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Does the Order of Face-to-Face and Computer-Mediated Communication Matter in  
Diverse Project Teams? An Investigation of Communication Order Effects on Minority  
Inclusion and Participation

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Abstract

**Purpose** - This study investigated whether meeting electronically first using computer-mediated communication (CMC) before meeting face-to-face (FTF) increases the inclusion of a female group member in a predominantly male project team.

**Design/methodology/approach** - We used an experimental design and a sample of 200 college students grouped within 50 four-person teams of one woman and three men. Twenty-five teams communicated using CMC first, then FTF. The other 25 teams communicated using FTF first, then CMC.

**Findings** - Results showed that women felt more included in the teams when they used CMC first and then FTF as opposed to the more often recommended FTF and then CMC. Findings showed that the order of communication medium influenced perceived inclusion, which in turn influenced individual participation.

**Implications** - Conventional wisdom suggests that today's project teams, whose members typically use a variety of communication media, should always meet FTF first at the beginning of their life cycle to enhance individual and team performance. Our study suggests that within diverse teams in which one minority team member is different from the rest of team and may feel excluded, initial CMC may help the minority member feel more included.

**Originality/value** - This study shows that the order of communication medium can influence team outcomes. In particular, meeting using CMC first and then FTF can be helpful for diverse teams with minority team members.

Keywords: Order of communication medium, Team diversity, Inclusion, Participation

There is great value in soliciting and using ideas from all employees. More than ever organizations are using work teams to solve complex problems in innovative ways (Cohen & Bailey, 1997; Kozlowski & Bell, 2003), with a majority of organizations using various types of teams both domestically (Devine, Clayton, Philips, Dunford & Melner, 1999; Gordon, 1992) and internationally (Kirkman & Shapiro, 1997). Furthermore, with continuing improvements in computer-mediated communication (CMC), teams typically interact using both face-to-face (FTF) and CMC (Mathieu, Maynard, Rapp, & Gilson, 2008). In this study, we focus on project teams and how the order in which they use CMC and FTF communication impacts the inclusion and participation of minority members of those teams. Project teams are defined as “temporary entities that execute specialized time-constrained tasks and then disband” (Kozlowski & Bell, 2003, p. 336). Most scholars and practitioners agree that all modern organizational teams vary in the extent to which their members interact FTF versus using CMC (Bell & Kozlowksi, 2002; Griffith & Neale, 2001; Kirkman & Mathieu, 2005; Stanko & Gibson, in press).

Project teams that use a variety of communication media to carry out tasks are often advised to have at least an initial FTF meeting at the beginning of the team’s life cycle in order for team members to establish rapport, build trust, and get off to a good start (Hambley, O’Neill, & Kline, 2007; Horwitz, Bravington, & Silvis, 2006; Lantz, 2001). However, a limitation of this recommendation is that we know little about the impact of initial FTF meetings within the context of *diverse* project teams with minority members who are obviously different from the rest of the team based on readily observable, surface-level differences (Harrison, Price, & Bell, 1998). Surface-level diversity cues are one way in which people socially categorize the world around them (Tajfel & Turner, 1986; Turner, 1985). Categorization processes can be problematic because they can trigger negative stereotypes about members of minority groups, negatively

affecting these individuals. For example, research on sex differences has demonstrated that in mixed-sex FTF teams, men receive more attention and speak more than women (Cleveland, Stockdale, & Murphy, 2000). This finding has been observed in many settings, including businesses (Benokraitis & Feagin, 1995), classrooms (Kimmel, 2000), and laboratories (Ritter & Yoder, 2004). If project teams include members who feel excluded due to differences in surface-level characteristics, individual participation may suffer.

Social categorization theory (Tajfel & Turner, 1986; Turner, 1985) is predicated on the notion that team members will interact, to a large extent at least, FTF. The originators of the theory could not possibly have foreseen the dramatic advance made in information and communication technologies allowing many teams to work primarily using CMC. The way that people accomplish their work has changed. Therefore, it is timely and important for research to examine whether the assumptions made by social categorization theory hold under the new work context where team members switch between CMC and FTF. A research question that has not been sufficiently examined is whether diverse project team members can benefit from using CMC interaction rather than FTF at the beginning of the team's interactions, thereby reducing the salience of surface-level characteristics and the resulting social categorization. Examining the order of communication medium use is practically important because most modern day project teams switch between various media, including CMC and FTF, and because most researchers recommend that team members have an initial FTF meeting (Hambley et al., 2007; Horwitz et al., 2006; Lantz, 2001). Thus, our purpose is to determine whether or not the order of CMC versus FTF communication influences female inclusion in predominantly male project teams and, ultimately, individual participation.

Our study attempts to make two contributions to the teams and diversity literatures. First, we contribute to the teams literature by identifying potential benefits of having diverse project teams interact using CMC *before* meeting FTF. Meta-analyses comparing the effects of CMC versus FTF interactions found that groups using CMC experience greater participation, more equality of influence, and less member dominance than do groups meeting FTF (Fjermestad, 2004; Rains, 2005). Our research extends the previous literature on CMC because it examines whether the *order* of communication medium matters rather than just the medium itself. Our study reflects the ways in which today's project teams carry out work and communicate (using both CMC and FTF). We propose that order of communication medium, together with team member sex, influences the perceptions of minority team members (i.e., perceived inclusion) and that such responses will influence participation.

