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## **ON THE INTERNET, NOBODY KNOWS YOU'RE A GIRL: THE FEMALE PERFORMANCE ADVANTAGE IN ANONYMOUS VIRTUAL TEAMS**

### **ABSTRACT**

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As work is increasingly done across borders, the quality of this work depends upon electronically connected virtual teams. We examine the performance of women and men in face-to-face versus anonymous virtual teams. In anonymous virtual teams, women significantly outperformed men. The performance of face-to-face teams was better overall than that of anonymous virtual teams, and women's performance was equivalent to that of men in face to face teams. While virtual teams experience lower performance and satisfaction than face to face teams overall, this difference appears to be due to lowered performance in men.

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*Key Words: virtual teams, workgroups, stereotypes, gender, glass ceiling, anonymity*

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## **INTRODUCTION**

As companies began eliminating layers of management in the 1980s and 1990s, more and more organizational work has been done by workgroups. For women, these workgroups carry some negative elements. Men dominate discussions (Holmes 1995), and ignore women's ideas until those same ideas are restated by men (Distelhorst 2005). Men interrupt women more than they interrupt other men, and interrupt more than women overall (West and Zimmerman 1983). When men and women contribute equally to a task, men tend to get more credit (Heilman and Haynes 2005). Men value male input over female input and assume that men are more competent than women (Martin 1996, Pierce, 1995, Williams 1995). Such dynamics can be demoralizing for women and could lead to decreased performance both for the group and for individual women working in these groups (Distelhorst 2005).

A parallel trend since the early 1980s has been the increased use of information technology in organizations, particularly e-mail and file sharing. Workgroups or teams can share information, make decisions, and produce output without ever meeting face to face. The trends of increased use of workgroups and increased use of technology have converged in virtual teams. Virtual teams are increasingly common in organizations, but they are still not as well understood as traditional face to face teams (Powell, Piccoli, and Ives 2004).

Virtual teams may be appropriate for trans-border projects, both within and between companies; travel is expensive and time-consuming, and flying in or out of the United States has become especially difficult since 9/11. In addition to convenience and economy, can virtual teams also provide gender equity? In an anonymous virtual team, where the sex of group members is unknown, might the negative effects on women be lessened or removed? Can women excel when their sex is masked? In this study we compare the performance of men and women in face-to-face workgroups and anonymous virtual teams, to determine the effect on women's satisfaction and performance when teammates are not aware of one another's gender.

## **LITERATURE REVIEW**

Women are stereotyped as less competent than men in mathematics and engineering (Bell, Spencer, Iserman, and Logel 2003) but more fluent in language (Hyde and Linn 1988). Recent studies call these assumptions into question. Sex differences in test performance

can be manipulated and even eliminated depending on how the test is described to test takers beforehand, and whether and how the test takers are reminded of their gender and other characteristics (Bell, Spencer, Iserman, and Logel 2003, Johns, Schmader, and Martens 2005, McGlone and Aronson 2006). While there is a gender gap in math achievement, it is closing quickly (Monastersky 2005). While in the United States girls surpass boys in reading achievement, German boys and girls do not differ in reading ability (S. E. de Pillis and Singer 1985) and even in the U.S. those differences are smaller than is commonly assumed (Bell, Spencer, Iserman, and Logel 2003).

Research has identified some differences in male and female communication styles. Men's communication tends to be more task-oriented while women's communication focuses on relationships and consensus building. Tannen (1990a) suggests that this may be the result of differences in socialization. She posits that men are socialized to communicate in a "one-up, one down" style in which the goal is to win the discussion. Women, on the other hand, are socialized to communicate in a "rapport-talk" style in which the purpose is to discuss and understand others' perspectives. Since women's communication goals focus on gaining trust and establishing relationships with others (Troemel-Ploetz 1991), they tend to be more considerate and responsible listeners (Rogers 1989). Men participate less in polite forms of speech (Rogers 1989) and express less interest in the contributions of conversational partners (Dovidio, Brown, Heltman, Ellyson, and Keating 1988). Men are more likely to use conversation as a method of gaining information and establishing status (Aries and Johnson 1983, Tannen 1990b). One way in which men assume dominance in relationships is through verbal interruption (Aries 1996) and men have been found to dominate mixed-gender conversations in public situations (Holmes 1995).

Women may also have a greater ability than men to send and receive nonverbal communication (Briton and Hall 1995, Burgoon and Dillman 1995). Women have been found to be more expressive and better at sending messages clearly using nonverbal cues (Briton and Hall 1995, Burgoon and Dillman 1995). They are also better than men at decoding, understanding, and using nonverbal cues that are sent by others (Briton and Hall 1995, Kette and Konecni 1995, LaFrance and Henley 1994). Tannen (1990a) found that even in computer mediated communication men traded information while women asked questions and sought consensus and understanding. Women's nonverbal

communication might be ineffective in a group if it is not understood or valued by male group members.

