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Electronic Mail Usage Pattern of Emergent Leaders in Distributed Teams

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Abstract

We conducted an exploratory study to examine the unique electronic mail usage patterns exhibited by the emergent leaders in seven teams of senior executives of a federal government agency. The team members worked together over ten weeks via electronic mail in the context of an executive development program. The goal of the analysis was to identify the distinct patterns of communication behaviors among emergent leaders in distributed teams that differentiate them from other team members. To this end, we conducted a content analysis of 327 electronic mail messages that were sent to the list-serve, using a coding scheme developed based on the existing leadership and small group literature. We examined the communication frequency, the message type (task-oriented, people-oriented, and technology-oriented), and the message length. Our results provide four main observations regarding emergent leadership in distributed teams: (1) overall, the emergent leaders sent more messages than other members did; (2) the emergent leaders sent more task-related messages than other members did; (3) the emergent leaders sent longer messages than other members did; and (4) demographic variables such as age, job experience, and experience at the current position did not affect emergent leadership.

Keywords: Emergent Leadership, Virtual Teams, Computer-Mediated Communication

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Electronic Mail Usage Pattern of Emergent Leaders in Distributed Teams

Introduction

“There is no substitute for a manager’s keeping a finger on a company’s pulse, and the best way to do that in a virtual company is to be virtual. Sitting in a central office without plugging into virtual culture is almost a guarantee of failure.”—William R. Pape, co-founder and former CIO of VeriFone Inc., Redwood City, California.

How can one lead others when he or she cannot “see” them face-to-face? How would one gain trust and power from other people when they are in different geographic locations, primarily communicating through electronic mail? Can some of the leadership skills learned in traditional work settings be used to lead a group of autonomous individuals working through electronic communication network for a short period of time?

As organizations are increasingly using computers and communication network technology to create “distributed” or so-called “virtual” team-methods of organizing, managers have to face these new challenges. Yet, leadership in such environments is not well understood (Kostner, 1994).

To start answering these questions, this paper explores the unique communication patterns exhibited by emergent leaders of teams whose members are geographically dispersed. Specifically, we attempt to identify the distinctive communication patterns via electronic mail among the individuals who emerged as the leader of the teams. Our objective is to investigate the existence of systematic differences between emergent leaders and other members in their use of electronic mail. To this end, we use an inductive case methodology to examine the differences between emergent leaders and non-leaders in their use of electronic mail. In the following, we present a theoretical background by reviewing the literature of emergent leadership in face-to-face environments and the literature of computer-mediated communications. We then present the study design, the data analysis strategy, and the results, followed by a discussion that includes implications for future research and practice.

Theoretical Background

Emergent Leadership in Face-to-Face Environments

Team-based methods of organizing have been proposed to replace bureaucratic hierarchical organizational structures. Team-based approaches allow organizations to mix members from different functional areas and from different disciplines to discover integrative solutions to complex, unstructured tasks (Uhl-Bren & Graen, 1991). Although such organizing methods present viable solutions to some of the challenges that organizations face today, these methods create their own challenges and issues. One such issue is the emergence of leadership. In a traditional hierarchical organizational structure, there is usually a clear leader-subordinates relationship. In such situations, leadership comes from a superior position in the organization’s hierarchy and the authority in the functional area (Katz & Kahn, 1978).

However, in team environments where members are coming from different functional departments with various expertise in their own area, leadership cannot be achieved necessarily based on an organizational position or a “designated” authority. Instead, leaders in self-managing teams seem to “emerge” and “earn” their status as a leader through incremental influences and contributions to the team. Emergent leadership is an interpersonal process through which an individual’s contribution to a team is accepted and recognized by other members of the team (Hollander, 1960; Uhl-Bren & Graen, 1991). Emergent leadership becomes especially important to team performance when the team faces a stressful situation or a crisis (Hamblin, 1958; Helmreich & Collins, 1967). Given today’s turbulent and uncertain business environments, we believe that emergent leadership is an important factor that affects team performance and effectiveness (Lawler, 1988).

Although the concept of emergent leadership is directly applicable to self-managing teams, where there are no formally appointed leaders, there are much broader implications. That is, past research has shown that leadership is a reciprocal, dyadic process between the leader and subordinates (Farris & Lim, 1969; Graen & Scandura, 1987; Herold, 1977; Lowin & Craig, 1968). These results show that, in order to be effective, even a formally appointed leader must emerge and be accepted as a leader by team members through emergent leadership processes.