Our second contribution is related to understanding how minority members (i.e., women in predominantly male teams) feel in project teams. This is important because it is common for women to find themselves in predominantly male project teams as they move up the organizational hierarchy or if they work in traditionally male occupations. For example, although women comprise 46.5% of the U.S. labor force, they hold only 15.2% of *Fortune 500* board seats and only 3% of CEO positions (Catalyst, 2009).

### Theory and Hypotheses

The theoretical rationale underlying our study is based on process models of employee behavior in teams (Hackman, 1992) as well as models of teamwork processes (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008). Our first construct of interest, the sex composition of the team, is reflective of job or work-related characteristics that might influence subsequent employee perceptions and behaviors. Our next construct, perceptions of inclusion, suggests that people

typically react cognitively first (before they react behaviorally) to work-related characteristics or events. In turn, employees' cognitive reactions then influence behavioral responses (i.e., participation; Hackman, 1992).

Inclusion is defined as the extent to which individuals feel involved in the team and able to influence team decision-making (Holvino, Ferdman, & Merrill-Sands, 2004). Inclusion has been studied in sociological research on social inclusion and exclusion (e.g., Bourdieu & Wacquant, 1992) as well as in organizational settings (Abrams, Hogg, & Marques, 2005; Baumeister & Leary, 1995; Pearce & Randel, 2004; Williams, Cheung, & Choi, 2000). A related construct in the teams literature is team identity, which is a team-level variable that taps the "emotional significance that members of a given group attach to their membership in that group" (Van der Vegt & Bunderson, 2005, p. 533). In our study, we chose to define inclusion as it has been used in the diversity literature (e.g., Holvino et al., 2004; Mor-Barak & Cherin, 1998; van Prooijen, van den Bos, & Wilke, 2004; Williams et al., 2000), which is more closely related to whether or not the treatment received is fair and appropriate. We do this because our emphasis on social categorization theory (Tajfel & Turner, 1986; Turner, 1985) and the proportions of men and women on the team (Kanter, 1977) best lend themselves to looking at inclusion from the perspective of diverse individuals in an organizational setting. Similar to Pearce and Randel (2004), we focus on how individual perceptions of inclusion affect the actions of these individuals.

We position our inclusion and participation variables within the rubric of teamwork processes (LePine et al., 2008). LePine et al. (2008) identify three categories of teamwork processes: transition processes, which are actions that teams execute between performance

episodes; action processes, which occur as the team is in the process of accomplishing its goals; and interpersonal processes, which focus on managing the interpersonal relationships within the team. LePine et al. (2008, p. 290) further describe emergent states as “team-level concepts that reflect certain types of shared affect and cognitions.” We categorize individual participation as a key action process and inclusion as an individual-level affective emergent state. Emergent states were originally defined by Marks, Mathieu, and Zaccaro (2001, p. 357) as “properties of the team that are typically emergent in nature and vary as a function of team context, inputs, processes, and outcomes.” We borrow the emergent state concept but apply it to the individual level of analysis in a team context, which is not a new idea. It is well understood in the emotions literature that affective states fluctuate frequently throughout the workday (George & Jones, 1997) and that affective experiences typically lead to work attitudes and affect-driven behaviors (Weiss & Cropanzano, 1996). We use a similar rationale to conceptualize inclusion as an individual-level emergent state.

#### *The Relationship between Order of FTF versus CMC and Individual Inclusion*

We propose that experiencing CMC first should allow women in predominantly male project teams to feel more included. As we explain below, we make the assumption that the norms that emerge using CMC initially will be more inclusive than those that emerge using FTF communication first. Team norms are the informal rules that teams use to regulate team member behavior (Feldman, 1984). Norms develop early within the team’s interaction, often before team members sufficiently understand their task (Bettenhausen & Murnighan, 1985). It is particularly important to examine different contexts in which norms emerge in diverse teams (e.g., CMC or FTF) because special challenges confront teams in the norming stage, including “coordinating work, developing a shared understanding around modes of communication, and the speed and

frequency of responding” (Furst, Reeves, Rosen, & Blackburn, 2004, p. 9). Importantly, once norms emerge, they have an enduring influence on behavior (Bettenhausen & Murnighan, 1985; Feldman, 1984). Also, research has shown that in demographically diverse teams, norms of lower cooperation can emerge, particularly in the early stages of the team’s lifespan (Chatman & Flynn, 2001). Given the importance of context during team norm development, it is critical to examine perceptions of inclusion as a function of the order of the communication medium.

The theoretical justification for examining inclusion (over other theoretically plausible alternatives) is based on social categorization theory (Tajfel & Turner, 1986; Turner, 1985), which states that individuals categorize themselves and others into in-groups (i.e., those similar to themselves) and out-groups (i.e., those who are different) based on readily observable characteristics, including sex. Social categorization theory (Tajfel & Turner, 1986; Turner, 1985) predicts that people are attracted to in-group members and are more likely to include them. Likewise, individuals compare their own demographic characteristics to those of others in their group to determine if they are similar or dissimilar to the rest of the group (Tsui & O’Reilly, 1989). In diverse teams, in which particular individuals are different from others, minority team members can feel isolated and ignored (Riordan & Shore, 1997; Tsui, Egan, & O’Reilly, 1992). In diverse teams in which women are the minority members, the women would be in the out-group and may feel excluded, possibly due to their lower social status (Benokraitis & Feagin, 1995; Glick & Fiske, 1996; Kanter, 1977; Sidanius & Pratto, 1999). It is well established that in teams with mixed-status individuals, the higher status individuals speak more often and have more control over team processes and discussions (Berger, Cohen, & Zelditch, 1972; Cleveland et al., 2000; Holtgraves, 1986). In mixed-sex teams, men tend to speak more often, be more



influential, and are seen as leaders more often than women (Lockheed & Hall, 1976).