Women in a business context tend to be evaluated more harshly than men. Characteristics attributed to successful managers correlate closely with those attributed to male managers, while characteristics attributed to female managers align with neither (Brenner, Tomkiewicz, and Schein 1989, Deal and Stevenson 1998, Dodge, Gilroy, and Fenzel 1995, Heilman, Block, Simon, and Martell 1989, Schein 1973, Schein 2001, Schein, Mueller, and Jacobson 1989, Schein, Mueller, Lituchy, and Liu 1996). Subordinates, peers and superiors evaluate female managers more negatively relative to their male counterparts (Morrison and Stein 1985, Reed 1983, Tischler, Morrison, Greene, and Steward 1986). In one study, MBA students were willing to invest 300 percent more in a hypothetical firm run by a man than in a comparable firm run by a woman (Bigelow and McLean Parks 2006). These participants also evaluated the hypothetical female CEOs more negatively, and found them deserving of lower salaries, than male counterparts with identical resumes. This suggests that women can enjoy improved job outcomes when their sex is masked, and this has been the case. For example, "blind" auditions lead to increased hiring and advancement of women in symphony orchestras (Goldin and Rouse 2000).

Because virtual teams overall generally perform at a lower level than face-to-face teams (de Pillis and Furumo 2007), we do not expect women's performance to be higher in anonymous virtual teams. Instead we examine women's outcomes relative to men's outcomes in virtual and face-to-face teams.

*Hypothesis 1: The performance of women in anonymous virtual teams relative to their male counterparts will be significantly higher than the performance of women in face-to-face teams relative to their male counterparts.*

*Hypothesis 2: The satisfaction of women in anonymous virtual teams relative to their male counterparts will be significantly higher than the satisfaction of women in face-to-face teams relative to their male counterparts.*

## **METHODOLOGY**

### **Design**

We tested our hypotheses with a laboratory study. Participants were randomly assigned to 3-member virtual or face-to-face teams. They were given a week to complete a task. At the conclusion of the experiment, individual students were given two surveys to complete. One measured the individual's perceived trust in the team and the other measured the individual's satisfaction with the team's outcome and process. In addition, productivity was measured by individual grade as a percentage. These grades were based on the following three factors: accuracy and quality of the final report, timeliness of the report, and a confidential evaluation of their contribution by other members of the team.

### **Participants**

Participants in the study were upper level college students enrolled in a management course at a mid-sized university in the Midwestern United States. Thirty five women and fifty men were randomly assigned to anonymous virtual teams; 34 women and 53 men were randomly assigned to face-to-face teams. Most participants were U.S. citizens, from the state; only twelve were international students. Participants ranged in age from 19 to 50 with a mean age of 22 years. Many participants came from a nearby urban center that is largely African-American, while others hailed from affluent majority-White suburbs. The issue of race for many participants was an uncomfortable one, and quite a few participants indicated that they did not wish to provide information on race or ethnicity. We respected their desire and did not collect that information from the group.

### **Task**

The project, in which groups were assigned to weigh a variety of factors and correctly rank desirable locations for a new manufacturing plant, accounted for 25% of each student's final grade. This provided motivation for participants to take the task seriously and contribute their best effort.

### **Tools and Manipulation Checks**

Students assigned to virtual teams used WebCT, an instructional software package, to complete the team project. WebCT allows users to participate in email and discussion board facilities with assigned members of a team without divulging individual identities.

Prior to the start of the experiment all participating students, whether ultimately assigned to the virtual or face-to-face team, were trained on the WebCT software package. Students completed three assignments requiring them to use the various features of the software. This helped insure that variations among participants were not the result of unfamiliarity with the technology.

In reality, many virtual team members have some face-to-face contact. However in this study, individuals in the virtual teams never met face-to-face and were instructed not to reveal any personal information about themselves during the course of the project. On the day the project was assigned students were given a personalized printout, providing them with their team number and written instructions about how to complete the project. Students who were randomly assigned to the virtual teams were given the WebCT email addresses of their team members and instructed that they would receive a failing grade if they attempted to meet in person or communicate any personal information about themselves to the other team members. WebCT collects a stream of all communications that take place on-line and students were informed that the instructor would review the communication stream to insure that they did not violate the confidentiality guidelines. Review of the communication stream uncovered inappropriate communication in two teams and these individuals were eliminated from the study.