A convincing body of research shows that emergent leaders show different verbal communication patterns compared to non-leaders. Particularly, it has been shown that emergent leaders tend to participate most actively in the team interaction process (Bales, 1953; Bass, 1955). Regula & Julian (1973) and Sorrentino & Boutillier (1975) found that the quantity of verbal contributions a prospective leader makes is more highly correlated with emergent leadership than the quality of the contributions. Using a meta-analytic procedure, Mullen et al. (1989) also found that the level of participation is significantly correlated with emergent leadership.

Also, an individual’s task contributions are strongly related to emergent leadership. For example, Hollander (1960; 1961b) found that a team member must gain “idiosyncrasy credits” from other members by demonstrating competence and by conforming to the expectancies that members have of him or her; once these credits are gained, it becomes appropriate, in the eyes of the other team members, for the prospective leader to assert influence. Stogdill (1974) found that technical and task-relevant skills were the most frequently suggested factors predicting emergent leadership. Team members are more accepting of leaders who have previously demonstrated task ability (Goldman & Frass, 1965).

Computer-Mediated Communication and Emergent Leadership

Previous research in computer-mediated communication (CMC) suggests that CMC may influence emergent leadership in distributed teams. CMC provides asynchronous communications with “invisible” members through no shared physical settings (Finholt & Sproull, 1990). The literature also informs us that CMC suppresses peripheral communication cues, which results in a “leaner” communication environment compared to face-to-face environments (Daft & Lengel, 1986; Kiesler & Sproull, 1992). Due to the characteristics of CMC, the literature suggests that the use of CMC inevitably causes changes in interaction, influence attempts, and identity maintenance among individuals (Finholt & Sproull, 1990). For example, past research shows that individuals become task-oriented when communicating via CMC (Kiesler & Sproull, 1992). A great deal of contextual and emotional information is filtered out by CMC, which does not permit non-verbal and/or paralinguistic communications. As

such, recipients of CMC messages might focus primarily on the task-related contents of the message.

Recently, Sarbaugh-Thompson et al. (1998) found that the overall volume of organizational communication declined as the use of electronic mail increased, and that much of the lost communication was greetings. Also, Sussman and Sproull (1999) found that people were more straightforward when delivering bad news through electronic mail than they were in face-to-face communication. Taken together, the use of CMC might cause members of a team to become more task-focused and more vigilant and straightforward in evaluating other members' contribution.

On the other hand, the lack of peripheral communications cues in CMC also reduces the social presence of the sender in electronic mail communication (Short, Williams, & Christie, 1976). Social presence refers to the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationship. According to Short et al. (1976), CMC has a lower degree of social presence than face-to-face meetings. Due to reduced social presence, one can argue, a receiver of a message via CMC may not pay as much attention to the sender of the message as to the message itself. This depersonalization of the communication process has been reported in organizational communication via electronic mail (Sproull & Kiesler, 1986) and in group support systems (Watson, DeSanctis, & Poole, 1988). As a result, although team members might be able to recall that certain contributions were made to the task during the project, they may not be able to recall exactly who made them. In other words, due to the reduced social presence of CMC, the salience of individuals' task contributions through CMC may be also reduced. Therefore, one may expect that, in contrast to face-to-face environments, the quality and the quantity of individuals' task contribution may not be related to emergent leadership in distributed teams communicating via CMC.

In other words, on one hand, CMC might influence emergent leadership in distributed teams by making the communication processes more task-focused, which will lead to task-focused and vigilant evaluations of individuals' contribution. On the other hand, CMC might influence emergent leadership in distributed teams by depersonalizing the communication processes, which will lead to less salient emergent leadership in distributed teams.

Past research on leadership in CMC environments has been conducted primarily in same-time and / or same-place environments typically using group decision support systems in a controlled laboratory environment for a short period of time. In a study that compared the emergent leadership in a face-to-face environment and to that of a same-time, same-place CMC environment, Strickland et al. (1978) found that the quantity of verbal participation had much weaker correlation with the emergent leadership in the CMC environment than it did in the face-to-face environment. They also found that emergent leadership was significantly less vivid in the CMC environment than in the face-to-face environment. From a controlled laboratory experiment with twenty-four groups of five professionals and managers participating in a one-day seminar, Hiltz et al. (1991) found that designated leadership had little influence on decision quality, consensus, and members' satisfaction in the CMC environment. Ho and Raman (1991) found that leadership did not increase post-meeting consensus in their controlled experiment with forty-eight undergraduate student groups. In a same-time, same place group decision making environment, Lim et al. (1994) found that group decision support systems caused the influence distribution to be more equal among group members in the absence of leadership, and that, in presence of a leader, group decision support systems had no effect on the leader's influence. In a controlled laboratory experiment with twenty-six teams of four undergraduate