Social categorization theory also provides the theoretical rationale for examining the effect of the order of communication medium. As CMC research shows (Fjermestad, 2004; Rains, 2005), when the team interacts through CMC and social categorization cues are not as salient, feelings of inclusion (Dubrovsky, Kiesler, & Sethna, 1991; Siegel, Dubrovsky, Kiesler, & McGuire, 1986) and uninhibited communication (Spears, Lea, Corneliussen, Postmes, & Haar, 2002; Sproull & Kiesler, 1986) are more likely to emerge than when the team interacts FTF.

It is likely that having CMC prior to meeting FTF will allow female minority members to become more embedded in the conversation and participate more in subsequent FTF settings. For a woman in a predominantly male team, the ability to enter the conversation during norm formation establishes her place in the conversation. To the extent that women have already entered the conversation in the CMC setting, the feeling of inclusion has already been set. In fact, research has shown that with every additional interaction, confidence in applying the team norm to given situations increases and patterns of behavior become more automatic (Bettenhausen & Murnighan, 1985).

Empirically, there is evidence that women respond more positively to CMC, in general, than do men. Lind (1999) found that women in CMC groups perceived that the group stuck together more and that they helped each other more than did men. Women were somewhat more satisfied with the CMC groups than were men. Women in FTF groups were also less satisfied with the group experience than their CMC counterparts. Lind (1999) obtained these results in teams that were mostly balanced on sex composition or were predominantly female. We believe that the results will be similar, or perhaps even more pronounced, for women in predominantly male project teams because the women are even more salient. For these reasons, we argue that

initial CMC will allow women in predominantly male project teams to feel more included than will initial FTF communication. However, we do not expect to find any differences for men. Regardless of the order of communication medium, the men in predominantly male teams are in the majority and should feel included. Therefore, we predict:

*Hypothesis 1: Women in predominantly male teams will report higher levels of inclusion in teams that meet using CMC and then FTF as opposed to teams that meet FTF and then use CMC.*

#### *The Relationship between Individual Inclusion and Individual Participation*

Next, we propose that there is a relationship between individual inclusion and individual participation in a project team. Participation, an individual behavior, is the extent to which a person has contributed to team discussions (Campion, Medsker, & Higgs, 1993). Individual participation is a critical process to consider in team settings because it represents essential actions that help the team accomplish its objectives (LePine et al., 2008). As we have proposed above, a work-related event (i.e., the formation of a predominantly male team) will likely influence perceptions (i.e., perceived inclusion) in the team. These perceptions will, in turn, influence behavioral outcomes, such as participation. Thus, to the extent that people perceive that they are included within the team, they are likely to respond behaviorally by participating more in team discussions and tasks (Holvino et al., 2004), and this relationship should hold regardless of sex. Empirically, Pearce and Randel (2004) found that employee perceptions of workplace social inclusion were related to engagement at work. Thus, we predict:

*Hypothesis 2: Perceived inclusion will be positively related to individual participation.*

## Method

### *Sample*

Participants were juniors and seniors in a business class at a large university in the southwestern United States. Participation in the study was voluntary and approximately 91% of the students in the course completed the study. Participants received extra credit points for their participation. In order to increase overall participation rates, they also had a chance to win one of several gift certificates from popular local restaurants. The gift certificates were awarded in a random drawing at the end of the semester to participants who completed both phases of the study. The sample included 212 individuals in 53 four-person project teams. However, one team was removed due to insubordination and two teams were removed because the women in the teams guessed the purpose of the study. Therefore, the final sample consisted of 200 individuals in 50 teams. The mean age of the participants was 21 years ( $SD = 1.03$ ). Seventy-five percent of the participants were male, while 25% were female. The demographic breakdown of the sample was 86% Caucasian, 8% Latino(a), 3% Asian-American, 2% African-American, and 1% other. While 46% of the students were currently employed, 68% reported having at least one year of full-time work experience and 80% reported at least one year of part-time work experience.

In order to create a predominantly male team, all teams in this study included three men and one woman. This fulfills Kanter's (1977) description of a predominantly male team because men are the majority ( $\geq 75\%$ ) and the woman is a minority ( $\leq 25\%$ ). She is also the only one of her sex in the team. Kanter's work is frequently referred to as the classic source to define the percentages at which sexes become majority and minority members in teams (e.g., Mannix & Neale, 2005; Sackett, DuBois, & Noe, 1991). Participants were randomly assigned to teams, and teams were randomly assigned to conditions.

