Leadership and Gender in Groups: An Experiment*

Philip J. Grossman, Mana Komai and James E. Jensen

Abstract
We conduct a laboratory experiment with salient incentives, a technique used by economists to study gender differences in leadership. We strip the concept of leadership down to its most basic elements. Questions of style and evaluations of a leader based on style of leadership adopted are made irrelevant. Our leader is an average player who is distinguished merely by occupying the leadership position; his/her legitimacy is derived from superior information about the value of the project in hand. Legitimacy is conferred on the leader from the special information possessed. Followers voluntarily choose whether or not to follow the better informed leader. The effectiveness of the leader is reduced to two simple factors: is the leader willing or not to voluntarily place herself in a vulnerable position to achieve an outcome beneficial to both the leader and her followers and do followers trust their leaders to make the right choice? We provide experimental evidence that, when the leaders’ gender is revealed to their followers in mixed groups, female leaders 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

Women today are reaching the higher echelons of business and politics but have failed to attain leadership positions consistent with their representation in the labor force. The Women’s Learning Partnership reports that only 13 countries, out of over 180 countries, have elected a female head of state, women comprise only 39% of salaried workers, and in the United States women represent only 7.9% of Fortune 500 top earners and only 1.4% of Fortune 500 CEOs (http://www.learningpartnership.org/resources/facts/leadership). Attitudes regarding female leaders may be changing; Tahmicioglu (2007) notes that in a poll conducted by Elle and MSNBC.com, 54% of the 60,000 respondents said a leader’s gender made no difference. However, of those who said gender mattered, most had a preference for men. Tellingly, 75% of the women who expressed a preference said they preferred to work for a man rather than a woman. Male leaders were preferred over female leaders by more than 2-1.

While discrimination may be one explanation for this shortfall, it may not explain it all. On one hand, even though they may have the ability to lead, women may be less inclined to voluntarily take on the role of leader in some circumstances. In many situations, to lead the leader must adopt a risky plan of action, placing her in a vulnerable position. If the followers follow, the outcome can be mutually beneficial; however, if the followers fail to follow, the leader bears the cost of failure. If women are less willing to expose themselves to such risks then they will shun leadership roles more frequently than men.

This paper contributes both to the research on gender differences and the literature on leadership by addressing the role of gender in the behavior of leaders and followers in collective actions. It offers some insight into how the gender combination of groups and organizations and
the emphasis on gender in them may help explain why women are not well represented in leadership roles.

Leadership and gender has been much studied by management scholars and psychologists. Leadership style differences (Eagly and Johnson, 1990; Eagly and Johannesen-Schmidt 2001, van Engen et al. 2001; Coleman, 2003; and Mandell and Pherwani, 2003), the evaluation of leaders (Eagly et al. 1992; Rudman, 1998; Boldry et al. 2001; Ridgeway, 2001; and Rudman and Glick, 2001), and leaders’ effectiveness (Rice et al. 1980; Adams et al. 1984; Van Velsor et al. 1993; Eagly et al. 1995; Thompson, 2000; Ridgeway, 2001; and Douglas and Ammeter, 2004) are aspects of leadership that have been examined for gender differences.

Economists, however, have made relatively few contributions to this literature. The focus of economists has been more towards gender differences in competitiveness (Gneezy et al. 2003; Gneezy and Rustichini, 2004; Gupta et al. 2005; and Niederle and Vesterlund, 2006); risk attitudes (Schuber et al. 2000; Eckel and Grossman, 2002; Gysler et al. 2002; Fehr-Duda et al. 2006; and Croson and Gneezy, 2009); cooperativeness (Brown-Kruse and Hummels, 1993; Nowell and Tinker, 1994; Ortmann and Tichy, 1996; Croson and Buchan, 1999; Cox, 2002; and Chaudhuri and Gangadharan, 2003), and altruism and concern for others (Bolton and Katok, 1995; Eckel and Grossman, 1998, 2001, 2003; Andreoni and Vesterlund, 2001; Solnick, 2001; List, 2004; Cox and Deck, 2006; Eckel et al. 2007; Fong, 2007; Carpenter et al. 2008b; Crumpler and Grossman, 2008; and Croson and Gneezy, 2009).

Most economic models of leadership ignore leaders’ and followers’ personal and socioeconomic characteristics including gender. In economics leaders are mainly average players who are distinguished merely by occupying the leadership position, their legitimacy derived from superior information about the value of the project in hand (Hermalin, 1998;
Leaders can improve cooperation by making a costly commitment (their own participation) persuading their followers to participate in a project. Followers can choose, voluntarily, to follow the leader. One exception is Rotemberg and Saloner (1993), who compare the effectiveness of selfish and empathetic managers in different situations.

We apply a technique (laboratory experiment with salient incentives) common to economics for studying gender differences in other types of behavior to the question of leadership. We strip the concept of leadership down to its most basic elements. Questions of style and evaluations of a leader based on style of leadership adopted are made irrelevant. The effectiveness of the leader is reduced to two simple factors: 1) is the leader willing or not to voluntarily place herself in a vulnerable position to achieve an outcome beneficial to both the leader and her followers, and 2) do followers trust their leaders to make the right choice?

Subjects play a leader-follower, collective action game in which free riding and coordination failures can prevent efficient group cooperation. Free riding failures occur when individual interest and group interest conflict and the individual acts in his/her own interest. Coordination failures arise when, even though each individual in the group has an interest in choosing the same course of action, no one is sure that every other person will make the same choice.

Leaders are informed about the value of the project in hand, but followers are not. The leaders decide first whether they want to make a costly contribution to the project. Followers then make their decisions simultaneously after observing the decision of their leaders. Leaders

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have an incentive to persuade group cooperation by sending a costly signal to their followers indicating that cooperation is worthwhile when the project indeed is. Followers have an incentive to follow their leaders because the leaders are more informed than they are.