students, Barkhi et al. (1998) found that the presence or absence of a formal leader did not appear to have substantive effects on decision outcomes. Finally, comparing the effects of different leadership styles (transformational vs. transactional) in a longitudinal laboratory experiment using a same-time, same-place group decision support system, Sosik et al. (1997) found that CMC amplified the positive influence of transformational leadership on group outcomes relative to transactional leadership. These studies provide useful insights into leadership issues in same-time and / or same-place CMC environments over the short term.

The current research contributes to the body of literature by examining emergent leadership in CMC environments in a truly distributed team environment and for an extended period of time. Given the lack of established theory of emergent leadership in distributed teams, in the research study reported here, we conducted exploratory data analyses to identify differences between team members who did and did not emerge as leaders in terms of their use of electronic mail. The exploration of such differences can lead to construction of a theoretical framework that identifies factors that predict emergent leadership and leadership effectiveness in distributed team settings.

Research Study

Research Setting

We studied the emergent leadership in seven distributed teams of 87 senior executives of a government agency taking part in a senior executive development program at a large state university. Each team had eight to ten members. The sample consisted of 59 men and 28 women; the average age was 49; there were 24 with bachelor's degrees, 54 with master's degrees, 2 with Ph.Ds, and 7 with other degrees. There were no statistically significant differences among the teams on any of the demographic variables collected in this study.

As a part of the executive development program, executives participated in a ten-week "virtual" team project. To create a distributed team environment, team members were carefully recruited from different regions of the United States so that no team members were co-located. Team members were asked to communicate via e-mail through a single list-serve address¹ as a primary communication vehicle during the project, although they were allowed to use other means of communication (telephone and fax). Prior to the virtual team project, executives had participated in a residential education program at a university campus. Thus, the team members knew each other but had no history of working with each other as a team.

In the project, the participants were asked to assume the role of a consultant team to the mayor of a town for a community planning and development project for the city. The goal of the project was to develop a specific strategy to increase the home ownership rate of the city from the current 38% to 51% (or greater) by the year 2006. At the end of the project, each team was to submit a report to the mayor containing specific recommendations on the attributes of the customers (e.g., age and income mix), financing options, and annual housing production levels (new construction and/or rehabilitation of old construction), as well as specifications of resource levels, sponsors, and partners. All teams were given census, demographic, and economic data for the town and the surrounding region. Other relevant materials, including statistics on employment, crime, education, and the town's housing and community development profiles,

¹ A different list-serve address was used for each team.

were provided by the mayor's office. The teams were free to use additional information from any other sources that they deemed useful in the project. The project materials were made available to the teams on the World Wide Web.

For each of the seven teams we identified an "emergent leader" and "others". In the literature, emergent leaders have been identified in several different ways. First, they can be identified by a voting procedure in which the person acquiring the most votes is deemed the emergent leader (Baird, 1977; Wentworth & Anderson, 1984). Second, group members' leadership perceptions can be measured by a set of Likert-type scales or semantic differential items in a questionnaire (Hollander, 1960; Lord & Alliger, 1985; Strickland et al., 1978). Third, sociometric techniques may be employed in which each individual is asked to list in rank order the members who he / she would most prefer as leader, friend, roommate, and so on (Stogdill, 1974). By analyzing the interpersonal choice pattern, one can identify an emergent leader of the group. However, as Hollander (1961a) pointed out, due to the "social desirability" factor, the usefulness of sociometric techniques in identifying an emergent leader is questionable. Finally, emergent leaders can be also identified by a rater who observes group members' behaviors and interaction patterns using a predefined coding system (Anderson & Wangerg, 1991; Lord, 1977).

Since in a distributed team environment members' "behavior" cannot be observed easily, we identified emergent leaders using the first two methods. First, at the end of the project, we asked the question, "if you were told today to pick who has emerged as the informal leader of your team for the Project, based on your experience with your team, who would you pick (including yourself)?" The variable was coded 1 for the person who received the largest number of votes in each team and 0 for other members. All seven teams had a clear emergent leader who received more than 50% of votes. On average, each emergent leader received 5.3 votes with a standard deviation of 1.8. This was used as a primary variable to identify the "emergent leader" of each team for our analysis. The mean and the standard deviation of the number of votes for other members were 0.7 and 1.8, respectively.