### *Study Design*

Our experimental design was a one-way design (order of communication medium) with two levels of the independent variable (FTF then CMC, and CMC then FTF). The experimental manipulation that took place during the study was the order of communication medium used. The precedent for this procedure has become established in CMC research that has manipulated the salience of social categorization and surface-level characteristics of team members by varying the amount of FTF and CMC to which teams are exposed (Bhappu, Griffith, & Northcraft, 1997; Dubrovsky et al., 1991; McLeod, Baron, Marti, & Yoon, 1997; Siegel et al., 1986; Weisband & Atwater, 1999). CMC was accomplished by means of a computer chat program. The manipulation was operationalized by having one condition that began interacting using CMC and then moved to FTF interaction. The second condition moved from FTF interaction to CMC. Twenty-five of our 50 project teams were in the CMC then FTF condition, while 25 were in the FTF then CMC condition.

### *Procedure*

Data were collected at two points in time and using two different methods in order to reduce common method variance (Conway & Lance, 2010; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). A web survey was used to collect individual difference variables and demographics at Time 1. Time 2 involved a lab study.

### *Time 1 Measures*

Demographics and extraversion were measured at Time 1. Extraversion was used as a control because extraverts enjoy speaking with others in social settings and are therefore more likely to participate (Goldberg, 1999). Extraversion was measured using Goldberg's (1999) 10-

item scale on a scale from 1 = *extremely inaccurate* to 9 = *extremely accurate* ( $\alpha = .90$ ).

### *Time 2*

At Time 2, which began two weeks after Time 1, participants engaged in the project team exercise. Students who participated in Time 1 signed up for times to participate in teams of four (3 men and 1 woman) in Time 2. The lab was always overbooked to ensure that a team of three men and one woman would be obtained. The sign-up process for Time 2 was set up so that only six men and five women could sign up for each session. This was done using a combination of distribution lists (one for men, one for women) and web pages, which only allowed a certain number of people to sign up for each session. This process was invisible to the participants. The experimenter invited four participants (three men and one woman) into the lab. The extra participants who did not enter the lab received an alternate task packet containing unrelated research studies, which they filled out in a different room. The experimenter told participants that everyone had been randomly assigned to doing either the study or the alternate task. In reality, the experimenter selected the first woman and three men who entered.

Upon arrival at the lab, participants were greeted by the same experimenter who ran all of the labs. Once the four participants were seated, the experimenter gave them 10 minutes to read the task silently. The experimenter then told them that they would be participating in a team decision-making activity. The instructions the experimenter gave the team were in accordance with the condition to which the participants were assigned. In the CMC then FTF condition, the experimenter told the participants that they would be communicating using the computer chat program for 25 minutes and then using FTF discussion for 25 minutes. In the FTF then CMC condition, the experimenter told the participants that they would work on the activity for 25 minutes using FTF communication and then for 25 minutes using CMC. The participants all

knew each others' gender and learned each others' names during the lab sessions because the facilitator wrote everyone's names on the board when they entered the lab. Also, the participants were identified by name during the CMC communication because, while the four participants were spending 10 minutes reading the case, the experimenter went to the four computers on the other side of the room and signed each participant into the chat program on their individual computer using the participant's full name.

The project task was taken from Montoya-Weiss, Massey, and Song (2001), who used a case called Calgolia by Boyd, Walker, and Larréché (1998), which involves the development of an international marketing strategy for a global company. Because research on sex diversity in teams has shown that men dominate discussions when the task is male-gendered and women dominate when it is female-gendered (Ritter & Yoder, 2004), we pretested the Calgolia case task with 59 participants by giving them a description of the task from Montoya-Weiss et al. (2001) and by asking them to rate the gender of the task on a scale from 1 = *very masculine task*, 4 = *gender neutral task*, to 7 = *very feminine task*. Results showed that the task was gender neutral ( $M = 3.83$ ,  $SD = .85$ ). The mean was not significantly different from 4 ( $z = -1.54$ ,  $p \geq .05$ ). Although our context was predominantly male, we wanted to ensure the task was not.

After 10 minutes, the experimenter instructed participants to work on the project team deliverable, which involved filling out a Team Decision Form, with the team being required to document how they would allocate money and management time across three different product lines that were being sold in five different countries. Depending on the condition, the experimenter asked the participants either to sit around a conference table (in the FTF then CMC condition) or at individual computer terminals with cubicle walls dividing them (in the CMC

then FTF condition). The team had 50 minutes (split into two 25-minute segments) to fill in the Team Decision Form. The 25-minute segment format was chosen because this would allow enough time for norms to develop, following Bettenhausen and Murnighan (1985), who observed repeated patterns of team behavior in as little as seven minutes. This is also equal to the 25-minute median amount of time that it took Bettenhausen and Murnighan's five-person teams to establish norms in untimed conditions.

Once 25 minutes had passed, the experimenter let everyone know that half their time was up and that they had 25 minutes to finish the team discussion. The project teams switched between CMC and FTF communication, moving from whichever communication medium they began working in to the other communication medium. This entailed standing up and walking to the computer terminals or a conference table, both of which were set up in the same room. After the next 25 minutes were up, participants filled out a survey including perceived inclusion. On the last page of the survey, students were asked what they thought the purpose of the study was and whether or not they had any comments about the study. Once the participants answered the survey, they were thanked, debriefed, and asked not to discuss the study with any classmates.

### *Time 2 Measures*

*Manipulation check.* To confirm that everyone noticed the manipulation in the study (i.e., the order of communication medium), the following items were used (measured as 1 = *yes* and 2 = *no*): “My team communicated face-to-face *first* and then over a computer chat program to complete the Calgolia team case,” and “My team communicated over a computer chat program *first* and then face-to-face to complete the Calgolia team case.”