Legitimacy is conferred on the leader from the special information possessed (Ridgeway et al. 1994; Hermalin, 1998). The information contained in the leader’s signal and the strength of the signal is the same regardless of the gender of the leader. As such, there should be no gender related differences with respect to the probability that a leader chooses to send the signal and to the probability that a follower will mimic his leader’s action. If female leaders are, relative to male leaders, less willing to send the signal this reflects either a greater unwillingness of females to take the risk for fear of being played for a “sucker” (i.e. being exploited by their followers, see Ingram and Berger, 1977), or female leaders believe their followers will not follower them because the followers do not think she is able to discern what is the correct course of action. The latter may reflect the assumption that followers’ referential beliefs about leaders undermine the legitimacy of female leaders.

The game is played by student subjects in different environments with varying gender combinations and different emphasis on gender. We consider two single gender treatments in which all leaders and followers are either male or female. We also consider two mixed gender treatments, one with no emphasis on the gender of the leaders and one with explicit emphasis on the leaders’ gender.

We find evidence of gender differences in leaders’ behavior. In situations where the failure of the followers to follow the leader’s lead is costly for the leader, female leaders are more likely to lead (invest) in the mixed gender treatment with no gender emphasis than they are in the single gender and the mixed gender with gender emphasis treatments. This pattern is not
observed for the male leaders. We also find that followers do not react differently to signals sent by female and male leaders.

The paper is organized as follows. Section 2 reviews the literature. Section 3 describes the experiment. Section 4 presents our empirical results. Section 5 concludes.

Literature review

Since our paper contributes to the leadership literature in collective actions, it is appropriate to survey this literature. A seminal paper by Hermalin (1998) suggests that followers voluntarily follow a leader because followers believe that the leader has better information about what they should do than they themselves have. Hermalin considers a team leader who has private information about the return to the projects, and whose payoffs increase in his followers’ efforts. He suggests that the leader can induce a following by “leading by example” meaning that the leader, to convince his followers that the project is worthwhile, increases observable effort when the return is high. In Hermalin’s model the leader's effort fully reveals his information, but the leader-follower equilibrium produces more efficient outcomes than does the equilibrium under full information, mainly because it improves the leader's incentive to work.

Vesterlund (2003) applies Hermalin's idea to a model of charitable contributions, but in her model the leader chooses whether to acquire information before deciding whether to contribute and a fundraiser chooses whether or not to announce the leader's contribution. Following the same theme Potters et al. (2005) show experimentally that leaders lead by improving the information available to their followers. Andreoni (2006) builds on Vesterlund's (2003) model by endogenizing the selection of the leader. Vesterlund's and Andreoni’s leaders, like Hermalin's, fully reveal their information.
In a theoretical setting, Komai et al. (2007, henceforth KSH), study a team production problem (with linear payoff functions) in which the leader leads by example but the leader's information (about the project’s return) is only partially revealed to his ignorant followers. They show that by preventing full revelation of the state, the followers are induced to work harder than they would were the leader's action to reveal the state fully. In KSH, players’ payoff functions are linear. The linear payoff function produces no coordination problem and indeed no strategic interaction among the followers, in the sense that, a player’s optimal action does not depend directly upon any other player’s action. Potters et al. (2007-henceforth PSV) design a two player linear public good experiment, in the style of KSH, and provide experimental evidence consistent with their theoretical results. Using nonlinear payoffs in a theoretical article, Komai and Stegeman (2010, henceforth KS) introduce network externalities and a major coordination issue. With a nonlinear payoff function, unlike a linear payoff function, the optimal action of one player depends directly on the optimal action of the other players. KS then show that concentrating information in the hands of a leader and lack of information transparency solves, simultaneously, both the free rider problem and the coordination problem.

Komai et al. (2011, hereafter KGD) design a three player collective action game with KS’s non-linear payoff structure and experimentally confirmed that, in circumstances where the dominant strategy of the followers under complete information is to free ride, concentrating information in the hands of a leader and lack of information transparency improves cooperation. This result is consistent with the theoretical result of KSH and KS, and the experimental result of PSV. In PSV, each leader is followed by only one follower. In KGD, each leader is followed by two followers. Although KGD provide results consistent with PSV, they do it in a less trivial environment (the number of followers and the interaction between them are not trivial issues -
see KS, and Komai and Grossman, 2009). KGD’s results, however, suggest that coordination problems may be reduced more effectively when the leader’s information is fully transparent to his followers.

If the optimal group outcome is to be achieved, our game requires a leader to voluntarily place him/herself in a vulnerable position. The leader is faced with the decision whether to risk a guaranteed payoff and trust that his followers will reward him with higher payoff. This act places the leader at risk but not just financial risk but also the social risk of being betrayed by one or more of his/her followers. Evidence suggests that people respond differently to non-social, natural risks, than to social risk, in particular the risk of being betrayed by another person (see for example, Bohnet and Zeckhauser, 2004; Bohnet et al. 2008; and Aimone and Houser, 2010).

The experiment design does not allow for differences in leadership style (leaders either invest or not) and there is nothing about the leadership role that makes it a stereotypical male or female task. Gender is only relevant if followers perceive a gender differ in effectiveness or a difference in leader legitimacy based on gender. For these reasons, we focus our review of the gender leadership literature on studies examining gender differences in effectiveness and legitimacy.

There is considerable evidence that female leaders are rated less effective than male leaders. Experiments by Rice et al. (1980) with West Point cadets find that all male groups with female leaders are rated as less effective on the tasks than groups with male leaders. They also report that male followers with traditional attitudes towards women have strongly negative perceptions of female leaders. Adams et al. (1984) replicate the Rice et al. study with two differences. First, Adams et al. include female followers; second, the study takes place in a field
setting (i.e. during basic training and field training exercises). Leaders are evaluated on their leadership skills. Adams et al. find no evidence to support their hypothesis that followers with more traditional attitudes towards women in the military would respond more favorably to male than female leaders. Smith et al. (1998) compared job satisfaction of male and female employees in small male-owned and female-owned businesses. They find that female (male) employees report having significantly higher job satisfaction in female-owned (male-owned) than in male-owned (female-owned) businesses.