In order to verify our identification of emergent leaders, we examined the differences in the average score of leadership perceptions at the conclusion of the study. Following the method used by Lord & Alliger (1985), measurements of leadership perceptions were derived from the questionnaire collected at the end of the project in which each member rated the other group members on a variety of perceptual items. Ratings given to each subject by the other team members were averaged. Specifically, leadership perceptions were measured on 5-point scales (where lower scores indicate less contribution) indicating the amount of the ratee's contribution to task performance, the level of leadership the ratee exhibited, how willing the rater would be to choose the ratee as the formal leader on a similar project, the extent to which the ratee exerted control over group activities, and the extent to which the ratee exerted influence over other group members. These five items were all loaded on one factor with a reliability (using Cronbach alpha) of 0.95. Since the significant disparity in the sample size between the "emergent leader" group and "other members" group (7 to 56) caused a violation of the assumption of homogeneity of error variances of ANOVA, we used non-parametric Wilcoxon-Mann-Whitney test to examine the mean differences between the two groups. Siegel and Castellan (1988) noted that the Wilcoxon-Mann-Whitney test closely approximates the power of the parametric t-test for tests of two independent samples. The results were significant (Z -value = -4.036, $p < 0.001$), validating our identification of emergent leaders. Based on these results, we identified an emergent leader for each team.

Data Collection and Analysis

The primary data for our study consisted of the electronic mail messages sent by the participants through the list-serve during the 10 weeks of the project and several perceptual measures collected via questionnaire.

Analysis of electronic mail messages. A systematic content analysis of all 341 electronic mail messages was performed by one of the authors and a research assistant who was blind to the research questions. The goal of the content analysis was to explore the potential differences between emergent leaders and other team members in their use of electronic mail and in the contents of their messages. Following the recommendations by Krippendorff (1980) and Boyatzis (1998), the unit of analysis was individual messages.

In the absence of a coding scheme to analyze the contents of electronic mail messages for emergent leadership research, we developed our own coding scheme by drawing on the existing body of leadership literature (Boyatzis, 1998). The existing leadership literature identifies task-oriented behaviors and people-oriented behaviors as two primary dimensions of leadership² (e.g., House, 1971; Kahn & Katz, 1953; Katz, 1977; Stogdill, 1974). These two dimensions are consistent with the models of small group interaction patterns in the social psychology literature (Bales, 1950; Hackman & Morris, 1975) that argue that group members typically engage in either task-oriented or socio-emotional interactions. Thus, we initially started our analysis of the email messages by classifying them into these two categories. Soon, however, we discovered that some of the messages were not related to either task- or people-oriented dimensions of group interactions: these were messages related to the use of electronic mail and list-serve systems. Based on this observation, a third category was added to code the messages. Thus, we coded messages into three categories: task-oriented, people-oriented, and technology-oriented messages. Examples of each category are provided in the appendix. Although a more extensive coding scheme might have provided some additional insights, we decided to use this relatively simple coding scheme given the exploratory nature of this study. Note that our goal was to see whether there were any systematic differences between emergent leaders and the other team members in their use of electronic mail.

To check the reliability of the coding scheme, the two coders jointly coded several e-mail messages until they achieved 100% agreement. The coders then coded 27 messages independently and compared the results to check the inter-rater reliability; the calculated inter-rater reliability was 80%. After establishing the reliability of the coding scheme, the research assistant completed the rest of the coding.

Of 341 messages, four messages were dropped from the analysis because the senders of those messages could not be identified. This resulted in a total of 327 messages for content classification.

Message lengths. The length of each electronic mail message was measured by counting the number of words used in the main body of a message. We removed the header of the message and, if the message was a reply, we deleted the copy of the original message. The average length of the message was 139.12 words per message, with a standard deviation of 144.93.

² Although more recent leadership literature includes other forms of leadership such as visionary or charismatic leadership, given the context of this study, these forms were not included in our analysis.

Other perceptual measures. We also collected participants' background information including age, the number of years with the organization, and educational background at the outset of the project. In addition, participants' perceived e-mail skill was measured at the beginning of the project. The question was "How would you rate your e-mail skill?" with a 5-point Likert type scale, where lower scores indicated a lower level of perceived skill.

