination on virtual team performance over time. *Management Information Systems Quarterly*: 783-808.
- Kanter, R. M. 1977. *Men and Women of the Corporation*: New York: Basic Books.
- Karakowsky, L., & Siegel, J. P. 1999. The effects of proportional representation and gender orientation of the task on emergent leadership behavior in mixed-gender work groups. *Journal of Applied Psychology*, 84(4): 620-631.
- Kent, R. L., & Moss, S. E. 1994. Effects of Sex and Gender Role on Leader Emergence. *The Academy of Management Journal*, 37(5): 1335-1346.
- Kickul, J., & Neuman, G. 2000. Emergent leadership behaviors: The function of personality and cognitive ability in determining teamwork performance and KSAs. *Journal of Business and Psychology*, 15(1): 27-51.
- Kiesler, S., Siegel, J., & McGuire, T. 1984. Social psychological aspects of computer-mediated communication. *American Psychologist*, 39(10): 1123-1134.
- Koh, E., Liu, N., & Lim, J. 2011. Gender and Anonymity in Virtual Teams: An Exploratory Study. *International Journal of E-Politics (IJEP)*, 2(1): 1-16.
- Krippendorff, K. 2004. Reliability in content analysis. *Human Communication Research*, 30(3): 411-433.
- Krippendorff, K. 2012. *Content analysis: An introduction to its methodology*: SAGE Publications, Inc.
- Lea, M., & Spears, R. 1991. Computer-mediated communication, de-individuation and group decision-making. *International Journal of Man-Machine Studies*, 34(2): 283-301.
- Lee, C., & Farh, J. L. 2004. Joint effects of group efficacy and gender diversity on group cohesion and performance. *Applied Psychology: An International Review*, 53(1): 136-154.
- Lind, M. R. 1999. The gender impact of temporary virtual work groups. *Professional Communication, IEEE Transactions on*, 42(4): 276-285.

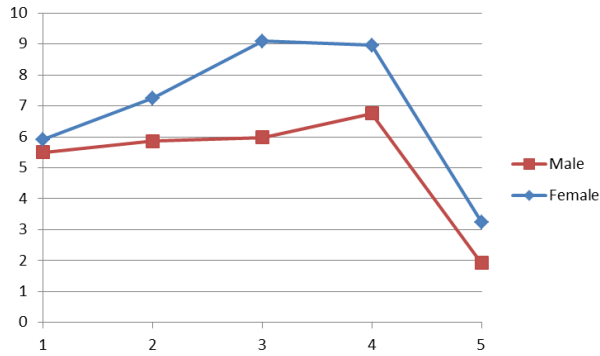
- Littell, R. C., Stroup, W. W., & Freund, R. J. 2002. *SAS for linear models*: SAS Institute.
- Lockhart, R. S., & Craik, F. I. 1990. Levels of processing: A retrospective commentary on a framework for memory research. *Canadian Journal of Psychology*, 44(1): 87-112.
- Lord, R. G. 1977. Functional leadership behavior: Measurement and relation to social power and leadership perceptions. *Administrative Science Quarterly*: 114-133.
- Lord, R. G., Phillips, J. S., & Rush, M. C. 1980. Effects of sex and personality on perceptions of emergent leadership, influence, and social power. *Journal of Applied Psychology*, 65(2): 176.
- Maher, K. J. 1997. Gender-related stereotypes of transformational and transactional leadership. *Sex roles*, 37(3-4): 209-225.
- McGrath, J. E. 1962. The influence of positive interpersonal relations on adjustment and effectiveness in rifle teams. *The Journal of Abnormal and Social Psychology*, 65(6): 365.
- McGrath, J. E. 1991. Time, interaction, and performance (TIP) A Theory of Groups. *Small Group Research*, 22(2): 147-174.
- Misiolek, N. I., & Heckman, R. 2005. *Patterns of emergent leadership in virtual teams*. Paper presented at the System Sciences, 2005. HICSS'05. Proceedings of the 38th Annual Hawaii International Conference on.
- Mortensen, M., & Hinds, P. J. 2001. Conflict and shared identity in geographically distributed teams. *International Journal of Conflict Management*, 12(3): 212-238.
- Mullen, B., Salas, E., & Driskell, J. E. 1989. Salience, motivation, and artifact as contributions to the relation between participation rate and leadership. *Journal of Experimental Social Psychology*, 25(6): 545-559.
- Nelder, J. A., & Wedderburn, R. W. 1972. Generalized linear models. *Journal of the Royal Statistical Society. Series A (General)*: 370-384.
- Nunamaker, J. F., Dennis, A. R., Valacich, J. S., Vogel, D., & George, J. F. 1991. Electronic meeting systems. *Communications of the ACM*, 34(7): 40-61.
- Oliver, R. 1980. A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of marketing research*, 17(4): 460-469.
- Phillips, G. M., & Santoro, G. M. 1989. Teaching group discussion via computer-mediated communication. *Communication Education*, 38(2): 151-161.
- Postmes, T., & Spears, R. 2002. Behavior Online: Does Anonymous Computer Communication Reduce Gender Inequality? *Personality and Social Psychology Bulletin*, 28(7): 1073-1083.
- Postmes, T., Spears, R., & Lea, M. 1998. Breaching or building social boundaries? SIDE-effects of computer-mediated communication. *Communication Research*, 25(6): 689-715.
- Rains, S. A. 2005. Leveling the Organizational Playing Field - Virtually: A Meta-Analysis of Experimental Research Assessing the Impact of Group Support System Use on Member Influence Behaviors. *Communication Research*, 32(2): 193-234.
- Randolph, W. A., & Sashkin, M. 2002. Can organizational empowerment work in multinational settings? *The Academy of Management Executive*, 16(1): 102-115.
- Reinig, B., & Shin, B. 2002. The dynamic effects of group support systems on group meetings. *Journal of Management Information Systems*, 19(2): 303-325.
- Rice, R. E. 1987. Computer-mediated communication and organizational innovation. *Journal of Communication*, 37(4): 65-94.