Although sex was not a manipulation but rather a constant across the conditions of the study (every team had three men and one woman), we wanted to confirm that everyone realized

the sex composition of the team. As part of the survey, we asked participants: “In your four-person team, how many males were there?” and “In your four-person team, how many females were there?” Responses ranged from 0 to 4. Everyone answered correctly.

*Inclusion.* Perceived inclusion was self-reported because participants themselves could best describe their feelings of being included (Conway & Lance, 2010; Mathieu et al., 2008). Inclusion was measured using two items from Pearce and Randel (2004). Although their scale included three items, the third item, which was reverse-scored, did not load well in a factor analysis (Tabachnick & Fidell, 2001) and would have substantially reduced the reliability of the scale. Because reverse-scored items can reduce the validity of responses (Schriesheim & Hill, 1981) and introduce systematic error into a scale (Jackson, Wall, Martin, & Davids, 1993; Schmitt & Stults, 1985), the third item was removed. Responses were measured on a 7-point Likert-type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree*. The items were “I feel included in the team activities” and “I feel like an accepted part of the team.” The correlation between the two items was .91.

*Independently-rated participation.* Consistent with other researchers who have assessed volume of participation in the past (e.g., Straus, 1996), the team discussion in each session was coded for participation in order to measure actual behavior. The CMC content was captured and saved by the chat program that was used for the CMC. The FTF content was videotaped and transcribed into Microsoft Word documents by a professional transcription service. Following Straus (1996), these transcripts were analyzed in Word by the first author to determine the actual number of words spoken by each team member. This involved sorting the transcript by speaker name and using Word's functionality to count the number of words spoken (Straus, 1996).



Individual-level participation consisted of the number of words spoken by each person.

In addition to number of words spoken, participation was also coded from the session transcripts by coding the number of facilitation comments made and the number of ideas contributed by each participant. Two coders (the third author of the study and one other coder with a master's degree who was not related to the research and was blind to the study's hypotheses) coded each comment in the transcripts for facilitation and idea contribution. Note that during the coding process, the two coders had access to the statements but not the names of the participants making the statements; hence, there was no gender-identifying information. Facilitation was defined as a series of "interpersonal acts that help maintain the interpersonal and social context needed to support effective task performance in an organizational setting" (Van Scotter & Motowidlo, 1996, p. 526). The coders were also given examples of facilitation behaviors according to Burns (1995; e.g., managing meetings, ensuring that all team members participate). Idea contribution was defined as the act of presenting a new idea to the team, which could be a completely unique idea not overlapping with what had been said already or an addition to or improvement upon what had been said (Cramond, 1995; Torrance, 1988). For both facilitation and idea contribution, each statement was coded as 0 = *no* if it did not represent the construct, 1 = *yes* if it did, and left blank if it could not be coded. Therefore, facilitation represents the number of facilitation statements made by the participant and idea contribution represents the number of ideas presented by the participant.

The two coders coded five practice transcripts, and they each received feedback from the first author along the way about the coding and their interpretation of coding instructions. Then, the two coders each coded the transcripts for the 50 teams. Agreement between the coders was computed using Cohen's Kappa, a coefficient of agreement for nominal scales (Cohen, 1960).

The proportion of agreement (with chance excluded) between the raters was .72 for facilitation and .79 for idea contribution. Disagreements between the coders were resolved by the first author based on her reading of the statements in question.

*Norms.* We collected a measure of norms as a robustness check. In the present study, we propose based on prior research that all teams have norms. However, rather than making that assumption, we wanted participants to tell us for themselves whether or not they perceived that there were team norms. We first defined norms to them based on the work of Feldman (1984): “Team norms are defined as informal rules that teams adopt to regulate and regularize team members’ behavior. Although norms are infrequently written down or openly discussed, they often have a powerful, and consistent, influence on team members’ behaviors.” We then asked participants this question: “Think about the interaction that you just had in your team. To what extent do you believe that team norms were present?” Participants answered on a 5-point scale from 1 = *to a small extent* to 3 = *to a moderate extent* to 5 = *to a large extent*.

## Results

### *Manipulation Check*

The manipulation check asked participants to identify which communication medium they used and in what order they used it to complete the case. One hundred percent of participants correctly identified the order of the communication medium they used.

### *Hypothesis Testing*

Means, standard deviations, and correlations are shown in Table 1. All of the analyses presented below are at the individual level. Following Raudenbush and Bryk (2002), we ran an analysis of variance (ANOVA) with team as the grouping variable to determine whether or not

individual-level inclusion or participation were influenced by team membership. The  $F$ -statistic was not significant for inclusion ( $F = 1.00, p > .05$ ). Also, ICC(1), which is the proportion of the total variance accounted for by group membership (James, 1982), was only .0006, and ICC(2), which refers to the reliability of the group level means, was .0025. The  $F$  statistic was not significant for participation ( $F = .67, p > .05$ ). ICC(1) for participation was -.09, while ICC(2) was -.49. Although members were nested in teams, these analyses show that team membership did not have a significant effect on the study variables and need not be taken into account in the substantive analyses. Therefore, all analyses below are at the individual level.

