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Leadership and Gender: An Experiment

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Abstract:

We present an information based model of leadership in a setting that exhibits the familiar problems of free riding and coordination failure. Leaders have superior information about the value of the project in hand and can send a costly signal to their uninformed followers to persuade them to cooperate in the project. Followers voluntarily choose whether or not to follow the better informed leader. We provide experimental evidence that, when the leaders' gender is revealed to their followers, female subjects hesitate to lead (send a costly signal) while followers' behavior does not indicate any gender discrimination. Such behavior is not observed among the male leaders.

Keywords: Leadership, Information, Gender, Free Riding, Coordination Problem.

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Introduction

There is considerable experimental evidence indicating that the behavior of men and women differs in a variety of issues such as risk aversion (e.g. Byrness, Miller, and Schafer, 1999), altruism (e.g. Andreoni and Vesterlund, 2001), and competition (e.g. Gneezy, Niederle, and Rusticchini, 2003). Our experimental study contributes to this literature by focusing on leadership.

Today women are capable and active in the society but have failed to attain leadership positions consistent with their representation. While discrimination maybe one explanation of this shortfall, it does not explain it all. If women believe that they are less likely to be followed than men, they may refuse to accept leadership roles that are often costly for the leaders.

We present a single-shot, collective action game in which free riding and coordination failures can prevent group cooperation. In our setting, leaders, informed about the value of the project in hand, have the incentive to persuade group cooperation by sending a costly signal to their followers indicating that cooperation is worthwhile. We observe no gender discrimination by the followers but find evidence that female subjects are significantly more eager to lead in anonymous environments, where their gender is **not known** to their followers, than they are in environments where their gender is known to their followers. Such a pattern is not observed among the male subjects.

Experiment

The experimental design is based on a theoretical model by Komai and Stegeman (2006) and Komai, et al (2007). An experimental session consists of 5 groups of 3 playing ten rounds of a single-shot, collective action game. Subjects begin each round with $10 endowments and

decide whether or not to invest their endowments in a group project. In each round three possible payoff scenarios are assigned to each group with equal probability (Table 1).

Table 1

	Scenario 1		Scenario 2		Scenario 3	
	Investors (each)	Non-investors (Each)	Investors (each)	Non-investors (Each)	Investors (each)	Non- investors (Each)
All invest	20	_	13	_	0	_
2 invest	13	17	9	15	0	8
1 invests	7	14	5	12	0	9
Nobody Invests	-	10	-	10	-	10

Scenarios vary across groups and change each round. In Scenarios 1 and 2, well-being is maximized if all players fully cooperate. Participation in Scenario 3 is bad for the group and individual group members. No player is willing to participate by himself in any scenario. There are increasing returns to participation in Scenarios 1 and 2. In Scenario 2 free riding is strictly dominant. In Scenario 1 players prefer to participate if they believe that the other two group members will participate. In Scenario 2, strict dominance of the free riding strategy, and in Scenario 1, failure of coordination can prevent efficient group cooperation.[1]

Each group has a leader who is aware of the assigned scenario. The others two members of the group (the followers) know only the possible scenarios and their likelihood. The leader moves first, deciding whether or not to invest. Followers observe their leader's decision before they simultaneously and separately make theirs. The leader has the incentive to invest in Scenarios 1 and 2 (to send a positive signal to his followers) and followers have the incentive to

[1] Under complete information.

follow the leader because the leader has more information about what they should do than they themselves have.[2]

We use a random rematching design: group composition and the leader-follower roles change each round. This rematching procedure was introduced by Andreoni (1988) in public good experiments to balance the desire to test a single-shot prediction with the need for repeated experience by the subjects.

What activities can represent our game? One example (Franzen 1995) is signing a petition or donating money for some common good. Both activities are costly. A typical person has no incentive to participate alone. More participation helps the cause. Potential participants have the incentive to free ride.[3] The game is a single-shot game because players may not get exposed to the same project or may not be with the same people again. Our model is also appropriate for taskforces (temporary units, or ad hoc committees established to work on a single-shot collective activity).

Subjects' earnings are privately announced after each round using identification numbers. Subjects are told that only one, randomly chosen round determines their final earnings and thus they should always make their best decision.

Two treatments were designed:

- Gender Signaling Treatment (GST): Leaders' gender is revealed to their followers (followers' decision sheets indicate whether the leader was male or female).[4]

[2] A precise characterization of the equilibrium is available upon request.
[3] However, if the project is highly valued (Scenario 1) and if a large number of players participate, participating may become more appealing than not because participants may not only gain from the success of the project but also may enjoy a positive political status or a sense of pride for being a participant.
[4] In the real world, potential followers are aware of their leaders' gender: in some contexts (like in politics) the gender of female leaders is explicitly talked about. To start, we choose the extreme manipulation of directly revealing the leader's gender rather than the more subtle manipulation of using he or she terminology. If we were unable to find a difference in behavior using our manipulation, differences are unlikely to be observed under more subtle manipulations.

- Gender Anonymous Treatment (GAT): followers are unaware of their leader's gender.

Our null hypothesis is that the same pattern of behavior should be observed in both treatments since the leaders' gender is irrelevant to their information signaling role.