- Robbins, S., & Judge, T. (Eds.). 2007. *Essentials of Organizational Behavior*. Upper Saddle River, NJ: Prentice-Hall.
- Robert, A. 1984. *The evolution of cooperation*. New York: Basic Books.
- Sarker, S., Grewal, R., & Sarker, S. 2002. *Emergence of Leaders in Virtual Teams: What Matters?* Paper presented at the Proceedings of the 35th Hawaii International Conference on System Sciences.
- Sarker, S., Nicholson, D., & Joshi, K. 2005. Knowledge transfer in virtual systems development teams: An exploratory study of four key enablers. *IEEE Transactions on Professional Communication*, 48(2): 201-218.
- Saunders, C. S., & Ahuja, M. K. 2006. Are all distributed teams the same? Differentiating between temporary and ongoing distributed teams. *Small Group Research*, 37(6): 662-700.
- Sherif, M., & Hovland, C. 1961. *Social judgment: Assimilation and contrast effects in communication and attitude change*: Yale University Press New Haven, CT.
- Smith-Lovin, L., & Brody, C. 1989. Interruptions in group discussions: The effects of gender and group composition. *American Sociological Review*: 424-435.
- Sproull, L., & Kiesler, S. 1986. Reducing social context cues: Electronic mail in organizational communications. *Management Science*, 32(11): 1492-1512.
- Sproull, L., & Kiesler, S. 1992. *Connections: New ways of working in the networked organization*: The MIT Press.
- Strong, D. M., & Volkoff, O. 2010. Understanding organization-enterprise system fit: a path to theorizing the information technology artifact. *Management Information Systems Quarterly*, 34(4): 731.
- Sudweeks, F., & Simoff, S. J. 2005. *Leading conversations: Communication behaviours of emergent leaders in virtual teams*. Paper presented at the System Sciences, 2005. HICSS'05. Proceedings of the 38th Annual Hawaii International Conference on.
- Trevino, L. K., & Webster, J. 1992. Flow in Computer-Mediated Communication Electronic Mail and Voice Mail Evaluation and Impacts. *Communication Research*, 19(5): 539-573.
- Valacich, J. S., Dennis, A. R., & Connolly, T. 1994. Idea generation in computer-based groups: A new ending to an old story. *Organizational Behavior and Human Decision Processes*.
- Valacich, J. S., Paranka, D., George, J. F., & Nunamaker, J. 1993. Communication Concurrency and the New Media A New Dimension for Media Richness. *Communication Research*, 20(2): 249-276.
- Van Dierendonck, D., Haynes, C., Borrill, C., & Stride, C. 2004. Leadership behavior and subordinate well-being. *Journal of occupational health psychology*, 9(2): 165-175.
- Vilkinas, T., & Cartan, G. 2006. The integrated competing values framework: Its spatial configuration. *Journal of Management Development*, 25(6): 505-521.
- Wagner, D. G., & Berger, J. 1997. Gender and interpersonal task behaviors: Status expectation accounts. *Sociological Perspectives*: 1-32.
- Walther, J. B. 1992. Interpersonal Effects in Computer-Mediated Interaction A Relational Perspective. *Communication Research*, 19(1): 52-90.
- Walther, J. B. 1995. Relational aspects of computer-mediated communication: Experimental observations over time. *Organization Science*, 6(2): 186-203.
- Walther, J. B. 1996. Computer-mediated communication. *Communication Research*, 23(1): 3-43.