Hypothesis 1 stated that women in predominantly male project teams would report higher levels of inclusion in project teams that met using CMC and then FTF as opposed to FTF first and then CMC. Because we proposed a simple main effect for women, we ran this analysis separately for women and men. The CMC then FTF condition was coded as 0 while the FTF then CMC condition was coded as 1. An analysis of covariance (ANCOVA) testing the women's perceived inclusion with extraversion as a covariate was conducted. Extraversion did not significantly predict perceived inclusion  $F_{(1,47)} = 2.28, p \geq .05$ , partial  $\eta^2 = .05$ . The manipulation for the order of communication medium (i.e., FTF then CMC versus CMC then FTF) had a significant effect on perceived inclusion  $F_{(1,47)} = 4.68, p \leq .05$ , partial  $\eta^2 = .09$ . Women's perceived inclusion was higher in the CMC then FTF condition ( $M = 5.94, SD = .94$ ) than in the FTF then CMC condition ( $M = 5.25, SD = 1.38$ ). This supports Hypothesis 1.

For men, extraversion significantly predicted perceived inclusion  $F_{(1,147)} = 24.02, p \leq .05$ , partial  $\eta^2 = .14$ . The manipulation for the order of communication medium (i.e., FTF then CMC versus CMC then FTF) did not have a significant effect on perceived inclusion  $F_{(1,147)} = .71, p \geq .05$ , partial  $\eta^2 = .01$ . Men in the CMC then FTF condition reported similar levels of inclusion ( $M$

= 5.82,  $SD = 1.00$ ) to men in the FTF then CMC condition ( $M = 5.76$ ,  $SD = 1.11$ ). This is consistent with our expectations.

Hypothesis 2 stated that inclusion would be positively related to participation. In order to test Hypothesis 2, we ran a hierarchical linear regression using all 200 participants (see Table 2a). Inclusion was positively and significantly related to participation in words  $\beta = .23$  ( $p \leq .01$ ), supporting Hypothesis 2. We ran two additional regression analyses, replacing participation (measured as the number of words spoken) with each of the other measures of participation (facilitation and idea contribution). The results were very similar to those presented above (see Table 2b and 2c). By replicating our findings using several different measures of participation, we demonstrate the robustness of our effects (Tsang & Kwan, 1999).

#### *Post Hoc Analyses*

We conducted post hoc analyses as additional robustness checks. First, because we made the assumption that norms could be established within the duration of our study (Bettenhausen & Murnighan, 1985), we confirmed that participants perceived norms in their teams. The mean norms reported were 3.93,  $SD = .83$ . This is significantly higher than the midpoint of the scale (3 = *to a moderate extent*;  $t = 15.85$ ,  $p \leq .01$ ).

Next, we present the breakdown of participation in both words and person proportion of words by condition, sex, and order of communication medium (i.e., each of the 25-minute blocks) in Table 3. We cannot look solely at the number of words per 25-minute block because some teams are more verbose than others and because the number of words will always be greater in FTF media than in CMC media since people speak faster than they type. Therefore, the person proportion of words captures how much each person said as a proportion of their team

total, regardless of total words in the team. Equality across the four members would be represented by a proportion of words of .25. The proportions are computed as the person's total words divided by the total number of words spoken by the team in that segment of the team project. Then, we computed average words of the women and of the men both by manipulation and by segment (see Table 3). Results show that women in the CMC then FTF condition spoke their equal proportion in the CMC part of the activity ( $M = .25, SD = .12$ ) and in the FTF part of the activity ( $M = .25, SD = .17$ ). Women in the FTF then CMC condition spoke the least in the FTF segment ( $M = .23, SD = .15$ ) and the most in the CMC segment ( $M = .26, SD = .12$ ). This is consistent with our theory that CMC communication makes it easier for women in the minority to participate and that initial CMC can help these women participate more equally to men.

### Discussion

The relationships posited in the study were well supported. There is evidence that women in predominantly male project teams feel more included in teams that begin interacting using CMC and then switch to FTF communication as opposed to teams that begin interacting using FTF and then switch to CMC. Men feel equally included regardless of the order of communication medium. Perceived inclusion is associated with independently-rated individual participation. Next, we discuss the theoretical implications of our findings followed by practical implications and then by limitations and directions for future research.

#### *Theoretical Implications*

The finding that women who are in the minority feel more included in project teams that begin interacting through CMC has implications for the diversity literature and for social categorization theory. Researchers who study diversity have typically concluded that demographic diversity in teams can lead to negative effects and poor interaction among team

members because of problems associated with social categorization (Mannix & Neale, 2005; Williams & O'Reilly, 1998). Further, studies have found that when individuals are different from their teams on demographic characteristics, such differences can have negative consequences for both individual and team outcomes as a result of categorization effects (Horwitz & Horwitz, 2007; Mannix & Neale, 2005; Webber & Donahue, 2001; Williams & O'Reilly, 1998).