Results

Our data analysis focused on the identification of potential differences in the number and on the type of electronic mail messages between the emergent leaders and other members of the groups.

First, we examined the overall distribution of the message types and the volumes across teams (see Table 1). We found that task-oriented communication was dominant (over 55%) in their electronic mail communication.

Then, we examined the differences between the emergent leaders and the other team members in terms of the number and the type of electronic mail communication. Due to the significant disparity in the sample size between the two groups, we used non-parametric Wilcoxon-Mann-Whitney test. Specifically, we examined the differences in the total number of messages, the total number of task-oriented messages, the total number of people-oriented messages, and the total number of technology-oriented messages. We also examined differences in the participants'/emergent leaders' age, the number of years with the organization, and the number of years at the current position to investigate if the emergent leaders differ from the other team members on these variables.

As displayed in Table 2, the results showed that the emergent leaders sent out significantly more electronic mail messages than the other members, both overall and in each of the three categories. At the same time, none of the demographic variables such as age and tenure at the job differentiated the emergent leaders from the rest of the group members.

We then examined how the emergent leaders differed from the other members in terms of the types of messages they sent out during the project. Although the results of table 2 might suggest that the emergent leaders sent more messages in all three categories, the high correlations among these variables makes it difficult to interpret these results in terms of the differences in communication message types. In other words, the data suggest that the members who sent more task-oriented messages than other members also sent more people-oriented and technology-oriented messages. Therefore, to understand the relationship between emergent leadership and a message type (e.g., task-oriented messages), we needed to partial out the relationship among emergent leadership and the other two types (e.g., people- and technology-oriented messages). Based on this, we conducted a series of partial correlation analyses. We examined the partial correlation between the number of messages of one type and emergent leadership in terms of the total number of votes and the leadership perception scores, while controlling the influence of the number of messages of the other two types.

As shown in Table 3, only the number of task-oriented messages was significantly related to emergent leadership once the number of messages of other types was partialled out. This seems to suggest that, in our data set, although the emergent leaders sent out more messages in all three categories, the number of task-oriented messages was the one that differentiated the

emergent leaders from the rest of the group members.

Finally, we also examined the length of individual messages by analyzing the number of words in each message. Among the 310 messages, 86 of them were sent by the emergent leaders and 224 were sent by the other members. Using a two-way analysis, we examined the differences in message length between the emergent leaders and the other members and among the three message categories. Table 4 shows the results of the analysis.

We found that messages sent by the emergent leaders (mean = 168.52 words per message, standard deviation = 139.12) were significantly longer than the ones by other members (mean = 127.83 words per message, standard deviation = 145.82). The two-way ANOVA also revealed difference among the three message types in terms of message length. A post-hoc analysis using Duncan test showed that technology-oriented messages (mean = 74.28 words per message, standard deviation = 72.73) were significantly shorter than both task-oriented (mean = 165.46, standard deviation = 167.33) and people-oriented messages (mean = 136.54, standard deviation = 115.89). There was no difference between task- and people-oriented messages in message length.

| | Task-oriented Messages | People-oriented Messages | Technology-oriented Messages | Total |
|--------|------------------------|--------------------------|------------------------------|-------|
| Team 1 | 64 | 14 | 23 | 101 |
| Team 2 | 14 | 8 | 10 | 32 |
| Team 3 | 35 | 10 | 14 | 59 |
| Team 4 | 17 | 11 | 11 | 39 |
| Team 5 | 16 | 12 | 6 | 34 |
| Team 6 | 15 | 9 | 0 | 24 |
| Team 7 | 13 | 4 | 4 | 21 |
| Total | 174 | 68 | 68 | 310 |

Table 1. Distribution of Electronic Mail Messages

| | Mean (S.D.) | | Z-value | p-value (2-tailed) |
|---|-------------|------------|---------|--------------------|
| | Leaders | Others | | |
| Total Number of Messages | 12.3 (8.5) | 3.9 (4.8) | -3.465 | < 0.001 |
| Task-oriented Messages | 7.6 (4.9) | 2.1 (3.1) | -3.288 | 0.001 |
| People-oriented Messages | 2.4 (2.7) | 0.9 (0.9) | -1.877 | 0.078 |
| Technology-oriented Messages | 2.3 (1.9) | 0.8 (1.6) | -2.703 | 0.009 |
| Number of Votes | 5.3 (1.8) | 0.1 (0.3) | -6.259 | < 0.001 |
| Age | 48.4 (3.3) | 48.9 (8.7) | -0.663 | 0.527 |
| Number of years with the organization | 22.8 (2.9) | 20.1 (7.3) | -0.763 | 0.459 |
| Number of years at the current position | 4.1 (2.6) | 4.4 (4.4) | -0.578 | 0.585 |
| Perceived e-mail skill | 3.4 (0.7) | 3.5 (0.7) | -0.068 | 0.957 |