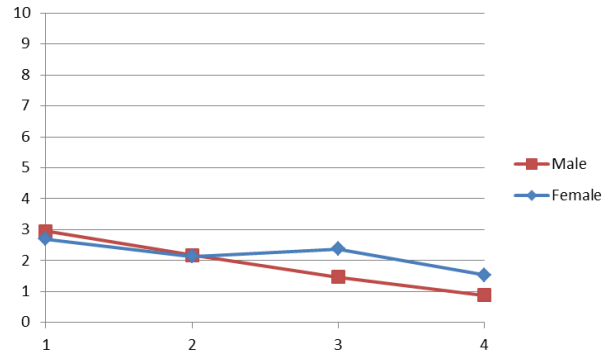
- Watson, C., & Hoffman, L. R. 2004. The Role of Task-Related Behavior in the Emergence of Leaders: The Dilemma of the Informed Woman. *Group & Organization Management*, 29(6): 659-685.
- Weathersby, R. 1993. Sri Lankan managers' leadership conceptualizations as a function of ego development. *Development in the Workplace*, 67: 89.
- Weber, B., Wittchen, M., & Hertel, G. 2009. Gendered ways to motivation gains in groups. *Sex roles*, 60(9-10): 731-744.
- Wei, K., Watson, R., Clapper, D., & McLean, E. 1998. Computer-mediated communication and majority influence: Assessing the impact in an individualistic and a collectivistic culture. *Management Science*: 1263-1278.
- Wood, W., Christensen, P., Hebl, M., & Rothgerber, H. 1997. Conformity to sex-typed norms, affect, and the self-concept. *Journal of Personality and Social Psychology*, 73: 523-535.
- Yang, O., & Shao, Y. E. 1996. Shared leadership in self-managed teams: A competing values approach. *Total Quality Management*, 7(5): 521-534.
- Yoo, Y., & Alavi, M. 2004. Emergent leadership in virtual teams: what do emergent leaders do? *Information and Organization*, 14(1): 27-58.
- Zigurs, I. 2003. Leadership in Virtual Teams: Oxymoron or Opportunity? *Organizational Dynamics*, 31(4): 339-351.
- Zigurs, I., & Buckland, B. K. 1998. A theory of task/technology fit and group support systems effectiveness. *Management Information Systems Quarterly*: 313-334.



Figure 1: Leaderplex Model based on Behavioral Complexity in Leadership (BCL)
 Source: adapted from Denison, Hooijberg, and Quinn, 1995; Vilkinas and Cartan, 2006

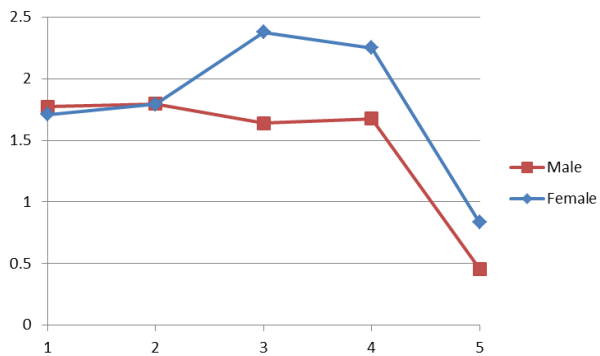


Study 1: US-Based (n=107)

