

Impact of Gender and Group Composition on Leadership in Small Groups

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I would like to thank my advisor Dr. Jessica Remedios for her consistent support and guidance throughout the project, Dr. Heather Urry for her supportive presence on my thesis committee and Muna Akhtar for her supervision and helpful advice. Additionally, I extend my gratitude to Emma Ranalli and Frederick Hissenkaemper and other members of the Social Identity and Stigma Lab for their help with coding and collecting data. Finally, I would like to thank the Center for Applied Behavioral Cognitive Sciences (CABCS) at Tufts University, for funding this research.

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Abstract

Despite many advancements that have been made in the field of gender-equality, women continue to be underrepresented in the leadership positions in the workplace. This deprives companies of the talent and leadership skills that women bring to the table and also discourages women from pursuing these positions. The current study aims to examine two possible causes of this phenomenon: gendered stereotype threat and group composition. I examined the impact of gender and group composition on the frequency of leadership behaviors exhibited under the conditions of stereotype threat. A 2X2 between-subjects experiment was conducted to test this relationship. Gender was coded as male or female, and gender composition was manipulated by placing participants in either gender-equal or female-majority groups. Leadership behaviors were measured on a scale adapted from one used by Lord (1975). Thirty-seven men and 59 women participated in 24 groups of four. The first hypothesis that men would display more leadership behaviors due to the negative impact of stereotype threat on women was not supported although data trended in the predicted direction. The second hypothesis that female-majority groups would overall display more leadership behaviors than the gender-equal group was largely supported. The last hypothesis that women in the female-majority groups would perform more leadership behaviors than women in gender-equal groups was not supported through the data trended in the predicted direction. The current study combines two usually distinct avenues of research and paves the way for future research into the ways stereotype threat can be mitigated by group composition.

Keywords: Gender, Leadership, Stereotype Threat, Group Composition

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Over the past few decades, women have made great strides towards equality in the workplace. In 1945, only 28.6% of the workforce consisted of women, while the current percentage stands at a much more equitable 46.8% (U.S. Bureau of Labor Statistics, 2015). However, these heartening statistics do not tell the whole story. Although the barrier preventing women from entering the workforce appears to have been lifted, women continue to face struggles in their professional lives. Despite the fact that over 46% of women are a part of the workforce in the United States, upper level management continues to be an “old boys club” (U.S. Department of Labor, 2015; Hoobler, Lemmon, & Wayne, 2011). This problem is colloquially known as the “glass ceiling.” The term refers to the metaphoric ceiling or barrier to women’s advancement in their careers. This phenomenon is evident in the corporate sphere. Of the companies considered a part of the Standard & Poor’s 500 in 2017, women made up 44.3% of the workforce, but less than 10% of the five to seven individuals reported by the companies as ‘top earners’ and only 5.8% of the CEOs (Catalyst, 2017). The story being told here is clear; while women can join the workforce in large numbers and make important contributions to both the economy and the corporations that they work for, they can only advance so far before crashing into the glass ceiling. As we strive towards creating an egalitarian society, this discrepancy suggests that there is yet work to be done.

The absence of women from top tier management positions is especially problematic considering the impact that it can have on women entering the workforce. The prevailing idea that higher level positions are inaccessible to women may discourage women from applying to those positions. This in turn impacts the company’s ability to make use of the talent that female managers could bring to the table (Hoobler, Lemmon & Wayne 2011). In fact, studies have shown that companies with women in leadership positions perform on par with (and

sometimes better than) companies lead primarily by men (Vieto, 2012; Lee, Marshall, Rallis, & Moscardi, 2015; Joy, Carter, Wagner, & Narayanan, 2007). This may be in part because women have been shown to display a more democratic and collaborative approach to leadership in contrast with men's more authoritative style. These leadership styles and strategies that women bring to the table have been shown to be more suited to the management of companies as their structures evolve and change (Bass, 1990; Bass & Avolio, 1994).

In light of the benefits that women bring to the table as a part of the management structure, it is important to understand why these benefits are not being reaped and why women continue to be missing from positions of leadership. The reasons provided by male CEOs to explain this problem are often not shared by the female executives. Some men point to a "pipeline problem" by insisting that there simply are not enough women in the talent pool to allow for women in leadership positions and others point to the idea that women simply do not have the credentials and qualifications or that they are not willing to make the sacrifices needed to advance to higher levels in their corporations. Women, on the other hand, point to corporate culture and deeper structural inequalities to explain the gender disparity between male and female executives (Riggins, Townsend and Mattis, 1998). One of the ways in which the disadvantages of the current corporate culture manifest is through stereotype threat.

Stereotype Threat and Gender

Stereotype threat occurs when members of a stereotyped group find themselves in a situation in which they are at risk of confirming a stereotype commonly associated with their group (Steele & Aronson, 1995). Stereotype threat was first investigated in the context of its influence on African Americans and negative stereotypes regarding their verbal abilities. African American students who were presented with the SAT verbal reasoning test as a test

diagnostic of their verbal abilities performed significantly worse than when the test was presented as a non-diagnostic test. White students, on the other hand, did not display this same discrepancy suggesting that this difference is motivated by race. Merely indicating that the test was diagnostic was enough to activate race related stereotypes and self-doubt in participants (Steele & Aronson, 1995). Thus, the fear of confirming a stereotype relating to their group ultimately impeded performance such that participants confirmed the stereotype they were concerned about confirming. Literature on stereotype threat has since progressed to include other marginalized identities. Spencer, Steele and Quinn (1999) found a similar effect with women and math ability. The researchers found that when participants were told that the test they were taking produced gender differences, women performed significantly worse than male participants. Once again, the salience of their gender identity and stereotypes relating to them (i.e. women are bad at math) negatively impacted the performance of the those with identities that were stigmatized or marked by a characteristic that devalues them in the view of society.

As the holders of a stigmatized identity, women's behaviors are profoundly impacted by stereotype threat on a daily basis, and their leadership behaviors in the workplace are no exception. Eagly and Karau (2002) studied this phenomenon from the perspective of Social Role Theory. According to Social Role Theory, there are specific roles assigned to various social identities. In the context of gender and leadership, leadership roles tend to be deemed a "predominantly male prerogative" (Eagly & Krau, 2002). Women, they posit, are commonly associated with communal and cooperative qualities, whereas leadership tends to be defined in more masculine and agentic terms. This understanding of leadership can help us understand how the mechanism of stereotype threat could impact women's access to leadership positions in the workplace. With the awareness of the stereotypes surrounding their gender identity, women could be adversely impacted by stereotype threat in leadership

situations. Previous research has shown that exposure to stereotype threat can impact women's leadership aspirations. For example, it had been demonstrated that when exposed to gender stereotypic portrayals of women, women tended to opt for the subordinate position in an upcoming task as opposed to a leadership role (Davies, Spencer, & Steele, 2005). This literature is especially relevant with regard to the male dominated structure of the corporate world, especially at the top tiers. However, the current literature falls short when it comes to measuring leadership in behavioral terms. The current study seeks to fill this gap by analyzing the ways in which stereotype threat may impact the leadership behaviors being exhibited by women. This approach is distinct from previous research in that it studies the actual behaviors by women when faced with potential leadership situations. However, in order to study this, leadership first needs to be defined and measured.

Leadership

Leadership is a concept that has been of great interest not just to psychologists but to many other researchers, managers, employers and employees for years. The question of what leadership is and what makes one a good leader has been considered for just as long. A major goal of the current study was to define leadership in the context of the experiment and develop a scale that would accurately operationalize and measure the variable. To do so, I examined previous research on leadership.

