Leadership: Who Matters

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Abstract: Previous research provides compelling evidence that human leaders are sufficient for efficiency-enhancing leadership effects on cooperation in groups, yet little is known regarding the contexts in which human leadership is necessary in this regard. For example, a simple explanation is that leaders provide a common signal to which group members naively respond. Because it is not necessary for a common signal to originate with a human leader, such an explanation could have critically different policy implications than are suggested by currently accepted accounts of a leader's value. We here report rigorous evidence on the extent to which leadership effects in a social dilemma require human leaders. We find that group members' decisions are significantly influenced by human leaders' non-binding contribution suggestions. On the other hand, those same suggestions do not impact group members' decisions when they do not originate with human leaders.

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I. Introduction

Leadership is a prominent feature of human societies, in part because leaders play an important role in promoting cooperation in non-family groups (see, e.g., Güth, et al, 2007 and List and Reiley, 2002). A large body of previous research provides compelling evidence that human leaders are sufficient for efficiency-enhancing leadership effects, yet little is known regarding contexts in which human leadership is necessary. For example, a simple explanation for leadership effects in social dilemmas might be that leaders provide a common signal to which group members naively respond. Unfortunately, because signals need not originate with a human leader, such an explanation could have substantively different policy implications than are suggested by accepted accounts of a leader's value. We here provide rigorous evidence on the importance of human leaders to leadership effects in social dilemmas.

Groups can benefit from human leaders in many ways. For example, leaders can signal the value of cooperation when they have more information than their group members, and this can lead to positive leadership effects (see, e.g. Brandts, et al 2006; Güth, et al, 2007; Levati, et al.,forthcoming; List and Rondeau, 2003; Potters, et al., 2005 and 2007). Leadership effects are also found when leaders do not have an informational advantage. Such effects have been tied to social preferences, and in particular conditional cooperation with a leader who reveals her own decision prior to the decisions of her group members (see, e.g., Meidinger and Villeval, 2002; Güth, et al, 2007; Moxnes and van der Heijden, 2003; Gächter and Renner, 2004). Finally, human leaders can powerfully influence their group's values, morals and ethics (see, e.g., Tyler, 1990 and

2002). Thus, a leader might be able to increase cooperation, say, by efficaciously activating a cooperative group norm.

In previous experimental studies, including those cited above, leaders have been participants in the experiment. An open question is the extent to which previously discovered leadership effects might hinge on this being the case. Indeed, there are several reasons that a common information signal, regardless of its source, can influence group members' decisions. For one, naïve signal following can occur when people are in a new environment and face unfamiliar incentives (see, e.g., Ferraro and Vossler, 2007). Second, a common signal can focus people's attention on what others might do (see, Cialdini et al. 1990) and can consequently change subjects' empirical expectations regarding others' decisions, which can have a substantial impact on own-decisions (see, e.g. Bicchieri and Xiao, 2007). Finally, if a group member believes that her other group members will follow the common signal, then she might also follow the signal as a result of a reciprocity motive (see, e.g., Croson, 2000; Fischbacher, et al., 2001; Kurzban and Houser, 2005; see also Camerer, 2003, especially chapter two, for a nice review of evidence on reciprocity in a variety of environments).

Shedding light on the extent to which human leaders play a role in leadership effects is important. If leadership effects are partially due to naïve responses to focal information then the importance of particular leaders is somewhat diminished, and relatively more emphasis might be placed on finding ways to generate publicly observable signals to promote cooperative and efficient economic exchange. On the other hand, if effective leadership requires an effective person, then more attention might be focused on efficacious procedures to obtain good leaders.

We report data from two types of games. In one an elected leader sends non-binding contribution suggestions to each member of her group. In another a group is given identical non-binding contribution suggestions that do not originate with a human leader. Participants in each game know the source of the suggestion they receive. Our key finding is that group members' decisions are significantly affected by non-binding contribution suggestions made by elected human leaders. We find this is the case both when a leader encourages cooperation as well as when she does not. On the other hand, our evidence is that those same contribution suggestions have no impact on the group members' decisions when they do not originate with a human leader.