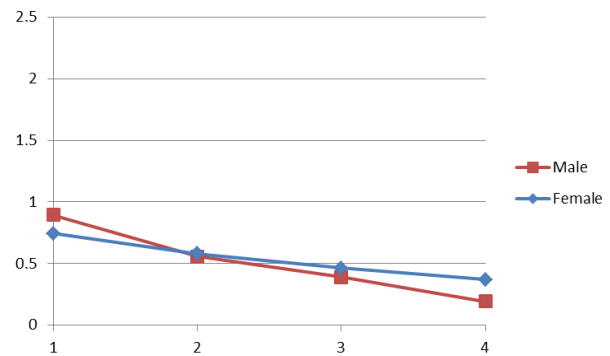


Study 2: Sri Lanka-Based (n=132)

Figure 2: Comparison of Task Leadership Behaviors



Study 1: US-Based (n=107)



Study 2: Sri Lanka-Based (n=132)

Figure 3: Comparison of Social Leadership Behaviors

Table 1: Meta-analytic findings

Study	Sample	Leadership findings for men	Leadership findings for women
Eagly and Johnson (1990)	31 studies	<ul style="list-style-type: none"> • Directive/autocratic style 	<ul style="list-style-type: none"> • Participative style
Wilkins and Andersen (1991)	25 studies	<ul style="list-style-type: none"> • Significant differences in communication behaviors among male and female managers; however variance accounted for was very small suggesting differences are not meaningful. 	
Eagly and Karau (1991)	75 studies	<ul style="list-style-type: none"> • Emerged as leaders when task or unspecified measures of leadership were used • difference dissipated over time • consistent findings for leader behaviors versus leader perceptions 	<ul style="list-style-type: none"> • Emerged as leaders when social measures of leadership were used

Eagly et al. (1992)	61 studies	<ul style="list-style-type: none"> • Marginal tendency for male leaders to be evaluated more positively than female leaders 	<ul style="list-style-type: none"> • Leadership was devalued if carried out in stereotypical masculine style (autocratic/directive)
Eagly, Karau, & Makhijani, (1995)	96 studies	<ul style="list-style-type: none"> • More effective in leadership roles requiring considerable task ability – defined as the ability to direct and control people 	<ul style="list-style-type: none"> • More effective in leadership roles requiring interpersonal skills – defined as the ability to cooperate and get along with others
Eagly et al. (2003)	45 studies	<ul style="list-style-type: none"> • Transactional style • Laissez-faire style 	<ul style="list-style-type: none"> • Transformational style

Table 2 Impacts of Reductive CT Capabilities

CT Capability	Reduces or Eliminates	Resulting In
Multiple Addressability / Concurrency / Parallelism	<ul style="list-style-type: none"> • Turn-taking • Production blocking 	<ul style="list-style-type: none"> • Increased opportunity to participate
Visual Anonymity	<ul style="list-style-type: none"> • Evaluation apprehension 	<ul style="list-style-type: none"> • Increased willingness to participate
Asynchronous Communication	<ul style="list-style-type: none"> • Need for an immediate response 	<ul style="list-style-type: none"> • Increased opportunity to participate • Selective self-presentation

Table 3: Research task description and duration

Task description	Task duration
Draft conceptual data model: teams delivered draft data model consisting of entities and relationship developed using the VISIO CASE tool.	Three weeks
Final conceptual data model: teams revised their draft models and delivered a finalized data model consisting of entities, relationships, and attributes using VISIO, data dictionary using MS Word.	Two weeks
Logical data model: teams delivered a normalized data model with foreign keys inserted using VISIO and revised data dictionary using MS Word	Three weeks
Implementation: Fully populated MS Access databases were provided to the teams, they delivered final conceptual and logical models using VISIO that matched the MS Access database, wrote 10 queries, and created two input forms and one report using MS Access.	Three weeks
Debriefing report: teams delivered 3-page paper reporting about their computer-mediated team experience.	Two weeks

Table 4: Demographics

Variable	Mean (SD)
Age (in years)	22.7 (4.60)
Work experience (in years)	3.98 (4.02)
Grade point average	3.15 (0.44)
Gender	Male=83; Female=24

Table 5: LR Statistics of Type 3 Analysis Results (Study 1: US data)

	DF	Task-oriented Leadership		Socially-oriented Leadership	
		Chi-Sq	Pr > Chi-Sq	Chi-Sq	Pr > Chi-Sq
Gender composition	1	8.53	0.0035**	2.61	0.1064
Time	4	43.38	<.0001***	27.63	<.0001***
Gender	1	15.37	<.0001***	4.93	0.0264*
Time*Gender	4	2.17	0.7037	2.71	0.6082