In the late 1800s and the early 1900s, the prevailing idea of leadership was based on the "Great Man" Theory which suggests that leadership is an intrinsic quality that one is born with and that cannot be earned. This was supported by early trait theories that attempted to identify universal inborn traits that make people leaders (Avolio, 2007). The field of study has since moved beyond the assumption that leadership is innate to include behavioral measures of leadership effectiveness. The behavioral theories of leadership in use today are based on the idea that rather than being innate traits carried by a person, leadership is better

defined as the leadership-related behaviors performed by an individual (Avolio, 2007). There are several behaviors that can be considered indicative of leadership and thus be used to measure leadership. In order to develop a scale to measure leadership in the current study, several behaviors identified in existing research were considered. One variable that previous literature has focused on is the amount of time a person in a group spends speaking (Karakowsky & Siegel, 1999; Aries, Gold, & Weigel, 1983). The measure created by Karakowsky and Siegel (1999) includes the simple numeric measure of how long each member of the group spoke for, compared to the length of time speaking for other members of the group. Another behavior that has been considered to signal leadership is initiating interaction. Aries (1976) used this behavior as a measure of leadership and found that leaders of groups tended not only to initiate more interactions but also receive the bulk of the interactions. Another study considered interruptions to be an exercise in conversational dominance (Smith-Lovin & Brody, 1989). The researchers analyzed conversations in small groups both for quantity of interruptions as well as quality. Part of their analysis differentiated between positive interruptions (those that agreed with the speaker) and negative interruptions (those that disagreed with the speaker). They analyzed how these types of interruptions varied depending on the gender composition of the groups (all male, all female or mixed gender). They found that men interrupted women twice as much as they interrupted men and women interrupted both men and women at the same rate. They further found that the odds of a woman yielding to a negative interruption are about three times that of a man yielding to a negative interruption.

One prominent theory that emerged in the literature of behavioral leadership was that of functional leadership. According to the theory, leadership behaviors are those that serve to enhance the functioning of a group. Unlike trait based theories and the “Great Man” approach, this theory is structured so leadership behaviors could be performed by anyone in

the group as opposed to one established leader (Gardner, 1956). The current study seeks to quantify the degree to which leadership behavior is being exhibited by each participant. This approach builds on the core ideal of the theory of functional leadership that leadership is a behavior that can be exhibited by anyone rather than being a personality trait restricted to a few. This type of measurement allows us to understand each participant's leadership behaviors and tendencies at a nuanced level as opposed studying merely the one leader that emerges. By seeing how leadership behaviors increase and decrease across participants and conditions, the impact of variables that influence leadership can be better understood. Further, the theory supports the method of the use of small groups in the current study. This is demonstrated in by Lord who used this theory to develop a scale for the measurement of leadership behavior in small task oriented groups (1977).

Group Composition

The second independent variable, after gender, that the current study seeks to investigate is group composition. By manipulating group composition at two levels (gender-equal and female-majority) we try to determine if the gender composition of a group can have an impact on leadership behaviors displayed by the whole group.

In a review of several past studies, Carli (2001) suggested ways in which group composition on the basis of gender impacts interaction. She posits that the when gender is a prominent or salient characteristic in a setting, it gives men a certain degree of power that women are not afforded. It has been found that being of minority status was often beneficial for men and led to increased task contribution as well as degree of participation but was disadvantageous for women due to the fact that it highlighted gender (Carli 2001; Izraeli, 1983, 1984; Craig & Sherif, 1986). Karakowsky & Siegel (1999) found a similar effect to be true for both men and women. They found that when faced with a task that was incongruent with the traditional gender roles ascribed to them, both men and women displayed greater

leadership in groups where they found themselves in the majority. This majority-effect is not limited to gender and has been observed in studies that have considered race in regards to group composition (Li, Karakowski & Siegel, 1999). Researchers have thus found that proportional representation, being in balanced or majority status groups, had a significant positive impact on the degree of participation displayed by the members of a relatively powerless group that group, especially when performing tasks incongruent with their gender roles.

However, it is also possible that the presence of a greater proportion of women changes the group dynamic of the group in a much more profound way. Men and women are socialized to communicate in distinctly different ways. While men tend to favor more assertive and dominant strategies for communication while women tend to display more cooperative and inclusive patterns (Maltz & Borker, 1982; Karpowitz, Mendelberg, & Shaker 2012). This difference in communication extends to a difference in leadership styles as women often display more democratic and participative leadership styles as opposed to men who tend to skew more in the direction of autocratic and task oriented leadership (Eagly & Johannesen-Schmidt, 2001). Women often tend to outperform men on scales of transformational leadership, whereas men tend to display behaviors more congruent with transactional leadership. Transactional leadership is characterized by motivation through the prospect of recognition, pay increases and other incentives for good performance and penalties for poor performance. Transformational leaders, on the other hand are those who pay individual attention to each member of their group and act as mentors, helping members to grow and develop (Bass, 1990). Research has shown that the style of leadership displayed by women are more compatible with the modern workplace than other methods characteristic of transactional leadership (Bass & Avolio, 1994; Appelbaum, Audent & Miller, 2003). Different patterns and types of leadership may thus arise with a greater proportion of women

in a group. A more transformational approach to leadership can open up the group dynamic to be more welcoming of input from others. This form of leadership may encourage both men and women to have a higher degree of input in group discussions or tasks. The greater presence of women has shown to influence the leadership styles and communication behavior of men in the group by making it more communal and less confrontational (Killen & Naigels 1995, Carli 2001). These changes could facilitate a more democratic leadership environment for all those involved, not just women.

Having reviewed the literature on stereotype threat, gender, as well as group composition, the current study was designed to study the impact of group composition and stereotype threat on leadership behaviors. Groups of four participants were brought into the study in either female majority groups (three women and one man) or gender-equal groups (two women and two men). They were then asked to complete a version of the travelling salesperson task, a common spatial reasoning problem. However, before they did so, participants were informed that previous research has shown that men perform better than women on this task, thus introducing the variable of stereotype threat. The performance of the group during the task was filmed and the behaviors displayed by each participant were analyzed and leadership behaviors observed were recorded. I have three distinct hypotheses for this current study. The hypotheses encompass the impact of the independent variables of gender and group composition on the dependent variable of leadership. Leadership is measured through three categories of functional leadership behavior: developing orientation (D), facilitating information exchange (F) and coordinating behavior (C), each of which are treated as separate dependent variables. The literature on stereotype threat leads to the first hypothesis of the study which focuses on the main effect of gender and stereotype threat on leadership behaviors.

H1: Women will perform fewer leadership behaviors than men in all three categories of leadership behaviors described above.

The current study posits that inducing stereotype threat and will negatively impact women's leadership performance since leadership is often conceptualized as a gender incongruent task for women and women are stereotyped as poor leaders. Research on stereotype threat has shown that making gender a salient characteristic or bringing gender stereotypes to the forefront have a negative impact on their performance on tasks that involve the stereotyped activity. Thus, by informing participants that women are not as likely to do well on this task, we introduce the possibility that women's performance on the following task will be negatively impacted. Male participants, on the other hand, would not only be faced with a task that is not only congruent with traditional gender roles but they will also not be impacted by the induced stereotype threat since the stereotype in consideration targets specifically women. In a situation where they are not only performing a task that is gender congruent but also escape the stereotype threat that should impact the women in the group, O predict that they will show a greater proportion of leadership behaviors in comparison.

H2: The number of leadership behaviors performed on average will be higher in female-majority groups as opposed to equal gender groups.

The second hypothesis is rooted in the literature on group composition and leadership styles. Given the literature on the ways in which a majority of women can impact the leadership and communication dynamics of a group, the current study predicts that those in the female-majority condition will encounter a more democratic and communal group and thus be more likely to feel comfortable enough to perform leadership behaviors irrespective of their gender.

H3: Women in the female-majority group will perform more leadership behaviors than women in the gender-equal group.

Lastly, I expect to see a significant interaction between the two gender and group composition. Specifically, I expect that women in the female-majority condition should present more leadership behaviors than women in the gender-equal condition. They should both be emboldened by the presence of more women as well as be host to a more cooperative atmosphere as compared with the gender-equal group. This difference can, in effect, be seen as a way of mitigating the negative impact that stereotype threat has on women's inclination to display leadership behaviors.

Method

Participants

The participant pool consisted of 37 men and 59 women who participated in 24 groups of four. Twelve of the groups were in the equal-gender condition (two men and two women) and twelve were in the female-majority condition (three women and one man). The ages of participants ranged between 18 and 67 ($M_{\text{age}} = 22.47$ $SD = 8.2$). Participants were recruited through the Tufts University SONA system and were paid \$20 for one hour of participation. The study was conducted in groups of four and none of the participants in groups were well acquainted with each other.

Materials

Travelling salesperson problem.