Table 2. Differences between Emergent Leaders and Other Members

| | Task-oriented messages | People-oriented messages | Technology-oriented messages |
|-----------------------------|------------------------|--------------------------|------------------------------|
| Total number of votes | 0.32** | 0.16 | -0.20 |
| Leadership perception score | 0.38** | 0.04 | -0.08 |

Note: For each message type, the impact of the other two message types were partialled out.
 * $p < 0.05$; ** $p < 0.01$.

Table 3. Results of Partial Correlation Analyses

| | Mean | (S.D.) | F-value | p-value |
|------------------------------|-------|---------|---------|---------|
| <u>Leadership</u> | | | | |
| Emergent Leaders | 168.5 | (139.8) | | |
| Other members | 127.8 | (145.8) | 5.246 | 0.023 |
| <u>Message Type</u> | | | | |
| Task-oriented Messages | 165.5 | (167.3) | | |
| People-oriented Messages | 136.5 | (114.9) | | |
| Technology-oriented messages | 74.3 | (72.7) | 7.125 | 0.001 |
| Leadership X Message type | | | 1.141 | 0.321 |

Table 4. Analysis of Message Length (in words)

Discussion

Summary and Limitations

The purpose of this study was to examine systematic differences between emergent leaders and other members of distributed teams in terms of the way they use electronic mail. To this end, we analyzed 327 electronic mail messages sent to the groups via list-serve by group members in terms of the message type and length. Our analyses provide four main preliminary observations regarding emergent leadership in distributed teams:

In distributed teams, overall, the emergent leaders send more messages than other team members.

In distributed teams, the emergent leaders send more task-related messages than other members.

In distributed teams, the emergent leaders send longer messages than other members.

In distributed teams, demographic variables such as age, job experience, and experience at the current position did not seem to affect emergent leadership.

This study serves as a preliminary step toward understanding emergent leadership in distributed team environments. Although many scholars in the leadership field have studied emergent leadership, this topic has not received much attention in a distributed team environment. Our results expand the existing theories of leadership emergence (Hollander, 1960, 1961a, 1961b; Regula & Julian, 1973; Sorrentino & Boutillier, 1975) into computer-mediated distributed team contexts. Although much more research needs to be conducted in this area, the

results of our study suggest that emergent leaders in distributed team are different from other members in their use of electronic mail medium in getting their work done. Perhaps more frequent and longer task-oriented messages sent by the prospective leader help him / her to gain idiosyncrasy credits as Hollander (1960; 1961a; 1961b) suggests. Furthermore, given the lack of importance of demographic variables on leadership emergence, one can hypothesize that in CMC distributed team environments, prospective leaders with various demographic and personal traits (such as gender, age, position authority, attractiveness, etc.) but with strong task orientation can more easily emerge as a leader than in traditional face-to-face conditions. However, it is important to our correlational analysis cannot offer any conclusive causal interpretations about the relationship between communication behaviors and leadership emergent. Instead, what we saw in this study was a clear and strong association between communication patterns and leadership emergent. Therefore, it is not clear if the unique communication patterns of emergent leaders observed in this study were the results of having emerged as leaders perhaps through other means, or the leaders emerged through these communication behaviors. Like many other social structures that has duality (Giddens, 1979), we expect that the emergent leadership in distributed teams simultaneously enables and is produced by communicative acts over time.

In addition to the correlational nature of our analysis, this study has a number of limitations. First, since we examined emergent leaders' communication behaviors via only electronic mail messages directed to the team, the picture emerging from the results of the current study is only partial. That is, we were not able to gather and analyze participants' communications via other means such as telephone, and fax. However, the objective of the current study was not to examine the complete profile of emergent leaders' communication behaviors, but to examine the differences between emergent leaders and other members in their use of electronic mail. Nonetheless, future research needs to examine differences between emergent leaders and other group members in their communication behaviors using various communication media.

Second, the electronic communication technologies used in this study to support distributed teams permitted only textual communication, which limits the generalization of the findings. One might discover different patterns of emergent leadership with "richer" multimedia communication technologies such as videoconferencing that allow synchronous interactions without the loss of many social cues.