Four sessions of each treatment were conducted. In each session we attempted to have 8 subjects of one sex and seven of the other, or as close to this split as possible.[5] Subjects are recruited by e-mail and posters. Instructions are read aloud and subjects are tested to make sure they understand them.[6] Decisions were anonymous; subjects were identified by random 5-digit identification numbers. Sessions lasted about 70 minutes. Average earning was $12.10 in the GST and $12.29 in the GAT (no showup fee). Subjects' socioeconomic characteristics did not differ significantly across treatments.

Results and Discussion

To analyze followers' behavior, we combined all three scenarios.[7] A total of 400 decisions were made by followers in each treatment. We conducted random effect Probit regressions estimating followers' probability of investment in both the GAT and the GST (see Table 2). We found a positive and significant correlation between followers' investment decisions and their leader's decision to invest in both treatments, but no significant relationship between the followers' decisions, their own gender, or their leader's gender.[8]

[5] No session had more than 9 of one sex.
[6] In a post-experiment survey subjects were asked about how clear the instructions were (1= unclear … 5 = very clear); 60% responded 5 and the rest 4.
[7] Because followers are uninformed about the assigned scenario (the only source of information for the followers is the decision made by their leader).
[8] The following variables were jointly insignificant: subjects' major, GPA, and clarity of the instructions.

Followers might have ignored the leaders' gender thinking that gender is irrelevant to the leaders' signal or might have acted out of political correctness thinking this is what is expected of them. We cannot completely dismiss the latter, but are inclined to discount it because decisions are anonymous and financially motivated (non-self-serving decisions are costly).

Table 2: Random Effects Probit Results-Followers' Decision to Invest

Coefficient
(t-stat)
Marginal value

Variable	GAT	GST
Constant	-1.178* (5.09)	-1.215* (3.78)
Leader Invested	1.900* (11.99) *0.736*	1.856* (5.51) *0.671*
Female Leader		-0.070 (0.26) *-0.026*
Female Follower	0.101 (0.42) *0.039*	-0.368 (0.10) *-0.013*
Leader Invested × Female Leader ×Female Follower		0.408 (0.83) *0.147*
Leader Invested × Female Leader × Male Follower		0.212 (0.51) *0.077*
Leader Invested × Male Leader × Female Follower		0.006 (0.01) *0.002*
Round	-0.029 (0.99) *-0.011*	-0.039 (1.28) *-0.014*
Rho	0.244* (2.49)	0.210* (1.98)
L.L.F.	-181.5	-173.9

To analyze leaders' behavior we consider each scenario separately.[9] Leaders made 133 decisions in Scenario 3 (both treatments combined) and, except for 1 leader, nobody invested. In Scenario 1, leaders made a total of 127 decisions. In every instance but 8, leaders invested regardless of their gender or the treatment.

[9] Because leaders are aware of the assigned scenario.

The interesting scenario is Scenario 2 in which leaders made 140 decisions (both treatments combined).[10] A preliminary data analysis suggested that while the male leaders' investment decision was not affected by the treatment, female leaders invested significantly less in the GST than they did in the GAT. We conducted Probit regressions estimating leaders' probability of investment in scenario 2 (see Table 3).[11]

The regression results show that the GST has a negative and significant effect on the investment decision of female leaders: when the leaders' gender is known, female leaders hesitate to lead (send a costly signal). Male leaders follow the same behavioral pattern regardless of the treatment and the pattern is insignificantly different from that of female leaders in the GAT.[12]

Table 3: Probit Results: Leaders' Decision to Invest

Variable	Coefficient (t-stat) Marginal value
Constant	0.755* (5.49)
Female×GST	-0.710* (2.02) -0.281
Male×GST	-.0267 (0.77) -0.105
Male×GAT	-.0322 (0.95) -0.128
Round	-0.035 (0.86) -0.014
L.L.F	-93.8

[10] Out of 140 decisions, 82 were made by male leaders (43 in the GST and 39 in the GAT), and 58 by females (36 in the GST and 22 in the GAT). The difference in the number of decisions made by men and women reflects the slightly greater number of male subjects and the random assignments which were determined prior to the experiment by ID number. The ID numbers were randomly allocated to subjects.

[11] The model was originally estimated with random effects. Estimated rho was either less than 0.001 or insignificant. Probit results are reported.

[12] Footnote 7 applies.

Our interpretation is that female leaders expect less cooperation from their followers in the GST, where their gender is revealed, than they do in the GAT, where their gender remains unknown. Female leaders, therefore, become less eager to send a costly signal in the GST, in Scenario 2, where followers' refusal to follow significantly jeopardizes their payoff. This behavior is not observed in Scenario 1, where followers' refusal to follow the leader does not harm her as much as it does in Scenario 2. In Scenario 2 (Scenario 1), the investing leader loses $1 (earns $3) if 1 follower refuses to invest and loses $5 (loses $3) if they both do.

Our results seem similar to the "Stereotype Threat" in psychology (Steel, 1997). The theme of this literature is that individuals who are targets of negative ability stereotypes (females, African Americans, Latinos, etc) are at risk of doing poorly on tests of ability for reasons such as self-doubt (the literature is mostly focused on verbal, mathematical, and analytical tests, while our study focuses on leadership).

The significant difference in the behavior of our female leaders could also be a reaction to similar social devaluations. In our case, however, the reaction of female leaders may be affected more by their pessimism about the reaction of their followers rather than self-doubt.

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