The task assigned to the groups of participants was a variation on the travelling salesperson problem. The Travelling Salesperson problem is commonly used to study spatial reasoning abilities (Macgregor & Ormerod 1996, Basso & Lotze 2006, Basso et al. 2001). Since it is associated with spatial reasoning, The Travelling Salesperson Task is 'gender incongruent' for women (McGlone & Aronson, 2006). The group was given a map of the United States with eighteen cities marked across the country (see Appendix 1). They were asked to come up with the single most efficient (i.e. shortest) route that would allow them to,

beginning with Boston, travel to each city exactly once and return to Boston. To help them with this task, participants were provided with a table that informed them of all distances between individual cities. Participants were also given a copy of the task instructions and a piece of scrap paper for any calculations that they may want to perform during the task.

Post study questionnaire.

After performing the task, participants were asked to complete a post study questionnaire (see Appendix A). This questionnaire contained 44 statements that participants responded to on a Likert-type scale from 1 (Strongly Disagree) to 7 (Strongly Agree). These statements involved the degree to which participants felt invested in the group and the collective solution produced by the group (“I feel committed to the group solution”; “I would feel bad and unhappy if our group performed poorly”), the degree to which the participant felt that the group worked together cohesively (“There was unpleasantness among the group members”; “I felt like my group members valued my contributions”) and the degree to which they felt that their gender impacted their interaction with and contribution to the group (“I believe that my ability to perform well on the spatial reasoning task was affected by my gender”; “I felt that the group didn't value my opinions and ideas because of my gender”). Participants were also asked to disclose the degree to which they knew the other members of their groups as well as the degree to which they completed the study to the best of their abilities. Lastly, participants were asked what they thought the study was about as well as if they had any questions regarding the study in a free response question. Please refer to Appendix A for the complete questionnaire. None of the data collected from the post study survey was used in the calculation of the results of the current study.

Leadership scale.

The dependent variable of interest for the current study, leadership, was measured through a leadership scale created for this study (see Appendix B). The scale consisted of

three distinct leadership behaviors displayed by the participants during the study. These behaviors were coded based on the video recording taken during the performance of the travelling salesperson task. The scale and the categories of the leadership behaviors were adapted from those used by Lord (1975) in his paper *Functional Leadership Behavior: Measurement and Relation to Social Power and Leadership Perceptions*.

In his paper, Lord aimed to develop a set of actions or behaviors that would be an operational definition of leadership and could be used across a variety of situations and tasks involving interactions between groups. Lord used past research on individual cognitive problem-solving to identify some main problem-solving requirements and adapted these behaviors to be suitable for groups. Most notably, he specified the need for group maintenance behaviors that are not required in the context of individual problem-solving. He thus included behaviors that are aimed towards avoidance of interpersonal friction and other socioemotional functions necessary for group maintenance. The behaviors he established were such that they could be used to measure leadership behaviors even as task characteristics varied. He established twelve categories of these behaviors, eight of which were task related and four were related to socioemotional functions.

Lord's study however, found that only six of these behaviors had significant inter-rater reliability and appeared frequently enough to be considered in their analyses. None of the socioemotional behaviors were considered in Lord's analyses. The six behaviors that Lord chose to include in his analysis were Developing Orientation, Facilitating Information Exchange, Facilitating Evaluation, Analysis and Integration, Developing Plans, Proposing Solutions, Initiating Required Behavior and Coordinating Behavior. Each of these six behaviors displayed high interrater reliability and most of them displayed high frequencies as well. The current study further narrowed down those six behaviors to three behaviors that were considered most relevant for the study. The behaviors were chosen in order to ensure

that their operational definitions would be different enough from each other to allow the coders to identify them with ease. Additionally, this would facilitate faster coding which was necessary due to the limited time frame within which the study was conducted. The three categories of behavior that were coded for in the current study included: developing orientation (D), facilitating information exchange (F) and coordinating behavior (C). Another characteristic that motivated the identification and selection of these behaviors was that they reflected three distinct components of the problem-solving process. The Developing Orientation variable reflects the beginning planning stages of the problem-solving process, while Facilitating Information Exchange and Coordinating Behavior were behaviors needed for the duration of the task. In addition, due to the nature of the task, I anticipated a need for exchange of information and coordination between various members of the group. Due to the fact that the task was relatively short, I did not anticipate the ‘Developing Plans’ or ‘Proposing Solutions’ variables proposed by Lord to be significantly frequent. Lastly, the ‘Facilitating Evaluation’ variable according to Lord involved the testing of hypotheses. While this could have been potentially relevant to the current study design, it was left out since I did not foresee seeing it at a high degree of frequency due to the short duration of the task. Since the task only lasted 20 minutes, I did not anticipate there being much time to develop and test multiple hypotheses or approaches to solving the problem.

Each of the three behaviors chosen was coded for each participant in each group. The coders were two undergraduate students, one man and one woman, at Tufts University who were volunteer research assistants in the lab. The coding scheme provided to the research assistants is available in Appendix B. Developing Orientation encompassed behaviors that involved identifying problems, sub-problems, constraints and goals as well as introducing new ideas and summarizing events. Some examples of the verbal behaviors that were coded as a part of the Developing Orientation category included saying things such as “I think we

are facing a problem because..." and "Maybe we should consider visiting city A first and then go on to city B." Facilitating Information exchange on the other hand involved behaviors such as asking for factual information, clarifying their own or others comments and directing communication between group members. For example, if a participant tried to clarify a comment someone else made by saying "I think what she meant was..." or tried to ask for factual information "What was the distance between city A and city B?" the behaviors recorded as part of the facilitating Information Exchange category. Lastly, the Coordinating Behavior category was used to categorize behaviors that served to direct participant behavior within the group. This included instances of requesting specific actions ("Can you calculate the distance between these four cities?"), assigning roles ("Can you mark up the route on the map?") and indicating when behaviors are to be performed ("When I do X can you do Y?"). Each time a behavior matching the description of a particular category was provided was observed, it was recorded as one instance of the display of leadership behavior.

Procedure

The participants were seated at a round table in a lab room equipped with a camera. A research assistant welcomed participants to the lab and presented them with two consent forms each: one for the study itself and one for the audio and video recording component of the study. The research design was a 2X2 between-subjects design where both the independent variables were manipulated at two levels each. The first independent variable in the study was the gender composition of the groups in which the participants worked. The variable was manipulated on two levels. Participants would either be in a group that consisted of two men and two women (the equal gender condition) or three women and one man (the female-majority condition). The other independent variable was the gender of the participant themselves which was recorded as either male or female. Once the consent forms were signed, the research assistant briefed the participants on the task. In order to ensure that

participants were unaware of the true hypothesis of the task, participants were informed that the purpose of the study was to study the ways in which groups perform on the travelling salesperson problem. In order to induce stereotype threat, they were also told that previous research had suggested that men perform better than women on the task. The research assistant then turned on the camera, started a timer, and told the participants to begin the task. Participants had twenty minutes to complete the task and were given a warning when five minutes remained. If participants finished their task before their allotted twenty minutes had elapsed, they were asked to inform the research assistant. Once the task was completed, the research assistant turned off the camera and asked each participant to complete the post-study questionnaire. After the completion of the questionnaire, participants were verbally debriefed by the research assistants and given a debriefing form which detailed the purpose of the study as well as contact information for the Principal Investigator of the lab. After the participants left, the research assistant was responsible for logging the route submitted by the group electronically. Additionally, they uploaded the video taken during the experiment to the lab's computer.

Results

I predicted that women would display fewer leadership behaviors than the men across all conditions and people in female-majority groups would display more leadership behaviors than those in equal gender groups. I also expected that women in the female-majority group would perform more leadership behaviors than women in the gender-equal group. To test the hypotheses, 3 2X2 between-subjects ANOVAs was conducted. The two independent variables in the ANOVAs were group-type (female-majority or gender-equal) and gender of the participant (male or female). For all the statistical tests conducted, $\alpha = .05$ was used.