Meta-analysis by Eagly et al. (1995) suggests that, with some caveats, male and female leaders are perceived as equally effective. In more male-oriented settings, women were perceived as less effective than their male counterparts; in more female-oriented settings, men were perceived as less effective than their female counterparts. They concluded that: “…gender role expectations spill over into leadership roles … and produce important consequences for the effectiveness of leaders (1995, p. 140).” Thompson (2000) reports no differences in the followers’ perceived effectiveness of male and female leaders in educational organizations. To measure perceptions of effectiveness across eight leadership dimensions, Thompson administered the Competing Values leadership Instrument (Quinn, 1988). He finds no significant difference between the genders for all eight dimensions. In an exception to the findings of the other studies discuss, Douglas and Ammeter (2004) report that staff in an educational organization rated their female leaders as significantly more effective than their male leaders.

Ridgeway et al. (1994) and Ridgeway (2001) argue that followers may not, based on gender stereotypes, see women as legitimate leaders. The role of leader is a high status position. Women are generally afforded lower status than men in society. A low-status female in the
high-status role of leader may not be viewed by her followers as a legitimate leader. Consequently, the followers are likely to ignore, dismiss, or treat as suspect any signal or action of the female leader.

The Game

We adopt KGD’s three player collective action game and their leader-follower setting, which itself is adopted from KS. We address whether or not the behavior of leaders and followers and the overall performance of a group is affected by the gender of the individual group members, the gender combination of the group, and the emphasis on gender in the treatment.

Consider the following single-shot game with a group of three identical players. Each player $i$ has an endowment of $10 and must decide whether or not to participate (invest his endowment) in a joint investment project. Each player chooses an action $a_i \in A = \{N, P\}$, where $N$ denotes non-participation and $P$ denotes participation in the project. Three random payoff scenarios are equally likely to happen: Scenario 1 which is the high payoff scenario, Scenario 2 which is the average payoff scenario, and Scenario 3 which is the low payoff scenario. The payoff scenarios are shown in Table 1. The payoff structure itself is adapted from the more complicated model by KS. Their theoretical results apply here. The table is organized by columns indicating scenario and investment decisions, rows reflecting the possible actions across three group members, and cells indicating individual player payouts. For example, if a group is assigned to Scenario 2, there are six possible payout options that depend on both individual and collective investment decisions. If all three group members choose to invest, all three members receive $13 (final earnings). If two of the three members invest and one chooses not to invest (free-ride), the two who invest each receive $9 and the one free-rider receives $15. If only one
group member invests, that individual receives $5 while the two free-riders receive $12 and if no one in the group invests, all three group members keep their $10 endowments. The efficient outcomes are all invest in Scenarios 1 and 2, and no one invests in Scenario 3.

The payoff structure presented in Table 1 has two important features. First, nobody is willing to participate alone but there are increasing returns to participation in the sense that any player i’s gain from participation is an increasing function of other’s participation. This network effect can cause inefficiency through coordination failure. Second, in Scenarios 1 and 2 non-participants benefit from others’ participation. This tends to cause inefficiency through shirking.

To show what actions can represent our game, we use an example from Franzen (1995). Consider activities such as 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. Political participants have the incentive to free ride. 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. For more examples see Komai and Stegeman (2010).

Suppose that all players observe the realized payoff scenario. Then, in Scenarios 2 and 3, the dominant strategy is not to participate in the project regardless of the action taken by the other players. Scenario 1 represents the coordination problem. A player’s optimal strategy depends on the actions of the other two players; if both invest then it is best to also invest but if neither or only one invests then it is better to not invest. In Scenario 2, free riding is the dominant strategy.

Consider the following leader-follower setting. One member of the group (the leader) observes the scenario and decides whether or not to participate (invest). The other two group members (the followers) observe only the leader’s decision (not the specific scenario) and then
decide simultaneously, but separately, whether or not to participate. Followers do know the possible scenarios and their likelihood.

In this leader-follower setting, the leader’s (pure) strategy has the form $S_l: \{\text{Scenario 1, Scenario 2, Scenario 3}\} \rightarrow \{P, N\}$. Each follower’s (pure) strategy, however, takes the form $S_f: \{P, N\} \rightarrow \{P, N\}$ given that a follower only observes the leader’s action but is unable to observe the scenario. This means that each follower has four possible strategies PP, NN, M, and R, where PP means that the follower always participates no matter what the leader does, NN means that the follower never participates regardless of the leader’s action, M means that the follower mimics the leader’s action, and R means that the follower rejects the leader’s action.

The theoretical analysis is similar to KS and KGD and is as follows. There are two (pure strategy) Bayesian Nash equilibria in this game. One is a trivial no participation equilibrium in which no one ever participates. Alternatively, there exists a full participation equilibrium in which the leader chooses to participate in Scenarios 1 and 2 (and not in Scenario 3) and both followers choose M (mimic the leader). No follower will choose strategy PP because it yields a negative expected payoff. A leader does not find it optimal to always participate because every follower will respond by choosing R or NN implying that every follower will choose not to participate. If the leader chooses to always participate then followers will not choose M. Because M is equivalent to PP and yields a negative expected payoff. If the leader chooses to never participate then the equilibrium is the no participation equilibrium because every follower will respond by choosing M or NN implying that every follower will choose not to participate. If the leader chooses to never participate then followers will not choose R. Because R is equivalent to PP and yields a negative expected payoff. Both followers choose the same strategy in equilibrium; it is sufficient to say that if one follower chooses not to participate,
participating has a negative expected gain for the other follower regardless of the leader’s action. That strategy cannot be R; if followers both choose R then the leader would never want to participate. If followers both choose NN then the leader never participates and the equilibrium is the no participation equilibrium. The only remaining possibility is for both followers to play M or to mimic the leader. If both followers play M, then the unique optimal strategy for the leader is to participate in Scenarios 1 and 2 and not to participate in Scenario 3 yielding the highest expected payoff for the leader. If the leader participates in Scenarios 1 and 2 and not in Scenario 3, and one follower plays M, then M is optimal the other follower yielding the highest expected payoff for the follower. There also exists a mixed strategy equilibrium in which the leader participates in the project in both Scenarios 1 and 2 and each follower chooses to participate with probability $\gamma = \frac{4}{5}$ and not to participate with probability $1 - \gamma = \frac{1}{5}$. If the leader decides not to participate, then followers will not find it optimal to participate. If the leader participates in the project, then followers will infer that they are not in Scenario 3 because the leader does not have an incentive to invest in Scenario 3. Thus, followers can be in either of the other two scenarios (Scenarios 1 and 2) with probability $\frac{1}{2}$. If (in our symmetric structure) each follower $f$ chooses to participate with probability $\gamma$ and not to participate with probability $1 - \gamma$, then each follower $f$’s expected payoff from participating is equal to $16.5\gamma + 11(1 - \gamma)$ and each follower $f$’s expected payoff from not participating is equal to $16\gamma + 13(1 - \gamma)$. Clearly, $\gamma$ is the solution to $16.5\gamma + 11(1 - \gamma) = 16\gamma + 13(1 - \gamma)$.