However, social categorization theory is predicated on the notion that team members will interact, to a large extent at least, FTF. The present study suggests that social categorization may be lessened given the right context. In particular, when the initial norms of interaction in the team are established in a setting that makes social categorization cues less salient, it appears that social categorization becomes less important, and individuals who are clearly in the minority within the team feel more included. Our findings extend the research that has found support for the view that diversity effects might be relatively weaker in teams that rarely meet FTF because surface-level differences that trigger biases in FTF contact are less salient (Bhappu et al., 1997; Bordia, 1997; McLeod et al., 1997). Because these studies compared teams whose members meet completely FTF versus those that meet completely using CMC, our study provides a more realistic test of communication media and diversity effects because we more accurately capture the communication media switching that occurs in modern-day organizational project teams (Griffith & Neale, 2001; Kirkman & Mathieu, 2005). More importantly, our findings suggest that the inclusion of women in predominantly male project teams is influenced not only by *medium* of communication but also by *order* of communication medium. In situations where women switch between communication media, they feel more included when interacting through CMC first as opposed to FTF first.

We also note that our study may help to reconcile conflicting findings in the literature on using CMC in teams. On the one hand, the SIDE model (social identity model of deindividuation effects) studies conducted by Postmes, Spears, Lea, and coauthors using CMC (Postmes & Lea, 2000; Postmes, Spears, & Lea, 1998; 2002; Spears & Lea, 1992, 1994; Spears, Postmes, Lea, & Watt, 2001) have repeatedly shown that in anonymous groups, in which there is an absence of social categorization on team members' demographic differences, team members are likely to develop all-new identity groups based on the norms that are salient in their team. On the other hand, the equalization phenomenon studies (Dubrovsky et al., 1991; Siegel et al., 1986) that have used CMC where team members are identified by name have observed greater equality among different groups as well as norms of equal participation and uninhibited communication using CMC. It is important to note that the equalization studies did not create anonymity among participants because participants were identified by name during CMC. In our case, similar to the equalization studies, participants were not anonymous and they were put into teams where there was an obvious minority on the basis of sex. For this reason, we would expect participants to retain social identities on the basis of sex and that our results would be more consistent with the equalization hypothesis (Dubrovsky et al., 1991; Siegel et al., 1986), not the SIDE model.

### *Managerial Implications*

The finding that women in the CMC then FTF condition felt more included in the project team than women in the FTF then CMC condition has practical implications for project teams because it suggests that the order of communication medium matters. Published research and anecdotal evidence from managers seems to uniformly suggest that project teams should always have initial FTF meetings (Hambley et al., 2007; Horwitz et al., 2006; Lantz, 2001). The findings in the current study suggest that this may not always be desirable.

Does this mean that organizations should always implement CMC communication first and then FTF for project teams? When the team is diverse and social categorization could lead some members to be excluded, initial CMC may be preferable. Such project teams may benefit from establishing norms in CMC mode before switching to FTF communication. The finding that women feel more included in project teams that interact using CMC and then FTF suggests that women who are in the minority will feel more included and thus contribute more when norms emerge using CMC. Results from our analysis of the transcripts (see Table 3) suggest that when using initial CMC, norms may be enacted equally between men and women because the proportion of participation between men and women is the same in the CMC portion of the CMC then FTF condition. When using initial FTF, the men may have more opportunity to enact norms initially because they have a higher proportion of participation than do the women in the FTF portion of the FTF then CMC condition. However, if the team is demographically homogenous and it is unlikely that any person on the team will be perceived as being different, initial FTF meetings may be preferable since FTF communication is generally more efficient (i.e., faster) than CMC (Martins, Gilson, & Maynard, 2004).

In a business setting, most project teams switch back and forth between CMC and FTF communication (Griffith & Neale, 2001; Kirkman & Mathieu, 2005). Managers should consider the demographics of their project teams when determining how to set the initial norms of communication. If the team is homogenous and could benefit from similarity effects, an initial FTF meeting may be the best option. If the team is heterogeneous such that certain people are salient minorities who might feel left out, an initial CMC meeting may be a better option.



*Limitations and Future Research*

One limitation of the study is the nature of the sample itself. There may be some characteristics of college students that do not generalize well to the rest of the population. This study could be replicated with different samples to improve its generalizability. Another question is whether or not the findings in this study may generalize to other types of minorities. For example, would the results observed with sex in this study generalize to race or age?

An additional limitation with regard to generalizability is the fact that the type of shift that we created in the middle of our experiment would not typically happen in practice. Switching participants to another communication medium in the middle of a decision-making task is artificial and limits the external validity of the study. Ideally, future research could replicate our study in an organizational setting with teams that naturally switch communication media throughout the course of their project work.

Also, we used a particular type of team – project teams – in our study. While project teams are together for a limited amount of time, other types of teams may have a longer duration. Thus, we do not know whether the effects we report are short-term or will persist over time. Our results may best generalize to teams that are short-lived (e.g., airline crews, police teams). This study could be replicated in a field setting with teams whose members work together longer. It would also be desirable to conduct a longitudinal study to follow diverse teams over their life cycles and investigate how and when negative effects of surface-level diversity may be alleviated over time (Harrison, Price, Gavin, & Florey, 2002; Watson, Kumar, & Michaelsen, 1993).

Further, the results of this study best generalize to predominantly male teams working on gender-neutral tasks. In reality, women working in male-dominated industries would probably be working on male-dominated tasks. Because men are dominant when working on masculine tasks

and females are dominant when working on feminine tasks (Ritter & Yoder, 2004), we selected a gender-neutral task to avoid confounding the task with the order of communication medium. Had we selected a masculine task, it would be harder to tell whether results were attributable to the predominantly male setting or to the masculine task. Because women in male-dominated industries would likely work on masculine tasks, we believe we have a conservative test and that effects are likely greater in the field. Future research could empirically examine this possibility.