Interrater Reliability Assessment

A simple correlation was run to determine the interrater reliability for both raters across the three leadership categories. Both raters counted the number of times a behavior occurred in each leadership category. The frequency of these behaviors was compared across coders in order to ensure that the behaviors were being consistently interpreted in a similar manner by both coders. For the Developing Orientation variable (D) the correlation between the ratings of the two coders yielded a Pearson's coefficient of $r(94) = 0.74$. This represents a moderate correlation between the ratings of the two coders on this leadership category. For Facilitating Information Exchange (F), there was a moderate correlation of $r(94) = 0.59$. This signifies a moderate degree of agreement between the two raters on this category. Lastly, for Coordinating Behavior (C) $r(94) = 0.50$. The correlation coefficient was just at the commonly used 0.50 threshold, indicating that the two raters did not strongly agree on this category. These correlations indicate that while on categories D and F, the coders found moderate agreement on how often were displayed, they were not able to agree on behaviors falling in category C. Therefore, interrater reliability cannot be assumed for category C and this will impact the degree to which the results for this category can be reliably interpreted.

Main Analyses

In order to obtain average leadership scores in each category (D,F,C), the frequency of the behaviors recorded by coders was averaged for each participant. This number represents the average number of times a leadership behavior falling into that category was observed for each participant by the coders. Across genders and group-type, the average score of the Developing Orientation, Facilitating Information Exchange, and Coordinating Behavior categories were 5.71 ($SD=2.62$), 2.80 ($SD=2.27$), and 0.98 ($SD=1.11$) respectively. The descriptive statistics for both the independent variables are presented in Tables 1, 2 and 3 for leadership categories D, F and C, respectively.

The dependent variables were frequency of leadership scores for each participant in each category (D, F and C). For each dependent variable, the main effects of each independent variable were compared and then the data was tested for an interaction between the independent variables. The results of the ANOVAs are presented in Figures 1, 2 (main effects), 3, 4, and 5 (interaction Effects).

Developing orientation (D).

For the Developing Orientation Variable, the average score for men was 6.16 ($SE = 0.48$, 95% CI [5.21, 7.11]) and for women was 5.69 ($SE = .37$, 95% CI [4.95, 6.43]) (Table 1). This difference was not significant ($F(1,84) = 0.66$, $p = 0.78$). This main effect is depicted visually in Figure 1. On the other hand, the average score for the equal gender condition was 5.28 ($SE = 0.39$ 95% CI = [4.51, 6.05]) and for the female-majority condition was 6.56 ($SE = 0.39$ 95% CI = [5.64, 7.49]). This difference was established as statistically significant by the ANOVA ($F(1,82) = 7.16$, $p = 0.009$)(Figure 2). The interaction between group-type and gender was not found to be significant ($F(1,82) = 0.005$, $p = 0.945$) (Figure 3). This data indicates that while women tended to perform a marginally greater number of leadership behaviors falling in the Developing Orientation category. It also demonstrates that people, irrespective of gender, in the female-majority group displayed significantly more leadership behaviors in this category. However, there was no interaction effect between the two independent variables found ($F(1,82) = 0.61$, $p = 0.44$). In other words, participants of different genders did not react differently to the gender-equal and female-majority conditions. The descriptive statistics for this category are presented in Table 1. According to this data, the hypotheses that women would perform more leadership behaviors than men and that women in the female majority condition would perform more behaviors than women in the gender-equal condition, were not confirmed. However, the trend they display is in the

predicted direction. This supports my hypothesis that in there would be a higher frequency of leadership behaviors performed in the female-majority group.

Facilitating information exchange (F).

For the Facilitating Information Exchange Variable, the mean for the men was 3.02 ($SE = 0.41$ 95% CI [2.21, 3.83]) and for the women was 2.88 ($SE = 0.31$ 95% CI [2.28, 3.5]) (Table 2) (Figure 1). This difference was not significant ($F(1,92) = 0.018, p = 0.89$). The mean for this category in the equal gender condition was 2.27 ($SE = 0.32$ 95% CI [1.63,2.91]) and for the female-majority condition was 3.63 ($SE = 0.40$ 95% CI [2.85, 4.42])(Figure 2). This difference was considered significant according to the p value for the ANOVA ($F(1,92) = 4.683, p=0.03$). The interaction of the two independent variables was also non-significant ($F(1,92) = 0.43, p=0.84$ (Figure 4). The analysis of this data tells us that while men tended to display marginally more leadership behaviors, overall gender did not significantly predict a difference between behaviors that fall in the F category. However, in support of my hypothesis (H2) the female-majority condition displayed a greater frequency of leadership behaviors as opposed to the equal gender condition. Since the interaction effect was not significant ($F(1,84) = 0.005, p = 0.95$), it can be concluded that group composition did not impact people of different genders differentially. Therefore, similar to the data obtained for the previous category, two of my hypotheses, that women would perform significantly fewer leadership behaviors than men and that women in the gender-equal condition would perform fewer leadership behaviors than would women in the female-majority condition were not supported but display tends in the predicted direction. One hypothesis that predicted the female-majority groups would display a greater number of leadership behaviors than the equal gender groups was confirmed.

Coordinating behavior (C).

Lastly, for the Coordinating Behavior category, the average for the men was 0.93 ($SE = 0.20$ 95% CI (.54, 1.32) and for the women was 1.16 ($SE = 0.15$, 95% CI = [0.86, 1.46]) (Table 3) (Figure 1). According to the ANOVA, this difference was insignificant ($F(1,84) = 0.88$, $p = 0.35$). The average in the equal gender condition was 0.93 ($SE = 0.16$ 95% CI [0.62, 1.24]. For the female-majority condition, the mean was 1.16 ($SE = 0.19$ 95% CI [0.78, 1.55] (Figure 2). The difference was not found to be significant ($F(1,84) = 0.90$, $p = 0.35$). The interactions between the two independent variables were also found to be insignificant ($F(1,84) = 3.35$, $p = 0.07$) (Figure 5). Since neither the main effects nor the interactions were significant for this variable, it can be concluded that neither gender nor group composition had a significant impact on the rate of coordination behaviors. Therefore, for this variable, gender did not impact the frequency with which people performed leadership behaviors. Unlike the previous categories analyzed, there was no effect of group composition on the display of leadership behaviors. Lastly, no interaction effect was found and the hypothesis that women in the gender-equal condition would perform leadership behaviors less frequently than women in the female majority condition was not confirmed.

Discussion

The current experiment set out to investigate if gender and group composition had an impact on the leadership behavior displayed by participants in a task-driven setting. The experiment also aimed to investigate the if women in the equal gender groups performed leadership behaviors differently than women in the female-majority groups. Results indicated that there was no significant impact of gender on the frequency of leadership behaviors. However, a significant effect of group composition was observed wherein participants in the female-majority groups displayed higher frequency of the leadership behaviors than those in the gender-equal condition. There was no significant difference between the ways in which women interacted in the gender-equal and female-majority groups.

Tests of interrater reliability revealed that for the Developing Orientation and Facilitating Information Exchange leadership categories, the two raters found moderate agreement. However, it was concerning that this standard was not achieved for the last category, Coordinating Behavior. There are several possible reasons for this. First, as is true with the whole of the study, the sample sized being used is quite small. Due to the time intensive nature of data collection for the study, the number of groups run per group composition type was only twelve. This number is quite small and thus may contribute to certain insignificant results as well as the low inter-rater reliability for the coordinating behavior category. Therefore, the lack of inter-rater reliability may be rectified with the addition of more participants to the sample pool. Secondly, the average frequency for the behaviors in the Coordinating Behavior category across conditions was quite low. This low frequency may have been another contributing factor that impacted the inter-rater reliability for the category. This finding is not entirely surprising given previous research. Robert Lord's original scale, from which the coding scheme for the dependent variables in the current study was adapted, displayed a similar trend of low frequencies for the Coordinating Behavior category. Lord explained this behavior in the context of his own study by arguing that this behavior is more prevalent for executing plans and working in a more structured context as opposed to those performing general problem-solving tasks (Lord, 1977). This interpretation holds true for the current study as well. Similar to the context in which Lord tested these behaviors, the task given to participants in the current study did not involve the establishment of plans and was focused on a problem-solving task. Since different groups approached the task in different ways, many of them may not have needed to display the coordinating behaviors being coded.