**The Experiment**

The leader-follower game explained in the previous section is played by student subjects under the following four treatments:
Gender Signaling Treatment (GS): sessions are conducted with a subject pool comprised of both male and female subjects. In this treatment, in addition to the leader’s investment decision, followers receive information about the gender of their leaders.

No Gender Signaling Treatment (NGS): sessions are conducted with a subject pool comprised of both male and female subjects. In this treatment, followers are informed of the decisions made by their leader but not his or her gender.

All Male Treatment (AM): in this treatment sessions are conducted with an all-male subject pool.

All Female Treatment (AF): in this treatment sessions are conducted with an all-female subject pool.

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. We choose the extreme manipulation of directly revealing the leader’s gender rather than the more subtle manipulation of using he/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.

We consider the AM and AF treatments to be single gender variations of the GS treatment with gender signaled implicitly by the make-up of the group rather than signaled explicitly on the experiment forms. The email sent to recruit subjects for all female (male) sessions explicitly asked for female (male) subjects.

Four sessions of the treatments AF and AM, and five sessions of the treatments GS and NGS were conducted. In the mixed gender sessions we attempted to have eight subjects of one sex and seven of the other, or as close to this split as possible. The five GS sessions were comprised of two with seven males, two with eight males, and one with nine males; the five
NGS sessions were comprised of two with seven males, one with eight males, and two with nine males.

The sessions were conducted with paper and pencil. We recruited (by e-mail and posters) 15 subjects for each session. The email list was comprised of persons who had expressed an interest in participating by e-mailing a sign-up e-mail address after being informed of the opportunity in large lecture classes. Posters were placed around campus and in dormitories. A total of 270 subjects participated in a total of 18 sessions. No subject participated in more than one session. There was no show-up fee. Subjects were seated separately in three rows of five in a common room. Each subject was identified by a randomly assigned five-digit code number. Subjects were instructed not to communicate with one another.

After signing the consent form, subjects received instructions, which were read aloud by the experimenter (see the Appendix for copies of the instructions and other forms). Subjects completed practice questions to catch any misunderstanding prior to subjects playing the game. After subjects completed the practice questions, a proctor went to each subject and checked his answers. If any question was answered incorrectly, the proctor explained the mistake and explained the correct answer until the proctor was satisfied that the subject understood how his earnings would be determined.

Each session consisted of ten rounds. For each round a subject was randomly grouped with two other subjects. Subjects were re-matched after each round and leader/follower roles in each session varied from round to round. A group's investment scenario was randomly determined at the beginning of each and every round. The scenario was the same for all group members but was different across groups. At the end of each round each subject's individual earnings was calculated and posted by id number. We did not explicitly inform the subjects about
the decision of the other group members (of course followers knew what their leader did), but subjects could determine the decision of their other group members once they were informed about their own individual earnings.

Identities remained anonymous throughout the experiment: nobody knew who they were, or would be grouped with; nobody knew who was, or would be their leader. Subjects were informed that their final earnings would be those of only one round chosen at random (at the end of the experiment, each subject separately rolls a 10-sided die to decide the round that determines his/her actual earnings) and therefore they should make the best decision possible in each round. At the end of the experiment subjects completed a survey form to collect gender data. They were then called up by code number to role the die and receive their earnings in private. Sessions took between 60 and 80 minutes to conduct.

Given that our model’s prediction does not depend on the gender of the players, our null hypothesis is that male and female subjects should not behave differently across treatments.

Results

Overall Investment Decisions

Tables 2 and 4 report the overall investment rates, in Scenarios 1 and 2, by session (we do not discuss Scenario 3 since in only three out of 230 cases did a leader invest). To analyze the overall investment decisions, we use the Mann-Whitney Rank Sum test (henceforth the MW-test) applied to session level data. We aggregate data within a session (as in Potters et al. 2007) and treat this as one independent observation. This recognizes the fact that individual investment decisions are not independent observations. Mann-Whitney test p-values are reported in Tables 3 and 5.

Consider Scenario 1, which represents the coordination problem. The highest overall investment rate is 78.3% which occurs in the AF treatment. This is followed by 74.4% in the.
NGS treatment, 66.3% in the GS treatment, and 60.3% in the AM treatment. Our two-tailed MW tests show only a significant difference between the investment rates of the AM and NGS treatments; the investment rate in the NGS treatment is significantly higher than it is in the AM treatment (p-value = 0.047).

Consider Scenario 2, in which the dominant strategy is not to invest. The highest investment rate is 53.7% in the NGS treatment. This is followed by 51.5% in the AF treatment, and 42.6% in the GS treatment. As in Scenario 1, the lowest investment rate, 29.4%, occurs in the AM treatment. Investment rates in the NGS and the AF treatments are significantly higher than that of the AM treatment (p-values < 0.05 in both cases). There is, however, no significant difference in the investment rates of the NGS and the AF treatments.