II. Experiment Design

II.1. Overview

Our design extends a standard linear public goods game. Linear public goods games have been widely used to study the social dilemma problems when personal interest conflicts with group interest (see, e.g., Ledyard, 1995). In a standard game, each round t each subject i is given y experimental dollars (E$, which are exchanged for US dollars at a known exchange rate at the end of the experiment) and chooses, simultaneously with other subjects, the amount to invest in the group account g_{it} and the amount to keep in their own individual account. Each E$ kept is worth one E$, and each E$ invested in the group account yields $\alpha < 1$ E$ to each group member. Thus, in a group of n subjects, the payoff π_{it} for each subject i in round t is given by:

$$\pi_{it} = y - g_{it} + \alpha \sum_{i=1}^{n} g_{it} , \qquad 0 < \alpha < 1 < n\alpha \tag{1}$$

Backwards induction in this finite-round game implies that, if individuals are selfish, the subgame-perfect equilibrium requires each subject to contribute zero to the group account each round. This follows from $\partial \pi_{it} / \partial g_{it} = -1 + \alpha < 0$. However, the restriction $1 < n\alpha$ ensures $\partial \sum_{i=1}^{n} \pi_{it} / \partial g_{it} = -1 + n\alpha > 0$, so that the aggregate group payoff $\sum_{i=1}^{n} \pi_{it}$ is maximized if every subject contributes everything to the public good.

As detailed below, we study two variants of this game. In one, a human leader sends a contribution suggestion to all of the group members. This suggestion need not be followed by the leader or by any other group members. Subsequent to this treatment we conduct a “random” treatment. Each group in the “random” treatment received the same suggested contributions in the same order as one randomly determined group from the human leader treatment. All group members were aware that the message did not originate with a member of their group.

II.2. (Human) Leader Treatment

The key features of this treatment are as follows. Four subjects (n=4) know they will play a public goods game for exactly 15 rounds. Each subject receives 10E$ (y=10) at the beginning of each round and asked to allocate these 10E$ between her individual and group account.

The experiment includes two stages. The purpose of the first stage in the human leader treatment is to accomplish leader selection. Our approach is to use democratic elections. A reason is that people might be relatively more likely to obey non-binding signals from a leader who has been democratically chosen (Tyler, 2002). This is an important case because leaders are in fact elected in many naturally occurring environments. Our potential leaders compete on the basis of a proposed platform.

The first stage of our experiment proceeds as follows. First, subjects make decisions in five rounds of a standard public goods game. Prior to the beginning of the sixth round, each subject writes a “platform” on carbon paper in a way that produces four identical copies. Subjects are not restricted with respect to the content of the platform, and understand that copies of the platforms will be collected and distributed to each member of the group.

After each group member has a copy of each other group member’s platform (including her own, for a total of four platforms) they vote for exactly one of them. Subjects are aware that the person who writes the winning platform will have a special role in the remainder of the experiment, and also have complete information on the nature of this role (described below). The winner remains anonymous (except to herself). Ties did not occur.

The second stage of the experiment, the final 10 rounds of the game, proceeds similarly to the first five rounds except that, at the beginning of each round, the person who wrote the winning platform (the “leader”) sends an identical suggestion to each group member, as follows:

“Let’s contribute ____E$ to the group account.”

These message slips were pre-printed, so the leader had no opportunity to communicate in any way except by filling in the number.

It was common information to the subjects that (i) each group member received the same message from the leader and (ii) each group member makes his/her decision after observing the leader's message and (iii) the message was an unenforceable suggestion: group members can make any decision they like; and (iv) the leader need not follow her own suggestion. The second stage included exactly 10 rounds, after which the experiment concluded (see Appendix for details.)