The first hypothesis the current study posited was that men would perform a greater number of leadership behaviors than would women due to the negative impact that stereotype

threat would have on women's performance in the groups. This hypothesis is supported by current literature on stereotype threat that states that when at risk of confirming a stereotype commonly associated with their group, the fear of validating the stereotype will in fact cause members of the group to perform poorly thus validating the stereotype (Steele and Aronson, 1995; Spencer, Steele and Quinn, 1999; Davies, Spencer and Steele, 2005; Schmader, 2002; Schmader, Johns and Forbes, 2008). This expectation is also reinforced by research on gender roles that suggests that being faced with tasks that are incongruent with the traditional gender roles ascribed to a person's identity, such as leadership for women, has a strong impact on their performance (Carli, 2002; Eagly and Krau, 2002). The first two leadership categories being studied, Developing Orientation and Facilitating Information Exchange, did not display a significant difference between the performance of men and women in terms of leadership behaviors performed. This is contrary to existing literature in the field of stereotype threat and gender. Current literature would suggest that when in a condition of stereotype threat, women would feel the pressure of disproving stereotypes assigned to them and this would thus lead to lowered performance (Steele and Aronson, 1995). However, as previously discussed, the lack of significance could possibly be an artefact of the low sample size. In fact, even though non-significant, the data for these categories trends in the direction predicted by the hypothesis (Table 1, Table 2). However, another possibility is that stereotype threat did not, in fact impact women in this situation. There are a few possible reasons for this. The manipulation used to trigger a condition of stereotype threat was related to spatial reasoning as opposed to leadership. Perhaps, if the manipulation had directly addressed leadership, the effect would have been less subtle and more effective leading to a more notable difference. Another possibility relates to the absence of a male-majority group. It is possible that the effect of stereotype threat is effectively mitigated not just by the female-majority condition but also by the gender-equal condition. Research on tokenism has

suggested that being the sole representative of one's identity has a negative impact on women's performance and influence in group settings (Sekaquaptewa & Thompson, 2003; Taps & Martin, 1990).

An interesting analysis of the hypothesis that women would underperform in comparison to men in terms of leadership behaviors emerges when looking at the data for the third leadership category, Coordinating Behavior. While the results for this category were not significant, the trend they displayed, unlike in the first two categories, was contrary to the direction hypothesized. Women performed marginally more leadership behaviors in this category than did the men. Once again, this too could be an artefact of low sample size and the direction could change if more participants were included in the analysis. Moreover, with this category, it is also important to note that there was incredibly low interrater reliability as well as frequency observed. Thus, this trend could be simply an indication of a weak measure of the dependent variable. However, if the trend is to be considered at face value, it could be a valuable avenue of future research to study why women tend to outperform men when it comes to this leadership behavior. Studies have shown that there are certain types of leadership behaviors, especially those classified as transformational leadership, that are associated with female leaders (Bass 1990; Bass and Avolio 1994; Appelbaum, Audent, and Miller, 2003). It is possible that Coordinating Behavior could represent one of the behaviors in this leadership type.

The analysis of the second hypothesis that the female-majority groups would display a greater number of leadership behaviors in comparison to those of the equal gender groups indicated significant results. As predicted by the hypothesis, participants in the female-majority condition displayed a greater number of leadership behaviors than did those in the gender-equal group. This data was significant for the first two categories, Developing Orientation and Facilitating Information Exchange, and was insignificant but trending in the

right direction for the third category, Coordinating Behavior. The reasons for the insignificance of the data for this category are similar to those discussed above in relation to the first hypothesis that men would, on average, perform a greater number of leadership behaviors than would women. The significance of these findings is supported by literature, for example it has been found that women tend to skew towards a pattern of leadership that is more democratic (Karpowitz, Mendelberg, & Shaker 2012; Eagly and Johannesen-Schmidt, 2001). This style of leadership could encourage more participation from everyone as opposed to leadership stemming from one sole leader. This narrative also fits the differences between men and women's leadership styles in terms of transformational versus transactional leadership since transformational leadership tends to be more geared towards inclusivity (Karpowitz, Mendelberg, & Shaker 2012; Eagly & Johannesen-Schmidt, 2001). Being a part of a more inclusive and participatory group is what could have perhaps lead to the increased leadership behaviors observed in the female-majority groups in comparison with the equal gender groups.

While this data is promising, it is important to consider some alternate explanations. It is possible that the higher average of the frequency of leadership behaviors displayed in the female-majority group is not a result of a different leadership styles but in fact due to the fact that there are a greater number of women in the female-majority group and they are thus able to overcome stereotype threat and are more comfortable in expressing leadership behaviors. This would imply that the difference between the female-majority and equal gender groups does not stem from the leadership styles that women bring to the table but due to the alleviation of stereotype threat that happens in the female-majority group. This is reflected by the fact that, while not significant, there was a trend towards women in the female-majority condition performing a greater number of leadership behaviors than those in the equal gender condition.

Lastly, the interaction hypothesis (H3) was tested. I expected that women in the gender-equal group would be more impacted by stereotype threat than would be the women in the female-majority group. In other words, women in the equal gender group would perform fewer leadership behaviors at a lower frequency than would women in the female-majority group. None of the three interactions for the three categories proved to be significant for this data. Once again, it is possible that this is due to the small sample size. The interaction plots for all three interactions, however, depict that there are interactions between the independent variables, though they may be insignificant. For Developing Orientation and Facilitating Information Exchange, the trend displayed supported the hypothesis. Women in the equal-gender condition in general displayed fewer leadership behaviors than did the women in the female-majority condition. This lends itself to the interpretation that as hypothesized, being in a female-majority group does to some extent mitigate stereotype threat and help women to perform leadership behaviors with greater frequency.

This trend was true for all but the last leadership category analyzed. For Coordinating Behavior, the trend was actually reversed. In other words, women performed leadership behaviors with greater frequency when in the gender-equal group than in the female-majority group. Since this difference was insignificant, no true conclusions can be drawn. Additionally, interpreting the trend in the case of this variable may not be helpful. As previously discussed, the low sample size in addition to the low frequency and the low inter-rater reliability brings the measure for this category into question. Thus, while incredibly puzzling, it is possible that this trend may merely be an artefact of inadequate data.

Another trend that was observed in the interaction between the two variables, had to do with the frequency of leadership behaviors performed by men in the gender-equal and the female-majority groups. While this difference was neither hypothesized nor significant, trends reveal that for all three leadership categories, men performed leadership behaviors at a

greater frequency in the female-majority group than in the gender-equal group. This observation is important for two reasons. First, it lends greater support to the hypothesis that female-majority groups display a greater frequency of leadership behavior than gender-equal groups since being in a female-majority condition encourages more leadership behavior not just in women as the interaction trends reveal but also for men. This makes it less likely that the greater frequency of leadership behaviors displayed by participants in the female-majority group is merely a result of the greater number of women in that group or that it is due to the mitigation of stereotype threat that impacts women. This would suggest that there is indeed an impact of leadership style on the number of leadership behaviors performed.

Secondly, it is congruent with some literature that suggests that men may be disproportionately benefitted and exert greater influence when they find themselves in minority situations as opposed to women who are in the minority (Carli, 2001; Izraeli 1983, 1984; Craig and Sherif, 1986). Since the current study did not include a male-majority group and was largely focused on the behaviors of women in conditions of stereotype threat, this relationship cannot be properly analyzed. However, this opens up interesting avenues for future research.

The current study opens up the opportunity for a variety of future experimental endeavors. The shortcomings of the experiment can be harnessed into the development of a more study design that includes control groups for the stereotype threat condition as well as for the group composition condition. By including a condition in which the participants are 3 men and 1 women, the impact that group composition on leadership behaviors and the direction of the data can be better understood. The addition of a male-majority condition would help to get a better sense of the direction of the trend. One possible direction is that women in the hypothetical male-majority condition perform leadership behaviors at the lowest frequency, since they should be the most impacted by stereotype threat, followed by

women in the gender-equal condition and finally the women in the female-majority condition at the highest level. However, another possibility is that the reason that there is no significant interaction effect is not due to the low sample size but also because being in an equal gender group is sufficient for the mitigation of stereotype threat and being in a female-majority group does not significantly impact leadership behavior in women. Therefore, if merely not being in the 'solo-status' can help mitigate stereotype threat then the direction of the data would reveal that women in male-majority groups perform significantly fewer leadership behaviors than do those in gender-equal or female-majority groups (Sekaquaptewa & Thompson, 2003). The addition of this group would also have an interesting implications for the hypothesis that female-majority groups perform a greater number of leadership behaviors than those in gender-equal groups. One way the addition of a male-majority group could impact this could be that due to the transactional and authoritative nature of men's leadership styles, fewer members of the group would take the initiative to perform leadership behavior and a larger number of them would fall into the follower role. This could possibly imply that male-majority groups would have the lowest average of leadership behaviors observed due to the lack of participation and inclusion characterized by male leadership styles (Bass, 1990).