Result 1: Overall, AM groups seem to be the least cooperative in both Scenarios 1 and 2. GS groups do not seem to produce a better outcome than that of AM groups in either scenario. NGS groups significantly improve cooperation in both scenarios. Cooperation in AF groups is not significantly different relative to the NGS groups in either scenario. It is reasonable to suggest that AF groups and NGS groups are more successful in producing cooperative outcomes.

Within Treatment Investigation of the Male and Female Subjects

We now investigate whether or not male and female subjects’ investment decisions are different within each treatment. We do so by conducting random effects Probit regressions with clustering at the session level to control for the potential dependency of decisions across individuals within a session (Chen and Chen, 2009). We estimate our regression models using STATA 11.2 and GLLAMM (Rabe-Hesketh et al. 2005). The dependent variable is the subjects’
investment decisions. We control for the gender of the subjects in each treatment by introducing the variable “Female” (Female=1 if the subject is a female and 0 otherwise). The other explanatory variable is Round (t=1, …, 10). We investigate the behavior of leaders and followers separately. To analyze the behavior of the leaders we look separately into Scenarios 1 and 2, because leaders observe the assigned scenario. To investigate the behavior of the followers, however, we combine all scenarios, for the followers are not aware of the assigned scenario. Tables 7 (leaders) and 9 (followers) show our results. The marginal probability effects are reported in the text. Tables 6 and 8 explain the regression variables.

The Single Gender Treatments

To investigate the possible difference in the investment behavior of male and female subjects in our single gender sessions, we combine the data from treatments AM and AF. Table 7, column Single Gender, reports our estimated marginal effects. For both scenario regressions, the marginal effect of the variable “Female” is significant (p ≤ 0.05). In Scenario 1, a female leader in the AF treatment is 80 per cent more likely to invest than is male leader in the AM treatment. In Scenario 2, a female leader in the AF treatment is 65 per cent more likely to invest than is male leader in the AM treatment (p ≤ 0.05).

Table 9, column Single Gender, reports regression results for the followers whose leaders have chosen to invest. Our data shows that when leaders chose not to invest, the followers decided not to invest, except in very few cases, regardless of their gender. The marginal effect of the variable “Female” is significant (p ≤ 0.05). Female followers in the AF treatment are 51 per cent more likely invest than are male followers in the AM treatment.
**Result 2:** Female leaders in the AF treatment are more likely to invest than male leaders are in the AM treatment. This holds for both scenarios but the marginal effect of having female leaders is larger in Scenario 1. Female followers in the AF treatment, who have observed their leader’s investment, are more likely to invest than male followers are in the AM treatment.

**The NGS Treatment**

Recall that, in the NGS treatment, followers are unaware of their leaders’ gender. According to Table 7, column NGS, in both Scenario 1 and 2, there is no significant difference in the behavior of male and female leaders (p > 0.10). Results reported in Table 9 indicate that a male follower with a leader of unknown gender (Unknown/Male) is 60 percent less likely to invest than is a female follower with a leader of unknown gender (p ≤ 0.05). Our control variable is Unknown/Female which equals 1 if the follower is a female and 0 otherwise.

**Result 3:** In the NGS treatment, we did not find a significant gender difference in the probability of investment among the leaders. This holds for both scenarios. Female followers, however, tend to follow their leaders more than male followers do.

**The GS Treatment**

In the GS treatment, the leader’s gender is signaled to his or her followers. According to Table 7, column GS, this signaling does not result in a significant difference in the behavior of male and female leaders in Scenario 1 (p > 0.10). We do, however, find a significant difference in behavior in Scenario 2. Female leaders are 44 percent less likely to invest, relative to male leaders, when their gender is signaled (p ≤ 0.05).
Results for followers reported in Table 9, GS column, indicate that followers’ likelihood of investing is unaffected by either their own or their leader’s gender (p > 0.10 for all treatment variables). The explanatory variables include “Male/Male” (= 1 if a male follower follows a male leader and 0 otherwise), “Female/Male” (= 1 if a male follower follows a female leader and 0 otherwise), and “Male/Female” (= 1 if a female follower follows a male leader and 0 otherwise). Our control variable is Female/Female which is equal to one if a female follower has a female leader and 0 otherwise.

Result 4: In the GS treatment, female leaders are less likely to invest than the male leaders in Scenario 2 (but not Scenario 1). We did not find a significant difference between the behavior of the male and female followers whose leaders invested, and the gender of their leaders did not significantly affect their investment behavior.

Across Treatment Investigation of the Subjects

In this section we hold the gender of our subjects constant and investigate whether male and female subjects behave differently across treatments. We do so by conducting random effects Probit regressions with clustering at the session level. The dependent variable is the subjects’ investment decisions. We control for the single gender treatment (Single Gender = 1 if the treatment is AM or AF, and 0 otherwise) and the GS treatment (GS = 1 if the treatment is GS and 0 otherwise). The control variable is NGS (=1 if the treatment is NGS and 0 otherwise). The other explanatory variable is Round (t = 1, …, 10). We investigate the behavior of leaders and followers separately. Again, to analyze the behavior of the leaders we look separately at
Scenarios 1 and 2 but combine all scenarios when analyzing the behavior of the followers. Table 7 (leaders) and 9 (followers) show our results.

Female Subjects

The results reported in Table 7, column Across Treatments – Females, suggests that female leaders are more likely to choose to invest when their gender is not signaled to their followers. In Scenario 1, a female leader in the GS treatment is approximately 74 percent less likely a female leader in the NGS treatment (p ≤ 0.05). The coefficient for Single Gender is negative but not significant. In Scenario 2, a female leader is 58 and 1.06 percent (Single Gender and GS treatments, respectively) less likely to invest when their gender is not signaled to their followers (p ≤ 0.05 for both coefficients). Female followers are 67 percent less likely to invest when they know the gender of their leaders (p ≤ 0.10).