Students assigned to the face-to-face teams were given written project instructions, the names of their team members, and instructions to come to the next class session to meet their team members. Regular class sessions were cancelled for the duration of the project. To further reduce unmeasured variability, students were eliminated from the study if they had had a previous virtual team experience or if one or more of the team members dropped the class before the completion of the experiment.

### **Data collection**

To assess perceived trust levels, a scale developed by Jarvenpaa et al. (Jarvenpaa, Knoll, and Leidner 1998) was used. Their scale is based on previous instruments developed by Mayer, Davis, and Schoorman (1995) and Pearce, Sommer, Morris, and Frideger (1992) to measure the level of trust in dyads. Jarvenpaa et al. (1998) modified these instruments to reflect the team rather than a dyad by testing the two instruments at two different time points and across cultures. Both measures of trust were correlated but the Pearce et al. instrument had higher reliability ( $\alpha = .92$ ) and thus it was used as the basis of their

modified survey. After testing, Jarvenpaa et. al. (1998) reduced the 8-item scale to a 6-item instrument with a five-point Likert-type response scale anchored on one end with strongly agree and the other with strongly disagree. They reported a Cronbach's alpha of .92.

To measure individual satisfaction with the output and process of the team, a scale developed by Reinig (2003) was used. He developed and tested an instrument to measure satisfaction with group process and outcomes in the virtual and face-to-face team environments. His instrument consisted of five questions pertaining to satisfaction with the process and five pertaining to satisfaction with the decision. He reported Cronbach's alpha for the instrument at .79. To test our hypotheses, we performed ANOVAs. The independent variables were sex and team type, virtual or face-to-face. The dependent variables were process satisfaction, outcome satisfaction, and performance as measured by grade.

## **FINDINGS**

### **Instrument Validation**

Before utilizing the scale data, principal components factor analyses were completed to insure that items appropriately tested the intended constructs. Analysis of the trust construct showed that all six items had acceptable loadings ranging from .712 to .865. All items were retained and the reliability analysis of the scale yielded a Cronbach's alpha of .87. A composite measure of trust was identified for each participant by averaging scores on the six items in the survey. Since the instrument utilized a 5-point Likert-type response scale, average scores could range from 1 for no trust to 5 for total trust.

Analysis of the satisfaction construct yielded two distinct dimensions: outcome satisfaction and process satisfaction. The loadings for the first dimension ranged from .747 to .869 while the loadings for the second dimension ranged from .773 to .878. Two items related to outcome satisfaction were removed because of high cross-loadings. The overall reliability analysis yielded a Cronbach's alpha of .89. Composite measures for both dimensions of satisfaction were obtained by averaging the scores for each of the remaining items. Since the instrument utilized a 5-point Likert-type response scale, average scores could range from 1 for total dissatisfaction to 5 for total satisfaction.

## RESULTS

ANOVA results indicate that in virtual teams, sex is a significant predictor of both outcome satisfaction and performance (grade). Table 1 shows that in anonymous virtual teams, women had significantly better performance, earning an average grade of 81% compared to an average grade of 75% for men. Women also reported a significantly higher level of outcome satisfaction, which is understandable given their higher grades. Men and women did not differ significantly in process satisfaction.

**Table 1. In Anonymous Virtual Teams, Outcome Satisfaction and Performance are Significantly Lower in Men**

	Men	Women	Sig.
<b>Anonymous virtual teams</b>	n=50	n=35	
<b>Process satisfaction</b>	$\mu = 3.70 (.95)$	$\mu = 3.92 (.78)$	.262
<b>Outcome satisfaction</b>	$\mu = 3.73 (.93)$	$\mu = 4.14 (.74)$	.034
<b>Performance (out of 100)</b>	$\mu = 75.34 (11.93)$	$\mu = 81.45 (10.95)$	.018

**Table 2. In Face-to-Face Teams, Sex does not Significantly Predict Satisfaction or Performance**

	Men	Women	Sig.
<b>Face-to-face teams</b>	n=53	n=34	
<b>Process satisfaction</b>	$\mu = 4.19 (.78)$	$\mu = 4.26 (.76)$	.687
<b>Outcome satisfaction</b>	$\mu = 4.35 (.64)$	$\mu = 4.12 (.88)$	.152
<b>Performance (out of 100)</b>	$\mu = 81.54 (10.45)$	$\mu = 82.18 (9.35)$	.776

**Table 3. The Extent to which being in a Virtual or Face-to-Face Team affected Outcomes for Women**

	Virtual	Face-to-face	Sig.
<b>Outcomes for women in virtual and face-to-face teams</b>	n=35	n=34	
<b>Process satisfaction</b>	$\mu = 3.92 (.78)$	$\mu = 4.26 (.76)$	.074
<b>Outcome satisfaction</b>	$\mu = 4.14 (.74)$	$\mu = 4.12 (.88)$	.898
<b>Performance (out of 100)</b>	$\mu = 81.45 (10.95)$	$\mu = 82.18 (9.35)$	.770

\* Women reported no significant difference in satisfaction or performance.