The stereotype threat control group would similarly help to establish to what extent and in what conditions stereotype threat has an impact on women's leadership performance and if it can be mitigated by a more egalitarian workplace. Having control group of women in both equal gender and female-majority groups who are not presented with the stereotype threat manipulation would be help to draw conclusions from the (non-significant) trend that women in female-majority groups performed leadership behaviors at a higher frequency than those in gender-equal groups. With the addition of the 'no stereotype threat' control condition, women in the non-stereotype threat condition should perform better than women in the gender-equal group and at comparable levels to women in the female-majority group.

Another helpful addition to the analyses would have been to statistically account for the shared experiences of the participants. Each participant completed the task in a group of four. It is possible that sharing this experience with others had a substantial impact on their performance. By treating all participants as individuals independent of the context in which they completed the task misses some of the nuances of the experience. A more nuanced statistical analyses that accounts for these shared experiences would be beneficial to understanding the data collected.

In addition, the measures of leadership in the current study were limited due to time constraints. In a larger time-frame, inclusion of a greater variety of dependent variables would be beneficial. These could include variables such as anxiety, measured through physiological measures, behavioral analyses or both. Additionally, measures of dominance and influence such as speaking time, interruptions, as well as a more extensive scale of functional behavior and leadership styles would advance the analysis. Lastly, correlating the participants' performance in leadership behavior to the actual task outcome would be interesting. This could help establish if there is a relationship not only between gender composition and performance but also between the types of leadership strategies and performance.

Despite its limitations, the use of the functional leadership as a theory of leadership displays a key strength of the current study design. By studying the behavior of each individual as opposed to that of the assumed 'leader' of each group, we are able to see a more nuanced view of the way in which leadership functions within intergroup dynamics. The insights into the trends of when men and women are more likely to perform leadership behaviors could not have been obtained with a non-behavioral analysis or one that did not evaluate each individual participant. Further, the current study succeeded in integrating two avenues of research that have yet not been examined together. In the analysis of the

performance of women in the workplace, both stereotype threat and the absence of women in leadership positions has long been studied. However, these two variables are not often examined in conjunction with each other. Combining these two areas of work allows for a more complex and realistic depiction of women at work since women are constantly dealing with both issues of underrepresentation as well as stereotype threat on a daily basis. Studying these two variables together is crucial to our understanding of how these problems feed into each other and perpetuate a culture of gender inequality in the workplace. By bringing together these two areas of literature, the current study fosters a better understanding of the dynamics that could make a modern workplace more egalitarian in terms of gender. By understanding if stereotype threat can indeed be mitigated by a more egalitarian group composition, our understanding of both stereotype threat and the practical applications of the ways in which it can be overcome is furthered. The trend displayed in the results of the current study are indicative of the possibility that stereotype threat can be alleviated by the inclusion of a greater number of women in groups. In other words, the mere presence of more women in an organization could help to lessen the negative impact of stereotypes on women. This can have great implications not just for corporate institutions but also many other avenues of work where women find themselves in the minority.

Further, the findings from current study suggest that having a female-majority group can be beneficial not just to women but also men in the group. This finding, especially with limited sample size of the current study, is very valuable because it confirms non-experimental reports that women have different and in some ways better leadership styles than men (Bass 1990; Bass and Avolio 1994; Appelbaum, Audent and Miller, 2003). This could suggest that there is may be a very substantial effect here that demands further experimental investigation. If the presence of women can fundamentally change the leadership structure and thus the culture of a company to be more suited to the modern

workplace, companies can be incentivized to diversity their workforce not solely for the purposes of promoting gender equality but also to improve objective performance.

In conjunction with the (non-significant) trend that suggests that altering the group composition may work to alleviate stereotype threat, this finding that female-majority groups are more conducive to democratic leadership behaviors could address both the perspective of the employers and the employees on inequality in the workplace. Since male CEOs often point to the lack of skills women bring to the table due to an apparent “pipeline problem” and women blame a hostile and unwelcoming corporate culture, the mere act of including more women as part of the team could help solve these problems. By including more women, women would be able to overcome the barriers (such as stereotype threat) preventing them from performing to the best of their abilities, a concern held by male CEOs and would also bring a welcome change to corporate culture addressing the concerns of female employees (Riggins, Townsend and Mattis, 1998).

Thus, current study sheds light on the nature of the glass ceiling but also attempts to find a way of overcoming it. By analyzing the ways in which gender inequality is perpetuated in the workplace by multiple variables, it lends a deeper understanding to the steps that must be taken to overcome it. Women have for long been important contributors to the economy, and it is long overdue that the barriers holding them back from the upper echelons of their careers be dissolved. It is only when women are equally represented at all levels of employment including positions of power and influence, that true gender equality can be within sight.

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Table 1

Descriptive Statistics: Developing Orientation

	Equal gender			Female Majority			Total		
	<i>n</i>	<i>M (SD)</i>	95%CI	<i>n</i>	<i>M(SD)</i>	95%CI	<i>n</i>	<i>M(SD)</i>	95%CI
Male	24	5 (0.54)	3.936, 6.064	11	7.32 (0.79)	5.75,8.89	35	6.16(0.48)	5.21, 7.11
Female	24	5.57(0.56)	4.456, 6.680	29	5.81 (0.49)	4.48,6.68	53	5.69(0.37)	4.95, 6.43
Total	48	5.28(0.39)	4.51, 6.05	40	6.56 (0.39)	5.64, 7.49			

Table 2

Descriptive Statistics: Facilitating Information Exchange

	Equal gender			Female Majority			Total		
	<i>n</i>	<i>M (SD)</i>	95%CI	<i>n</i>	<i>M(SD)</i>	95%CI	<i>n</i>	<i>M(SD)</i>	95%CI
Male	24	2.35(0.46)	1.45, 3.26	11	3.68(0.67)	5.75, 8.89	35	3.02(0.41)	2.21, 3.83
Female	24	2.18(0.46)	1.28, 3.1	29	3.59(0.41)	2.76, 4.41	53	2.88(0.31)	4.95, 6.43
Total	48	2.27(0.32)	4.51, 6.05	40	3.63(0.40)	2.85, 4.42			

Table 3

Descriptive Statistics: Coordinating Behavior

	Equal gender			Female Majority			Total		
	<i>n</i>	<i>M(SD)</i>	95%CI	<i>n</i>	<i>M(SD)</i>	95%CI	<i>n</i>	<i>M(SD)</i>	95%CI
Male	24	0.58(0.22)	0.142,1.024	11	1.27(0.33)	0.62, 1.92	35	0.93(0.16)	0.54, 1.32
Female	24	1.27(0.22)	0.830, 1.712	29	1.05(0.20)	0.65, 1.45	53	1.16(0.19)	0.86, 1.46
Total	48	0.93(0.2)	0.62, 1.24	40	1.16(0.15)	0.78, 1.55			