**Result 5:** Signaling of gender inhibits female leaders’ willingness to invest. Female leaders in Scenario 1 and also female followers are less likely to invest in the GS treatment compared to the NGS treatment. In Scenario 2, female leaders are less likely to invest in the GS treatment than they are in the NGS treatment.

Male Subjects

For male leaders, being in a single sex group significantly reduces their willingness to invest regardless of scenario (Scenario 1, p ≤ 0.05; Scenario 2, p ≤ 0.10). As followers, males’ willingness to invest does not differ across treatments (p > 0.10 for all treatment coefficients).

**Result 6:** Single sex groups reduce male leaders’ willingness to invest regardless of scenario. Male followers do not behave differently across treatments.
Summary and Conclusion

We consider the issue of gender differences in leadership using a technique (a laboratory experiment with salient incentives) commonly employed by economists studying gender differences in other forms of behavior. Our experiments strips the concept of leadership of questions of style and how leaders’ effectiveness is assessed based on the style adopted. A leader’s effectiveness is determined by his willingness to voluntarily place himself in a vulnerable position to achieve an outcome beneficial to both the leader and his followers and do followers trust their leaders to make the right choice?

Our experiment is a single-shot collective action game in which free riding and coordination failures can prevent group cooperation. We introduce an information based leadership structure in which the leader has exclusive information regarding the quality (i.e. returns to investing in) of the team’s project. Followers are uninformed about the project’s quality but are able to observe the leader’s decision to invest or not in the project. In this setting, a leader has an incentive to persuade group cooperation by sending a costly signal (i.e. investing) to the followers indicating that cooperation is worthwhile (when indeed it is). Followers have an incentive to follow their leader because the leader is more informed than they are.

We consider two single gender treatments in which all leaders and followers are either male or female. We also consider two mixed gender treatments, one with no emphasis on the gender of the leaders and one with explicit emphasis on the leaders’ gender.

Our results suggest two conclusions. First, in situations where the followers’ refusal to follow can impose significant costs on the leader (specifically in Scenario 2 where the followers’ dominant strategy is to free-ride), female leaders are less likely to lead in the treatments with
gender emphasized (both mixed and single gender treatments) than they are when there is gender anonymity (the mixed gender treatment without gender emphasis). Although the experimental design is unable to identify the underlying reasons for this difference in behavior, our result is consistent with what the psychology literature describes as the “Stereotype Threat” (Steel, 1997). The stereotype threat theory argues that “…performing in a domain in which one is negatively stereotyped produces feelings of anxiety, uncertainty, and discomfort … a consequence of experiencing this discomfort … is often impaired performance … compared to those who perform under less threatening conditions” (Vick et al. 2008, p.624). The stereotype threat may be evoked by an explicit stereotype or an implicit factor that hints a stereotype. Revealing our leaders’ gender in the two treatments that emphasize gender might have triggered such an effect among our female leaders making them reluctant to lead.

Second, that gender differences in leader effectiveness are not because followers trust female leaders to make the right choice less than they do male leaders or see female leaders as less legitimate than male leaders: followers do not behave differently towards their male and female leaders. Given our subject pool, this result is consistent with Tahmincioğlu’s (2007) observation that the Elle and MSNBC.com poll finds a generational change; younger workers have a higher preference for female leaders than do older workers. This finding is also consistent with the studies by Eagly et al. (1995) and Thompson (2000) which found, overall, no differences in the perceived effectiveness of male and female leaders.

The unwillingness of female leaders to lead may have more to do with their misreading of their followers’ intentions. This misreading may be due to lack of experience in leadership roles. More experience on the part of female leaders may serve to mitigate female leaders’ reluctance to lead in the mixed gender treatment with gender emphasis. This suggests a further
avenue of research: conducting an iterated collective action game with a fixed leader and group membership which gives female leaders time to acquire experience.
References


Working Paper, University of Auckland.

Chen, R., and Y. Chen. 2009. The potential of social identity for equilibrium selection,

Management in Education 17: 29-33.

Cox, J.C. 2002. Trust, Reciprocity, and other-regarding preferences: Groups vs. individuals and
males vs. females. Advances in Experimental Business Research, edited by R. Zwick

Cox, J. C. and C.A. Deck. 2006. When are women more generous than men? Economic Inquiry
44: 587-598.

Croson, R., and N. Buchan. 1999. Gender and culture: International experimental evidence from

Literature 47: 1-27.

Public Economics 92: 1011-1021.

London: JAI press.

about other people's behavior in a common dilemma situation. Journal of Personality


taxation in the lab. University of Texas at Dallas Working Paper.

the art to 1980. In *Judgment under Uncertainty: Heuristics and Biases*, D. Kahneman,
P. Slovic and A. Tversky, eds., Cambridge: Cambridge University Press.

114: 121-149.


Mandell, B. and S.Pherwani. 2003. Relationship between emotional intelligence and
transformational leadership style: A gender comparison. *Journal of Business and
Psychology* 17: 387-404.

Meidinger, C., and M. C. Villeval. 2002. Leadership in teams: Signaling or reciprocating.

*Journal of Conflict Resolution* 47: 773-795.


Table 1: Payoff Scenarios by Projects

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<tr>
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<th>Scenario 1</th>
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<td>Non-investors (Each)</td>
<td>Investors (each)</td>
<td>Non-investors (Each)</td>
<td>Investors (each)</td>
<td>Non-investors (Each)</td>
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<td>_</td>
<td>13</td>
<td>_</td>
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<td>_</td>
</tr>
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<td>10</td>
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<td>Individuals</td>
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<td>14</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>59</td>
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<td>73.3</td>
<td>77.8</td>
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Table 3: Mann-Whitney Test p-values (two-tailed test) – Decisions Scenario 1

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<thead>
<tr>
<th></th>
<th>All Male</th>
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<th>GS</th>
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<tr>
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Table 4: Decisions Scenario 2