**Table 4. The Extent to which being in a Virtual or Face-to-Face Team affected Outcomes for Men**

	Virtual	Face-to-face	Sig.
<b>Outcomes for men in virtual and face-to-face teams</b>	n=50	n=53	
<b>Process satisfaction</b>	$\mu = 3.70 (.95)$	$\mu = 4.19 (.78)$	.005
<b>Outcome satisfaction</b>	$\mu = 3.73 (.93)$	$\mu = 4.35 (.64)$	.000
<b>Performance (out of 100)</b>	$\mu = 75.34 (11.93)$	$\mu = 81.54 (10.45)$	.006

\* For men, working in a face-to-face team significantly improves all outcomes.

Women significantly outperformed men in virtual teams, but not in face-to-face teams. In addition, there was no significant difference in women's performance (grade) between virtual and face-to-face teams, while men performed significantly better in face-to-face teams than in virtual teams. This was true for both all-female and mixed-sex face-to-face teams; there were no significant differences between the all-female and mixed-sex face-to-face teams. The female advantage evident in anonymous virtual teams shrank to insignificance in face-to-face teams. These findings confirm hypothesis 1. The performance of women relative to men was higher in anonymous virtual teams than in face-to-face teams.

Women indicated significantly higher outcome satisfaction than men in virtual teams, but their level of satisfaction in face-to-face teams was not significantly different from that of their male counterparts. While men experienced significantly higher process and outcome satisfaction in face-to-face teams than they did in anonymous virtual teams, women did not, either in all-female or mixed-sex face-to-face teams. These findings confirm hypothesis 2. The satisfaction of women relative to men was higher in anonymous virtual teams than in face-to-face teams.

## DISCUSSION

While technology and cost considerations are enabling the increasing use of virtual teams, the human interaction of face-to-face teams makes them superior in many ways. Communication in virtual teams may be more difficult because of the lack of media richness (Watson-Manheim and Belanger 2002). Media richness theory (Daft and Lengel 1986) suggests that different forms of media, such as face-to-face communications or electronic communications, offer the user different levels of nonverbal cueing. Use of

leaner media, in which nonverbal communication cues are limited, restricts the extent to which communicators can use facial expressions and gestures to get their message across. Richer media, which enables the use of nonverbal cues, allows users to communicate and develop trust more quickly and has been found to improve understanding of ambiguous messages.

For women, however, the anonymity of virtual teams may provide an advantage relative to face-to-face teams by masking their gender. In the workplace, women are evaluated more harshly than men (Morrison and Stein 1985, Reed 1983, Tischler, Morrison, Greene, and Steward 1986). Both femaleness and femininity perceived as inconsistent with a professional or managerial image (Deaux and Kite 1987, Eagly and Wood 1982) and being female is associated with low status (Mainiero 1986, Sagrestano 1992). In groups, men interrupt women (West and Zimmerman 1983), dominate discussions (Holmes 1995), ignore women's ideas until those same ideas are restated by men (Distelhorst 2005), get more credit for the same work (Heilman and Haynes 2005), value male input over female input, and assume that men are more competent than women (Martin 1996, Pierce 1995, Williams 1995). For women, the advantages of face-to-face interaction are likely outweighed by these dynamics. It is not surprising, therefore, to observe that while men seem to flourish in face-to-face teams relative to their performance in virtual teams, women do not experience a performance or satisfaction advantage from working in face-to-face teams.

## CONCLUSIONS

Virtual teams offer potential savings in time, cost and energy, but these potential benefits can be obviated by lower performance and satisfaction. In our study, however, women on average were not significantly disadvantaged by being assigned to a virtual team, while men were. Our results support the conclusion that while face to face teams are generally superior to virtual teams, the climate for women in workgroups may contain enough negative elements that for women the anonymity of the virtual teams counterbalanced any disadvantages.

There may an alternative explanation for the female advantage - or, more precisely, male disadvantage - in the anonymous virtual condition. It may be that the women in our study possess a greater measure of certain skills required for effective virtual work. This may be related to having selected themselves into management studies. Future research in

this area may enable us to describe and measure the skills that are necessary for effective and rewarding participation in virtual teams. If these skills can be systematized and taught, the potential cost, energy and time savings of remote worldwide collaboration will come closer to being fully realized.

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