Table 6: LR Statistics of Type 3 Analysis Results (Study 2: Sri Lanka data)

	DF	Task-oriented Leadership		Socially-oriented Leadership	
		Chi-Sq	Pr > Chi-Sq	Chi-Sq	Pr > Chi-Sq
Gender composition	1	0.95	0.3289	3	0.0833†
Gender	3	35.59	<.0001***	22.09	<.0001***
Time	1	5.99	0.0144*	2.59	0.1076
Time*Gender	3	7.71	0.0525†	3	0.3919

Table 7: GLZ coefficients for perceived leadership and actual leadership behaviors

	Time 1	Time2	Time3	Time4
Gender Composition	-0.9317	-2.6664	-0.3334	-0.9712
Gender (male =0, female =1)	0.5373	-1.1837	-0.112	-0.6565
Socially-oriented leadership behaviors	-0.3911	-0.4862	-0.4593	-0.8134
Task-oriented leadership behaviors	-0.2433*	-0.1629	-0.2308	-0.6646*
Gender*Socially-oriented leadership	1.0211†	-0.4858	-0.1317	1.129
Gender*Task-oriented leadership	-0.4832	0.5599	0.094	0.2908

Table 8: Results of Hypotheses testing

Hypothesis	Supported?	
	Study 1	Study 2
H1: In CM teams, gender differences in emergent	<i>Not supported, instead found main effect for</i>	<i>Not supported: Significant interactions for task-</i>

leadership behaviors will be stereotypical early in the groups' interactions, and these differences will dissipate over time.	<i>women engaging in more task and social leadership compared to men</i>	<i>oriented and socially-oriented leadership behaviors– but neither are in the direction anticipated</i>
H2: Regardless of gender, individuals engaging in task leadership will be perceived as leaders		Partially Supported: significant at beginning and end of team's lifecycles (i.e., time 1 and 4)
H3a: Over time, men who engage in task-oriented leadership behavior will be more likely to be perceived as leaders in CM teams compared to women engaged in similar levels of task leadership.		Not supported: Significant but in opposite direction; behaviors historically atypical (i.e., men engaged in socially-oriented leadership) were perceived as leadership
H3b: Over time, women who engage in socially-oriented leadership behavior will be more likely to be perceived as leaders in CM teams compared to men engaged in similar levels of social leadership.		Not supported: Significant but in opposite direction; behaviors historically atypical (i.e., women engaged in task-oriented leadership) were perceived as leadership

Appendix A: Testing H1 for Study 2 with Big Five Personality Controlled

	DF	Task-oriented Leadership		Socially-oriented Leadership	
		Chi-Sq	Pr > Chi-Sq	Chi-Sq	Pr > Chi-Sq
Gender composition	1	0.17	0.6762	3.03	0.0818†
Agreeableness	1	1.4	0.2362	0.66	0.4166
Conscientiousness	1	6.9	0.0086**	5.82	0.0158*
Extraversion	1	1.69	0.1936	1.65	0.1992
Neuroticism	1	3.38	0.0659†	0.16	0.6862
Openness	1	1.55	0.2129	0.39	0.5304
Time	3	34.58	<.0001***	21.96	<.0001***
Gender	1	2.97	0.0846†	2.69	0.1008
Time*Gender	3	7.12	0.0681†	2.9	0.407

Appendix B: Testing H2-H3 in Study 2 with Big Five Personality Controlled

	Time 1	Time2	Time3	Time4
Gender Composition	-1.5145	-2.6	-0.1957	-0.9101

Gender (male =0, female =1)	0.3843	-0.5755	0.4342	-0.0932
Agreeableness	0.383	-0.6109	-0.568	-0.5463
Conscientiousness	-0.2811	-0.712	-0.2372	0.1093
Extraversion	-0.2116	-0.1642	-0.4103	-0.3355
Neuroticism	0.1653	-0.4814	-0.9852	-0.424
Openness	-0.5622	0.2214	0.274	-0.1058
Socially-oriented leadership behaviors	-0.5346†	-0.3825	-0.5756	-0.8878
Task-oriented leadership behaviors	-0.2537*	-0.1747	-0.2514	-0.6465*
Gender*Socially-oriented leadership	1.2781*	-0.6807	-0.3185	1.089
Gender*Task-oriented leadership	-0.5428†	0.5924	0.1629	0.1824