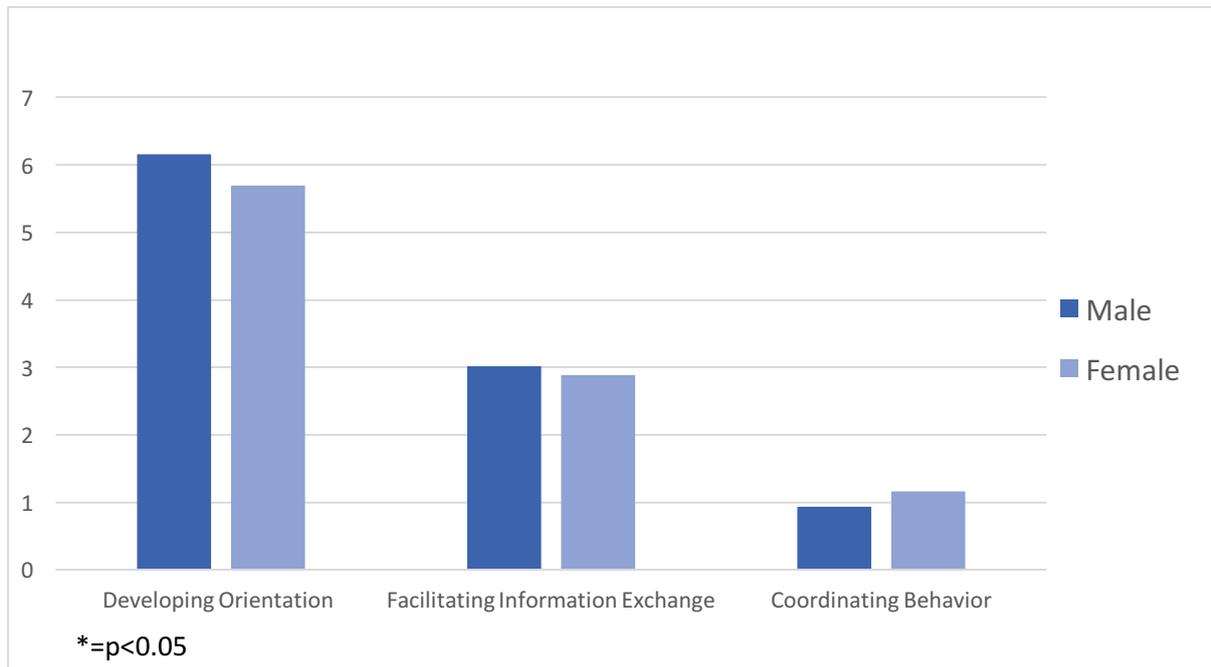


Figure 1. Means for Frequency of Leadership Behaviors by Gender

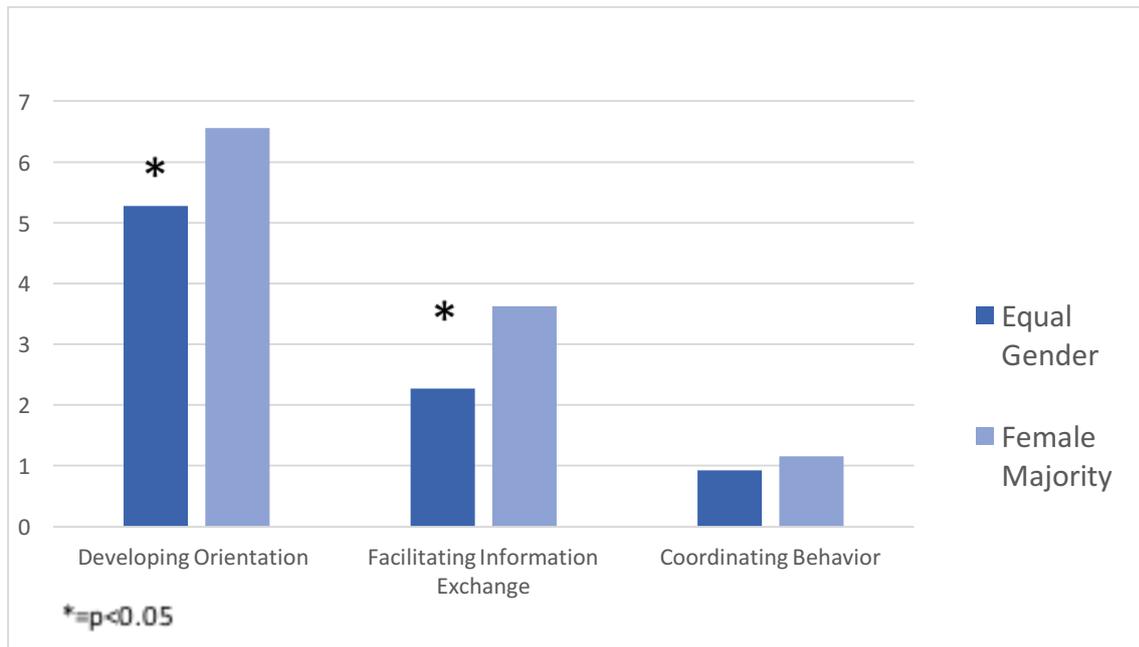


Figure 2. Means for Frequency of Leadership Behaviors by Group Composition Type

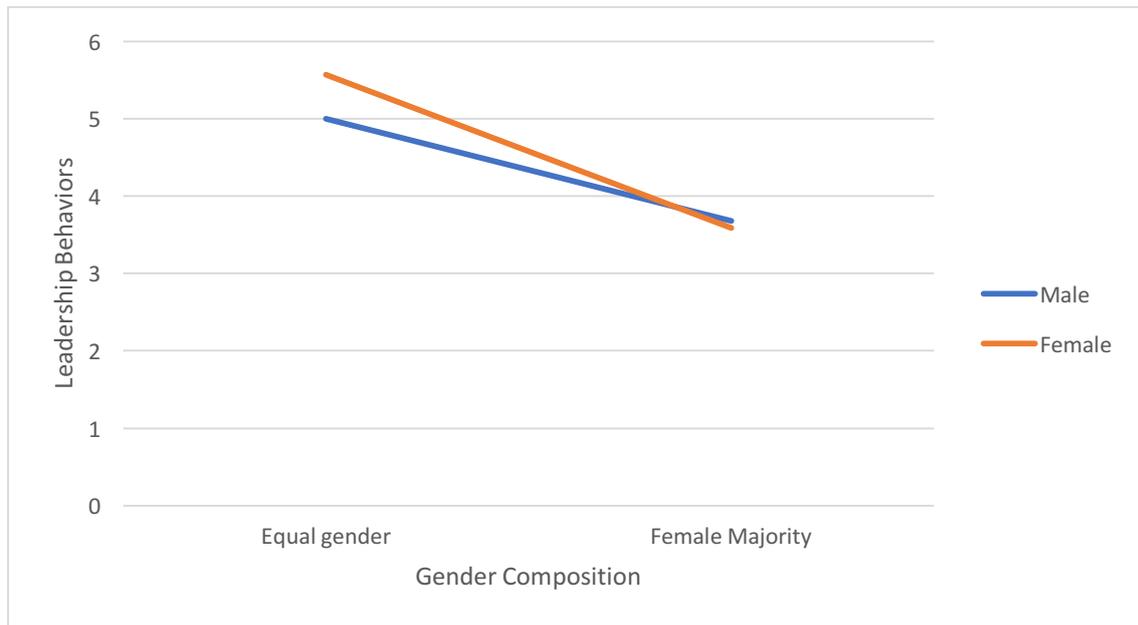


Figure 3. Developing Orientation- Interaction between Gender and Group Composition variables

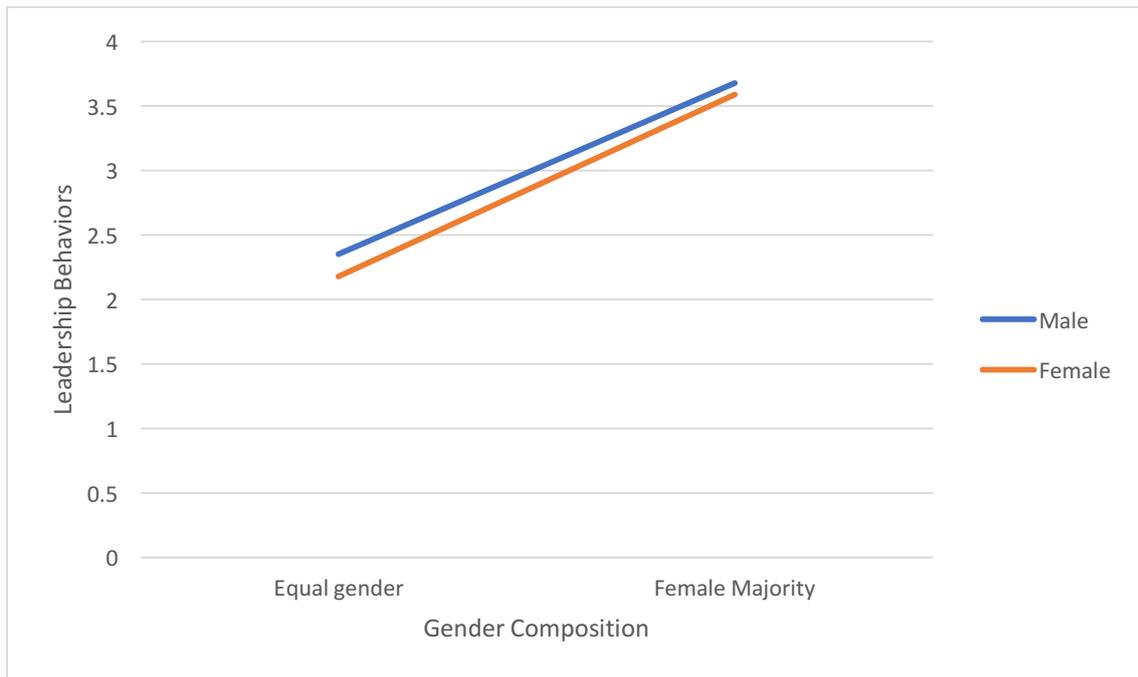


Figure 4. Facilitating Information Exchange- Interaction between Gender and Group Composition variables