II.3. Random Treatment

The "random" treatment enables us to distinguish effects of suggestions made by elected human leaders from effects of those same suggestions sent by an external device. The first stage of the random treatment is identical to the leader treatment. In particular, platform writing and voting occurs after the fifth round, and the person who won the vote is informed that they won. However, the winner has no special role in the second stage.

At the beginning of each round during the second stage, as in the human treatment, each group member receives a message before she makes her contribution decision. However, unlike the leader treatment, subjects are informed that messages are generated by a random process. This treatment was conducted subsequent to the leader treatment, and the random process involved pairing each random-treatment group with a unique (previously run) leader-treatment group, and then giving the "random" group exactly the same messages (and in the same order) seen by their paired leader-treatment group. Subjects were aware that the messages were not from any member in their group, and understood only that the messages were determined randomly. Just as in the leader treatment, subjects understood that they were not required to follow the message. The second stage of this treatment also included 10 rounds, after which the experiment concluded.

II.4. Procedures

Each treatment included two sessions of twelve subjects each. All subjects were recruited from George Mason University's general undergraduate population, using standard recruiting procedures in place at the Interdisciplinary Center for Economic Science. Subjects earned a $5 bonus for arriving on time. Subjects earned E$ during the experiment, and at the end of the experiment E$ were exchanged for dollars at the rate of 15E$ = $1. On average, subjects were in the lab for 90 minutes and earned $15 in addition to the show-up bonus.

Prior to the first round of each session the 12 participants were randomly arranged into three groups of four and told they would be in the same group for the entire experiment. Subjects read computerized instructions and answered embedded questions. Answers to questions were monitored, and the experiment did not begin until all subjects demonstrated that they understood the instructions. At the beginning of each of the first five rounds group members received their endowment and made simultaneous investment decisions via the software's user interface.

At the end of the fifth round each subject created and wrote a message, effectively their platform, on four-layer xeno-graphic paper. These platforms were collected, stapled and redistributed to the entire group along with a ballot. Group members read the platforms and voted for one. Subjects were asked not to vote for their own platform. Voting ballots and platforms were collected and the results tabulated. The experimenters then informed each subject only about whether s/he wrote the winning message. Only the winner knew the identity of the winner. This procedure was carried out identically in each of the two treatments.

During leader treatments the experimenter collected messages from leaders and distributed them to their corresponding group members at the beginning of each round of the second stage. During the random treatment's second stage the experimenter distributed messages to each group member in exactly the same way, but the message was based on the outcome of a previously conducted leader treatment. Our specific procedures are detailed in the experiment's instructions reproduced in Appendix.

II.5. Hypotheses

Our design provides the contrast necessary to distinguish the importance of human leaders in generating leadership effects. We organize our examination of this issue around three key and closely related hypotheses, each of which is tested in section III.2 below. The key hypotheses are as follows.

> ***Hypothesis 1****. Contribution suggestions made by elected human leaders are followed more closely by group members than identical contributions suggestions that do not originate with a leader.*

> ***Hypothesis 2****. Members of groups with human leaders who advocate cooperation will exhibit more cooperation than (i) members of groups with human leaders who advocate non-cooperative decision, and (ii) members of groups without a human leader.*

Hypothesis 3. *Members of groups with human leaders who advocate cooperation will earn more than (i) members of groups with human leaders who advocate non-cooperative decisions, and (ii) members of groups without a human leader.*

III. Results

III.1. Data Overview

Table 1 and Table 2 list all of the platforms that were written in the human leader treatment and random treatment, respectively, and denotes the winning platform in bold. Two aspects of the platforms deserve attention. First, the platforms are meaningful and thoughtful: our subjects took this task seriously. Second, note that the winning platforms tend to suggest and defend, often through example, quite reasonable strategies for achieving efficient outcomes. For instance, one winning platform argues for a trigger strategy, where everybody contributes everything until one person doesn't, after which everybody is free to make any decision they like.