Implications for Future Research

Given the strong relationship between team performance and leadership effectiveness established in traditional work team settings (Burpitt & Bigoness, 1996; Hoffman, 1990; House & Baetz, 1979; Smith, Carson, & Alexander, 1984; Stogdill, 1974), it is imperative for scholars studying distributed teams to investigate leadership issues. Despite the limitations of the current study, the findings of this study provide several implications for future research in emergent leadership and leadership in general in distributed teams.

First, it is clear from our results that the communication pattern—that is, the frequency and the length of electronic mail messages—seems to be strongly correlated with emergent leadership in distributed teams. This seems to be consistent with the traditional emergent leadership literature, which found that the quantity of verbal communication is an important predictor of emergent leadership in face-to-face settings. Our results indicate that the quantity of electronic communication might be an important predictor of emergent leadership in distributed team environments. Given the correlational nature of our analysis, however, this is subject to

future empirical investigation.

As stated earlier, due to the relatively low level of social presence of electronic mail medium, individuals' task contributions may not be salient to other members, thus leading to less clear emergence of leadership in distributed teams. Our data indicates that this is not the case. To the contrary, participants of the study perceived the person who contributed the most to the project as their leader. Therefore, the reduced level of social presence conveyed through the electronic mail did not seem to play a role in emergent leadership in our data set. Nonetheless, the issue of depersonalization and the reduced social cues in electronic mail in emergent leadership is an interesting issue for future research.

Second, it is clear that individuals' task contributions seem to be strongly associated with emergent leadership in distributed teams. Again, this is consistent with traditional emergent leadership literature that found that the quality of task contribution is highly correlated with emergent leadership in face-to-face environments. The relative importance of task-related messages (compared to the people-oriented messages) to emergent leadership in distributed teams is consistent with the results of other distributed team studies. As pointed out earlier, research on teams communicating via electronic mail or other text-based media suggests that people tend to focus on the task and depersonalize the situation. It seems that a similar phenomenon occurs in emergent leadership in distributed teams.

While the increasing importance of task contribution to the emergence of leadership in distributed teams might have certain positive aspects, one can also expect negative implications of such task-orientation. For example, traditional group literature suggests that teams try to meet their socio-psychological needs as well as task-related needs (McGrath, 1984). Leadership literature also suggests that effective leaders not only possess task-oriented skills but also know how to deal with "soft" personal aspects of team members (House, 1971; Kahn & Katz, 1953). Therefore, one can argue that distributed teams with task-focused leaders might eventually burn out due to an emphasis on task contributions by the leader possibly at the expense of social interactions between the leader and the team members. Given that emergent leaders in our sample were predominantly task-oriented, how did these distributed teams compensate for the possible decrease in social interactions between the leader and the team members? One possibility is that they could not compensate for the reduced social interactions, and as such their performance might have suffered from it. Alternatively, as leadership substitute theory suggests (Kerr & Jermier, 1978), these teams might have found a substitute for non-task oriented leadership from other sources. It would be interesting to test this theory in distributed teams and to investigate the sources for such leadership substitute. Furthermore, one can examine how task-oriented emergent leaders and other substitutes for non-task leadership interact with each other to produce effective collaboration environments.

Third, given that our analyses were only focused on the use of electronic mail directed to the entire team, future research should examine the potential differences in the use of various media, such as telephone, audio-conference, fax, etc. Given that the participants of the study were able to use these media for the project, it is not clear whether emergent leaders used these media differently. A post-hoc analysis on perceived importance of electronic mail and audio channels (combining individual telephone calls and audio conferencing) by participants showed no difference ($t(84) = 0.289$, $p = 0.774$). This seems to suggest that participants of the project viewed both traditional audio channels and electronic mail as equally important. It is an interesting empirical question whether there would be differences between emergent leaders and other members in terms of their communication behaviors via traditional channels, when

emergent leaders seem to communicate more frequently and contribute more on task via electronic mail than other members do, as this study indicates .

Fourth, future research can study emergent leadership in teams communicating via “richer” media such as desktop videoconferencing systems. These multimedia-based communication tools would enhance the social presence of communicators (Short et al., 1976), which may in turn influence emergent leadership. Would people be less task-focused in evaluating potential leaders when they communicate via desktop videoconferencing systems? Would other more dramatic forms of leadership style, such as charismatic leadership or visionary leadership, become more salient and effective in such environments than they are in text-based communication environments (c.f., Sosik, 1997)? What would be the choice of communication media of emergent leaders when both text-based and multimedia-based systems are available? All of these are important and interesting questions that have both significant theoretical and practical values.