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<th></th>
<th></th>
<th>Total</th>
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</thead>
<tbody>
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<td>Session</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>All Male</td>
<td>All Male Individuals</td>
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<td>15</td>
<td>15</td>
<td>15</td>
<td>60</td>
</tr>
<tr>
<td></td>
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</tr>
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<td>%</td>
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<td>19.0</td>
<td>30.2</td>
<td>29.4</td>
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<tr>
<td>All Female</td>
<td>All Female Individuals</td>
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<td>15</td>
<td>15</td>
<td>60</td>
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</tr>
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<td></td>
<td>%</td>
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<td>52.6</td>
<td>42.9</td>
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</tr>
<tr>
<td></td>
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<td>30</td>
<td>30</td>
<td>34</td>
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<td>48</td>
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<tr>
<td></td>
<td>%</td>
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<td>42.6</td>
<td>62.5</td>
<td>63.0</td>
<td>49.4</td>
</tr>
<tr>
<td>GS</td>
<td>GS Individuals</td>
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<td>15</td>
<td>15</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
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<td>Invested</td>
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<td>19</td>
<td>32</td>
<td>45</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>Decisions</td>
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<td>57</td>
<td>66</td>
<td>66</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>30.0</td>
<td>33.3</td>
<td>48.5</td>
<td>68.2</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Table 5: Mann-Whitney Test p-values (two-tailed test) – Decisions Scenario 2

<table>
<thead>
<tr>
<th></th>
<th>All Male</th>
<th>All Female</th>
<th>GS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Female</td>
<td>0.0286</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS</td>
<td>0.4126</td>
<td>0.2858</td>
<td></td>
</tr>
<tr>
<td>NGS</td>
<td><strong>0.0158</strong></td>
<td>0.8175</td>
<td>0.2222</td>
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</table>
Table 6: Leaders’ Investment Decisions Regression Variable Definitions

**Dependent Variable – all regressions**
Leader invest = 1 if leader invested, 0 otherwise

**Independent Variables**
Female = 1 if leader is female, 0 otherwise
Single Gender = 1 if the treatment is All Male or All Female, 0 otherwise
GS = 1 if the treatment is GS, 0 otherwise
Period = 1 ... 10
Table 7: Leaders’ Investment Decisions - Probit Regressions with Random Effects (clustering at the session level)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Single Gender</th>
<th>NGS</th>
<th>GS</th>
<th>Across Treatments - Females</th>
<th>Across Treatments - Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Marginal Effect (std. error)</td>
<td>Marginal Effect (std. error)</td>
<td>Marginal Effect (std. error)</td>
<td>Marginal Effect (std. error)</td>
<td>Marginal Effect (std. error)</td>
</tr>
<tr>
<td>Constant</td>
<td>1.187* (0.31)</td>
<td>-0.266* (0.13)</td>
<td>1.700* (0.59)</td>
<td>0.405* (0.16)</td>
<td>1.255 (0.65)</td>
</tr>
<tr>
<td>Female</td>
<td>0.795* (0.30)</td>
<td>0.646* (0.23)</td>
<td>0.531 (0.47)</td>
<td>0.83 (0.55)</td>
<td>-0.157 (0.21)</td>
</tr>
<tr>
<td>Single Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS</td>
<td></td>
<td>-0.736+ (0.39)</td>
<td>-1.058* (0.029)</td>
<td>-0.061 (0.40)</td>
<td>0.144 (0.36)</td>
</tr>
<tr>
<td>Period</td>
<td>-0.054 (0.05)</td>
<td>-0.025 (0.03)</td>
<td>-0.035 (0.10)</td>
<td>-0.072 (0.07)</td>
<td>0.032 (0.07)</td>
</tr>
<tr>
<td>LLF</td>
<td>-49.3</td>
<td>-101.7</td>
<td>-15.7</td>
<td>-56.3</td>
<td>-28.1</td>
</tr>
<tr>
<td>N</td>
<td>137</td>
<td>154</td>
<td>91</td>
<td>92</td>
<td>81</td>
</tr>
<tr>
<td>Individuals</td>
<td>81</td>
<td>90</td>
<td>50</td>
<td>49</td>
<td>58</td>
</tr>
</tbody>
</table>

* – 5% significance  
+ - 10% significance
Table 8: Followers’ Investment Decisions Regression Variable Definitions

**Dependent Variable – all regressions**

Follower invest = 1 if follower invested, 0 otherwise

**Independent Variables**

*Single-Sex Regressions*

Female = 1 if the treatment is AF, 0 otherwise

*GS Regressions*

Male/Male = 1 if leader and follower are both males, 0 otherwise

Male/Female = 1 if leader is male and follower is female, 0 otherwise

Female/Male = 1 if leader is female and follower is male, 0 otherwise

*NGS Regressions*

Unknown/Male = 1 if follower is male, 0 otherwise

*Across Treatment Regressions*

Single Gender = 1 if the treatment is All Male or All Female, 0 otherwise

GS = 1 if the treatment is GS, 0 otherwise

*Common Variables*

Period = 1 … 10
<table>
<thead>
<tr>
<th>Variable</th>
<th>Single Gender</th>
<th>NGS</th>
<th>GS</th>
<th>Across Treatment - Females</th>
<th>Across Treatment - Males</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>0.726</td>
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<td>(0.15)</td>
<td>(0.24)</td>
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<tr>
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<td>-0.429</td>
<td>-0.086</td>
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<tr>
<td></td>
<td>(0.24)</td>
<td>(0.58)</td>
<td>(0.48)</td>
<td>(0.39)</td>
<td>(0.22)</td>
</tr>
<tr>
<td>Male/Male</td>
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<td>-0.429</td>
<td>-0.086</td>
<td>-0.596*</td>
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<td></td>
<td>(0.58)</td>
<td>(0.48)</td>
<td>(0.39)</td>
<td>(0.22)</td>
</tr>
<tr>
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<td>-0.036</td>
<td>-0.429</td>
<td>-0.086</td>
<td>-0.596*</td>
</tr>
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<td></td>
<td>(0.58)</td>
<td>(0.48)</td>
<td>(0.39)</td>
<td>(0.22)</td>
</tr>
<tr>
<td>Female/Male</td>
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<td>-0.036</td>
<td>-0.429</td>
<td>-0.086</td>
<td>-0.596*</td>
</tr>
<tr>
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<td></td>
<td>(0.58)</td>
<td>(0.48)</td>
<td>(0.39)</td>
<td>(0.22)</td>
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<td>(0.24)</td>
<td>(0.03)</td>
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<td>(0.23)</td>
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<td>(0.04)</td>
<td>(0.03)</td>
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<td>(0.05)</td>
<td>(0.04)</td>
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<td></td>
</tr>
</tbody>
</table>

* – 5% significance
+ - 10% significance
Instructions

(Note: Italicized text in brackets included for the GS treatment.)