Figure 1 displays the average contribution in each round by treatment, as well as the average suggested contribution amount. Average contributions between treatments during the first five periods are statistically identical at about 4.6 E$. In round six, the first round after the voting procedure, contributions increase to 8.4 E$ and 7.1E$ of endowment in the leader and random treatments, respectively. Contributions remain higher on average in the leader than random treatment for the remainder of the experiment, and end at 4.3E$ and 3.5 E$ respectively. Table 3 reports the results of a simple censored regression of percent of endowment contributed by each group on an intercept and the round reveals statistically significant between treatment differences (the test of the null hypothesis that the intercept and round coefficients are jointly identical between the leader and random treatments is easily rejected, $p < 0.01$).

It is clear from Figure 1 that the mean suggested contribution remains above the actual mean contribution in all rounds of both treatments. The mean suggestion fluctuates around a mean of about 8.5 E$ between rounds six and 15. For the leader treatment, mean actual contributions are about 1.4 E$ lower than the suggestion between rounds six and 13. This nearly doubles to 2.6 E$ in round 14, and nearly doubles again to 5 E$ in the final round of the experiment. The difference between actual and suggested is systematically larger in the random treatment, increasing steadily from 1.9 in round six to 5.8 by round 15.

Next turn to Figure 2, panels A-F, which details the average contribution of each paired leader and random treatment group, along with the suggested contribution observed by that group's members. Three features of this figure are noteworthy. First, the leader and random groups behave substantially differently when faced with the same suggestion, with the human leader groups evidently following more closely. Differences are especially stark in groups 4-6, where the suggested contribution was almost always 10. The human leader groups generally followed the message, while the message does not have an obvious visual impact on decisions in the random group.

To assess treatment effects formally, Table 4 reports the results of a simple censored regression of the absolute deviation of each group's contribution from the suggested contribution on an intercept and the round. This reveals statistically significant between treatment differences (again, a test of the hypothesis that the intercept and round coefficients are jointly identical between treatments is easily rejected $p < 0.01$).

The second aspect of Figure 2 worth noting is that groups seem to follow a human leader better when the leader's advice is consistent and "good". In our spare experimental setting, we can suppose that there is no difference between maximizing group income and "good." In particular, in groups 4-6 the leader consistently suggested a high contribution, and group members followed this suggestion. On the other hand, in the first three groups the leader's advice was lower on average and less consistent, and the group members followed less well.

Third, the average of the human leader groups never exceeds the suggested contribution amount, while this occurs frequently in the random advice treatment. In fact, we will see below that the result is much stronger: there are only two instances where a participant in the human leader treatment contributed more than the suggestion.

Finally, note that in our data leaders often, but not always, followed their own contribution suggestion. Evidence for this is given by Figure 3, which plots mean absolute deviation of leaders' contributions from their suggestion. The mean absolute difference is less than one to the final round, when the deviation increases to about two. In fact, leaders followed their own suggestion somewhat more closely than this suggests. Excluding Group 2, leaders exactly followed their own advice 96% of the time (48 out of 50 opportunities), with the exceptional cases occurring in round 15. The leader of Group 2, however, exactly followed his/her own suggestion only one time over ten rounds, and otherwise contributed a few E$ less than the amount he/she suggested.

III.2. Hypothesis Tests

We next provide evidence on each of the key hypotheses stated in section II.5.

Result 1. *Suggestions made by elected leaders are followed more closely by group members than identical suggestions not originating with a leader. Thus, Hypothesis 1 is supported by our data.*

Evidence for this result can be found in Figure 3, which shows mean absolute deviation from the advice in the leader and random treatments for rounds 6 through 15 (recall there was no messages in the first five rounds). Mean absolute deviations are uniformly higher in the random than human leader treatment, averaging 4.94 E$ and 2.06 E$, respectively. A Mann-Whitney test (with one degree of freedom per subject) easily rejects the null hypothesis that the medians are the same ($Z = 3.206$, $p < 0.01$)