Finally, in this study, we used a rather simple coding strategy in an attempt to gain a parsimonious understanding from this early exploratory study. Future research can employ more elaborate coding strategies, which can more directly measure various leadership behaviors, influence attempts, and interaction patterns in distributed team environments.

Implications for Managers

This study also has several implications for managers. First, to emerge and to be accepted as a leader in an distributed team, an individual needs to learn how to communicate effectively with others via electronic media. As shown in our findings, demographic variables such as age, education level, job experiences, or gender did not seem to be related to emergent leadership in distributed teams. Instead, it was one’s use of electronic mail that affected the emergent leadership. Traditionally, managers have been known to be reluctant to use computers as a means of communication (e.g., Donath, 1985). Our analyses show that to emerge as a leader in distributed teams, one must use and communicate via electronic media. Contemporary leadership development programs emphasize traditional communication skills. Our results suggest that leadership development programs should include extensive computer and electronic communication training so that prospective leaders can effectively emerge and be accepted as leaders in distributed teams.

Second, in distributed team environments, an individual’s task-relevant contribution is a critical aspect of emergent leadership. Thus, even if one has mastered communication skills—both in traditional and electronic ways—he or she still needs to know the task and to demonstrate knowledge through active participation in the team’s task process.

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Appendix: Examples of Electronic Mail Messages in Each Category

Task-oriented message

Example 1

From: abc@xxx.gov

To: "Group 1 Cohort 1" <radish@xxx.yyy.edu>

Date: Mon, 26 Aug 96 08:18:58 EST

Team, {deleted} and I are also reviewing Hagerstown's news papers and will catch articles appropriate to the task.

As for my particular strengths, I have fairly good analytic skills and can prepare decent report gathering info from a variety of sources. I've also participated in the development of the VA Homeownership Plan as part of the National Homeownership Strategy. Regarding computer skills (graphics, presentation, etc.) I have good ideas, but am not very proficient and need assistance.

Finally, please let {deleted} know what your schedule is between now and September 11 so that he can prepare a calendar. Not everyone responded to that previous question.

Thanks, {deleted}

Example 2

From: efg@xxx.gov

To: "Group 2 Cohort 2" <salmon@xxx.yyy.edu>

Date: Mon, 04 Nov 96 16:01:52 EST

Message of 11/4:

This will confirm our conference call for Wed, 11/6, 2-3 p.m.

#: (700) xxx-xxxx

Access code: #####

If calling non-FTS: (xxx) xxx-xxxx

Hopefully, all 3 parts will be complete and in each others' hands no later than 1st thing Wed a.m. so we can do critiques and final planning during the call.

Talk to you then.

{deleted}

People-oriented message

Example 3

From: gmb@xxx.gov

To: "Group 5 Cohort 1" <spud@xxx.yyy.edu>

Date: Sat, 24 Aug 96 20:58:40 EST

Hi gang,

I guess someone has to be the first to use our shiny new listserv machine – maybe that will be this message :)

Hopefully y'all (a souther pronoun) got your stuff earlier than I did. Between some mail faux pas, a resent package, and travel schedule, I'm just getting into my package. I printed out everything from the H.C. website, as you must have. It's a formidable tome we are all digesting. So, does anyone want to suggest how we should begin?

As a starting point, there are seven key questions listed on the main page of the WWW home page for the H.C.

Bye for now... gotta go read this tome I just printed out! :)

{deleted}

Technology-oriented messageExample 4

From: jac@xxx.gov

To: "Group 4 Cohort 1" <rutabaga@xxx.yyy.edu>

Date: Wed, 11 Sep 96 11:11:49 EST

Just testing to determine who is listening!

{Deleted}

Example 5

From: abc@xxx.gov

To: "Group 1 Cohort 2" <scrod@xxx.yyy.edu>

Date: Thu, 05 Sep 96 16:58:55 EST

{Deleted},

Is it working? I sent a message to the listserv on Saturday (this being the following Monday) and these were the results:

At home, from where I sent the message ({deleted e-mail address}), I received back that evening an error report that the message to {deleted} was undeliverable.

At work, by Monday morning, I've received the message in which the header shows it as from me (rather than from the listserv) and is addressed to me as a bcc (blind copy).

Do these results reflect correct operation of the system?

{Deleted}

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