This is an experiment about decision-making involving 15 participants. You must not talk to the other participants or communicate with them in any way during the experiment. If at any time you have questions, raise your hand and we come to you to answer them.

You have received a folder with a unique five digit code number. You will use this number to collect your earnings at the end of this session.

The experiment consists of 10 rounds. In each round you play an investment game. At the end of each round your earnings will be calculated and announced. You are given a record sheet on which you should record your decision and earnings at the end of each round. Your final earnings will be those of only one round, chosen at random (by the role of a die) at the end of the experiment. Since you don’t know which round will determine your earnings, it is important that you make the best decision possible in each round. Your earnings will be paid to you in private at the end of the experiment.

At the end of the experiment you will receive a survey form. Please complete the questions. When you have completed the survey deposit it in the box at the front of the room. You will then be called up to receive your earnings and then you are free to go.

The game

In each round you will be randomly grouped with 8 other participants. Groups will be reformed each round. You will not be with the same 8 people more than one round.

At the beginning of each round you will each be given an endowment of $10. You must decide whether to invest or not invest your endowment in a joint investment project. The project’s potential return is randomly determined at the beginning of each round and will vary from round to round. In each round three scenarios are equally likely to happen: Scenario 1 in which potential returns are high, Scenario 2 in which potential returns are average, and Scenario 3 in which potential returns are low. The potential return is the same for you and the other members of your group for that round. Your earnings depend on your decision, the decisions of the others in your group, and the return to the project.

The three scenarios are shown on the next page.
Table 1: Payoff Scenarios in Game 1

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Invest (Each)</th>
<th>Not invest (Each)</th>
<th>Scenario 2</th>
<th>Invest (Each)</th>
<th>Not invest (Each)</th>
<th>Scenario 3</th>
<th>Invest (Each)</th>
<th>Not invest (Each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All invest</td>
<td>20</td>
<td>_</td>
<td>All invest</td>
<td>13</td>
<td>_</td>
<td>All invest</td>
<td>0</td>
<td>_</td>
</tr>
<tr>
<td>2 invest</td>
<td>13</td>
<td>17</td>
<td>9</td>
<td>15</td>
<td></td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>1 invests</td>
<td>7</td>
<td>14</td>
<td>5</td>
<td>12</td>
<td></td>
<td>0</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Nobody invests</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>10</td>
<td></td>
<td>-</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

In each group one member is selected randomly and will be informed which scenario has been assigned to his/her group. The other two members will not know the scenario. At the beginning of the game you get a sheet of paper that tells you whether or not you are the informed member. The game is then played in two stages:

**Stage 1:** At this stage the informed member observes the scenario and decides whether or not to invest in the project. The uninformed members do not make a decision in this stage. They, however, should pretend that they are making a decision by drawing a circle. **It is important not to show your identity to the others.**

**Stage 2:** At this stage the uninformed members will be informed about *(the gender of the informed player and)* the decision made by him/her and then will simultaneously decide whether or not to invest in the project. The first mover does nothing at this stage but should pretend that he/she is making a decision by drawing a circle on the paper.

Before we start the game we will practice to make sure you understand the game and your potential earnings.
Suppose that you are in Scenario 1.

What will you earn if all of you invest in the project? _______________
What will you earn if nobody invests in the project? _______________
What will you earn if you invest only by yourself? _______________
What will you earn if you and one other member invest? _______________

Suppose that you are in Scenario 2.

What will you earn if all of you invest in the project? _______________
What will you earn if nobody invests in the project? _______________
What will you earn if you invest only by yourself? _______________
What will you earn if you and one other member invest? _______________

Suppose that you are in Scenario 3.

What will you earn if all of you invest in the project? _______________
What will you earn if nobody invests in the project? _______________
What will you earn if you invest only by yourself? _______________
What will you earn if you and one other member invest? _______________
**Stage 1: Leader**

Round __________

Group __________

ID# __________

You are the informed player this time.

**Stage 1:**

You are in Scenario 1. You are randomly grouped with two other participants. You and the other two group members have the chance to invest your 10 dollars in a joint project. The following table shows your potential returns. You are the only one who knows the potential returns (the other two group members do not know the potential returns). You will make your decision first. Your other group members will be informed about your decision before they make theirs.

Please circle your decision (and verify your gender).

(A) I invest         (B) I do not invest

**(A) Male**        **(B) Female**

<table>
<thead>
<tr>
<th></th>
<th>Investors (each)</th>
<th>Non-investors (each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All invest</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Two invest</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>One invest</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Nobody invest</td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>
Stage 1: Follower

Round ________

Group ________

ID# ________

You are **not** the informed player in this round. Please follow the instructions below.

Stage 1:

Do not make any decision at this stage. But pretend that you are making a decision by drawing a circle. When you are done wait for 1 minute and give this sheet back to me.

Stage 2: Leader

Round ________

Group ________

ID# ________

Stage 2:

You have already made your decision and are waiting to see what the other two will do. The only thing that you have to do in this round is to pretend that you are making a decision by drawing a circle.

Stage 2: Follower

Round ________

Group ________

ID# ________

Stage 2:

The informed person decided to invest not to invest
(The informed person is a   male   female)

What is your decision? Please circle one.

(A) Invest       B) Do not invest