One additional limitation of the study is related to the fact that we did not control for participant experience with CMC. However, it is important to note that our sample of participants was representative of the millennial generation, which has grown up surrounded by computer mediated technology (Barnes, 2009). In fact, the experimenter who ran the laboratory said that only one out of the 200 participants seemed confused about the technology used during the experiment and needed assistance communicating through the chat program. In future research, scholars may examine how varying levels of experience with CMC may affect inclusion and other team outcomes.

Further, we acknowledge that our study focuses on a particular type of team situation in which women are in the minority in a predominantly male team and are also a “solo,” or the only one of their kind in the team. Had we focused on teams where women were in the minority but were not a solo, the women’s reported means for inclusion and participation may have been higher. In general, results in sex diversity on teams support the idea that “the proportion of the sex represented in the sample can have a significant impact on the presence and strength of sex effects” (Williams & O’Reilly, 1998, p. 105). As the proportion of people in a team with a

certain characteristic is smaller, those who possess the characteristic become increasingly aware of how different they are from the team (Ethier & Deaux, 1994; Mullen, 1983).

### *Conclusion*

This study makes a contribution to the teams and diversity literature by identifying potential benefits to having diverse project teams interact using CMC before they interact FTF. Although this is contrary to conventional wisdom in teams research and practice, the results of this study demonstrate that there may be some advantage to this because it makes women in predominantly male project teams feel more included while having no adverse effects on inclusion for men. Overall, evidence from this study suggests that the CMC setting provides a new context for diverse project team members to interact in a setting where social categorization cues are reduced. Hackman (1987, p. 319) argued that teams could combat process losses and achieve process gains if they could only identify ways of working together that “*differ* from typical interaction” and “test novel patterns of team interaction.” For diverse project teams that typically suffer from process losses as a result of social categorization (Williams & O’Reilly, 1998), modern technology and the use of project teams may have given us just that opportunity.

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Table 1

*Means, Standard Deviations, Inter-correlations, and Reliabilities*

	<i>M</i>	<i>SD</i>	1	2	3	4
1. Extraversion	5.94	1.42	(.90)			
2. Perceived Inclusion	5.74	1.09	.31**	(.92)		
3. Individual Participation (in number of words)	856.72	525.00	.26**	.28**	--	
4. Facilitation Comments	49.46	27.36	.28**	.33**	.74**	--
5. Idea Contribution	19.84	16.31	.23**	.26**	.66**	.42**

*Note:*  $N = 200$ .

Two-tailed tests reported. \*\*  $p \leq .01$ .

Reliabilities are in parentheses on the diagonal.

Facilitation comments = number of facilitation comments made by each participant.

Idea contribution = number of ideas contributed by each participant.

Table 2

*Regression Results for the Three Participation Measures**2a) Regressing Participation in Words on Inclusion*

Variables	Participation in Words	
	Model 1	Model 2
Extraversion	.26***	.19**
Perceptions of Inclusion		.23**
$R^2$	0.07***	0.11**
$R^2 \Delta$ beyond Model 1	--	0.04**

 $N = 200$ 

Standardized coefficients. Two-tailed tests reported.

\*\*  $p \leq 0.01$ ; \*\*\*  $p \leq 0.001$ .*2b) Regressing Number of Facilitation Comments on Inclusion*

Variables	Facilitation Comments	
	Model 1	Model 2
Extraversion	.28***	.19***
Perceptions of Inclusion		.27***
$R^2$	0.08***	0.14***
$R^2 \Delta$ beyond Model 1	--	0.06***

 $N = 200$ 

Standardized coefficients. Two-tailed tests reported.

\*\*  $p \leq 0.01$ ; \*\*\*  $p \leq 0.001$ .*2c) Regressing Number of Ideas Contributed on Inclusion*

Variables	Ideas Contributed	
	Model 1	Model 2
Extraversion	.22**	.16**
Perceptions of Inclusion		.21**
$R^2$	0.05**	0.08**
$R^2 \Delta$ beyond Model 1	--	0.03**

 $N = 200$ 

Standardized coefficients. Two-tailed tests reported.

\*\*  $p \leq 0.01$ ; \*\*\*  $p \leq 0.001$ .



Table 3

*Participation in Words by Condition, Sex, and Communication Medium*

		<b>CMC then FTF Condition</b>				<b>FTF then CMC Condition</b>			
		Person Proportion of CMC Words	FTF Words	Person Proportion of FTF Words	FTF Words	Person Proportion of FTF Words	CMC Words	Person Proportion of CMC Words	
<b>Men</b>	CMC Words	$M = 209.43$ $SD = 108.89$	$M = 665.11$ $SD = 475.87$	$M = .25$ $SD = .16$	$M = 640.01$ $SD = 414.88$	$M = .26$ $SD = .16$	$M = 198.09$ $SD = 117.68$	$M = .25$ $SD = .11$	
<b>Women</b>	CMC Words	$M = 221.44$ $SD = 131.86$	$M = 687.76$ $SD = 547.70$	$M = .25$ $SD = .17$	$M = 584.80$ $SD = 391.38$	$M = .23$ $SD = .15$	$M = 221.80$ $SD = 151.89$	$M = .26$ $SD = .12$	

*Note:* CMC = computer-mediated communication. FTF = face-to-face communication.