Figure 5. Coordinating Behavior- Interaction between Gender and Group Composition variables

Appendix A

Post-study Questionnaires

Now that you have completed the group task, we would like you to provide feedback regarding your experiences. You will now be asked to respond to questionnaire items.

1. I am satisfied with the quality of my group's solution.
2. I feel committed to the group solution.
3. I am confident that the group solution is correct.
4. I feel personally responsible for the correctness of the group solution.
5. I would feel bad and unhappy if our group performed poorly.
6. I would feel a sense of personal satisfaction if our group performed well.
7. My own feelings are not affected one way or the other by how well our group performed.
8. I agreed with the final solution.
9. I could have come up with a better solution on my own.
10. I could have come up with the correct solution in less time on my own.
11. I think that the group decision was the correct one.
12. I only agreed with the group decision so we could reach a unanimous decision.
13. I enjoyed talking and working with my group members.
14. My relations with the other group members were strained.
15. There was unpleasantness among the group members.
16. My own creativity and initiative were suppressed by the group.
17. Working in this group was an exercise in dealing with frustration.
18. I got along with the people in this group.
19. I wouldn't hesitate to participate on another task with the same group.

20. If given the choice, I would have preferred to work with another group.
21. I liked working with my group members.
22. I felt like I was given an opportunity to contribute to the solution.
23. I felt like my group members listened to me when I spoke.
24. I felt like my group members valued my contributions.
25. I felt confident when expressing my opinions.
26. Some individuals interrupted and spoke over me during the discussions.
27. I felt intimidated by the group.
28. Some people dominated the group discussions.
29. I think that my opinions made a contribution to the final decision.
30. I think that everyone in the group had the opportunity to express their opinions.
31. I think that everyone in the group contributed to the final decision.
32. I felt that the group didn't treat me with respect because of my gender.
33. I felt that the group didn't consider my points of view because of my gender.
34. I felt that the group didn't value my opinions and ideas because of my gender.
35. I felt that I was treated unfairly because of my gender.
36. I felt that the group didn't value me because of my gender.
37. I believe that my ability to perform well on the spatial reasoning task was affected by my gender.
38. I believe that if I performed poorly on the spatial reasoning task, the group will attribute my poor performance to my gender.
39. I believe that if I performed well on the spatial reasoning task, the group will attribute my good performance to my gender.
40. I believe that negative stereotypes about my gender increased my anxiety during the spatial reasoning task.

41. I believe that positive stereotypes about my gender increased my anxiety during the spatial reasoning task.
42. I worry that my ability to perform well on the spatial reasoning task was affected by my gender.
43. I worry that if I performed poorly on the spatial reasoning task, the group will attribute my poor performance to my gender.
44. I worry that, because I know the negative stereotype about women and spatial reasoning, my anxiety about confirming that stereotype negatively influenced how I performed on the spatial reasoning task.

What was the gender composition of your group?

- All women (1)
- All men (2)
- One woman & three men (3)
- Two women & two men (4)
- Three women & one man (5)
- I don't remember (6)

How many of your group members did you know well prior to today's session (friend, romantic partner, etc.)?

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)

How many of your group members have you previously worked with in a group setting (job, class project, etc.)?

- 0 (1)
- 1 (2)
- 2 (3)
- 3 (4)

Tried I tried to complete the study to the best of my abilities.

- Strongly Disagree (1)
- Disagree (2)
- Somewhat Disagree (3)
- Neither Agree nor Disagree (4)
- Somewhat Agree (5)
- Agree (6)
- Strongly Agree (7)

What do you think this study was about?

Do you have any questions or concerns about the study?

Appendix B

Coding Scheme

Evaluate each of the four participants on the basis of the following three categories described.

Descriptions and examples are provided for behaviors in each category to help you understand the types of behaviors to look for. However, the examples provided are **not** exhaustive and other behaviors may be applicable to the descriptions. If you observe a behavior that falls in one of the categories, add a tally mark to the appropriate cell in the table provided. At the end of the video, add up the tally marks in each category (D, F and C) as well as the total number of tally marks (D+F+C). Each behavior must only be recorded once. If you feel a behavior could belong in more than one category, add it to the category you feel it fits in best and describe the problem you faced in the comments section of the table provided.

The participant number can be determined using the subject logs and the position in which the participants sit in the video. The chair on the left of the screen (near the window) is 1 and the numbering proceeds in a clockwise motion from there. The gender of the participants should be cross checked with the subject logs.

Categories**1. Developing orientation and defining a problem.** Examples:

Identifying or interpreting problems	<ul style="list-style-type: none"> ○ <i>I think we are having a problem because...</i> ○ <i>If we go to city A first, we might skip over city B</i> ○ <i>I think too many of us are talking at the same time</i>
Identifying sub-problems or specific needs that arise during the task	<ul style="list-style-type: none"> ○ <i>I think we need to calculate the distance for each route</i> ○ <i>I think we need to keep track of which cities we've visited</i>
Identifying initial conditions, goals and	<ul style="list-style-type: none"> ○ <i>We need to have the shortest possible</i>

rules of the task at hand	<i>route</i> <ul style="list-style-type: none"> ○ <i>According to the task sheet...</i> ○ <i>So, we can't go over a city twice</i>
Introducing new ideas	<ul style="list-style-type: none"> ○ <i>What if we do it this way...</i> ○ <i>Maybe we could start this way...</i>
Summarizing progress in a non-evaluative manner	<ul style="list-style-type: none"> ○ <i>So, what we have so far is...</i> ○ <i>Our total distance right now is...</i> ○ <i>So, you're doing x, and you're doing y, and I'm doing z, right?</i>

2. Facilitating information exchange

Examples:

Asking for factual information	<ul style="list-style-type: none"> ○ <i>What is the distance between A and B?</i> ○ <i>How far have we travelled now?</i> ○ <i>Was this what we discussed earlier?</i>
Asking others to clarify what they meant	<ul style="list-style-type: none"> ○ <i>What did you suggest?</i> ○ <i>Did you mean we should go to x first?</i>
Asking others to repeat themselves	<ul style="list-style-type: none"> ○ <i>Could you repeat what you just did/said?</i>
Clarifying others' comments for them	<ul style="list-style-type: none"> ○ <i>I think what he meant was...</i> ○ <i>Oh, so what you're trying to do is...</i>
Directing communication between members of the group	<ul style="list-style-type: none"> ○ <i>Maybe you could show her what you were trying to do</i> ○ <i>She can explain to you what she had in mind</i>
Supporting other members' right to talk and contribute to the group	<ul style="list-style-type: none"> ○ <i>If someone is interrupted "What were you saying?"</i>

3. Coordinating or directing behavior

Examples:

Requesting specific actions from other group members (one time tasks)	<ul style="list-style-type: none"> ○ <i>Could you hand me that?</i> ○ <i>Can you calculate the distance so far?</i> ○ <i>Can you check...</i>
Indicating when specific behaviors are to be performed	<ul style="list-style-type: none"> ○ <i>While I do x, can you do y?</i>
Indicating roles to be played by specific group members (assigning longer term roles members of the group)	<ul style="list-style-type: none"> ○ <i>Can you add up the distances as we go?</i> ○ <i>Can mark up the route on the map?</i> ○ <i>Maybe you can...</i>