Result 1.1. *A human leader's contribution suggestion becomes an upper bound for contributions by other group members. Absent a leader, that same suggestion does not serve as an upper bound. This provides a partial explanation for Result 1.*

Evidence for this result is provided by Figure 4, which describes the distribution of differences between actual and suggested contribution amounts. Out of 240 observed decisions (including the leader), there were only two instances in the human leader treatment where a contribution exceeded the suggested contribution. This occurred once when the suggested contribution was zero and one group member contributed one, and once when the suggestion was nine and one group member contributed ten. In neither case was this subject the leader. In the random treatment, there were 41 occurrences

(17.1%) from 11 distinct subjects (45.8%) of a contribution exceeding the suggestion. One can easily reject the null hypothesis that the frequency of subjects who contribute above the suggested amount is the same between treatments ($p < 0.01$, two-sided Mann-Whitney test). Finally, it is strikingly apparent from Figure 4 that the frequency with which the message was exactly followed (deviation of zero) is much greater in the human leader than random treatment.

Result 2. *Contribution suggestions made by human leaders are followed, so high suggested contributions can lead to efficient group outcomes, and low suggested contributions to inefficient group outcomes. Contribution suggestions do not affect contribution decisions if they do not originate with the human leader. Thus, our data supports Hypothesis 2.*

To provide evidence for this we divide our six groups into two sets of three each. One set includes groups that received "bad" suggestions (groups 1, 2 and 3) and the other group includes those that received"good" suggestions (groups 4, 5, and 6). There is no ambiguity in this classification. Because the efficient outcome (which we identify with the social good) occurs when everybody contributes everything, it is reasonable to view a suggestion of "10" as a "good" suggestion, and to argue that suggestions are less good as they fall further from 10. Three of the leaders (groups 4, 5 and 6 in Figure 2) suggested 10 in nearly every round, while suggestions were inconsistent and almost always less than 10 in the other three groups.

Figure 5 shows the path of mean contributions among the four cases. Note there are exactly three groups underlying each path. Cooperation is sustained only in the case that a human leader gives good advice. Cooperation in other cases decays, and the paths are visually quite similar.

We proceed with formal analyses by conducting a random (individual) effects censored regression of individual contribution decisions on the suggestion, a subject's previous contributions, the previous contributions of the subject's other group members and a constant. We do this separately for each treatment, and include dummy variables to indicate whether each person was a member of a group who received "good" or "bad" suggestions. Table 5 reports the results. Contribution suggestions are not statistically significant predictors of decisions in the absence of a human leader, while suggestions are significant when they originate with a leader, even when the suggestion advocates a non-cooperative decision (the coefficients on the suggestion are individually significant in the human leader treatment at the $p<.001$ level, even for groups that are receiving messages that advocate non-cooperation). Thus, our evidence is that contribution decisions vary with the suggestion when there is a human leader, and that this is true regardless of whether the suggestion is to cooperate. On the other hand, the suggestion does not have a statistically significant effect in the random treatment.

Result 3. *Members of groups with leaders earned more money when the leader encouraged high contributions than when he or she did not. Members of groups receiving suggestions without leaders earned the same regardless of the suggestion. Thus, our data supports Hypothesis 3.*

To assess the effects of leadership on earnings, we calculated the earnings for each of the subjects (non-leaders) in all of the treatments. We then compared earnings among the four groups: leader with good suggestions, leader with bad suggestions, random with good suggestion and random with bad suggestions. Table 6 details our results. Earnings are higher on average in the leader, good suggestion groups than in any of the others. Earnings are nearly identical on average among the low earning groups. Consequently, we pooled all of the earnings in the random and leader/bad suggestion cases, and compared earnings among those nine groups to earnings in the three leader/good suggestion groups. Even with this small sample, we find that the leader/good suggestion groups earn significantly more ($p < 0.01$, two-tailed Mann-Whitney).

IV. Conclusion

We designed a novel public goods game to compare effects of democratically elected leaders' suggested contribution amounts to the same suggestions given in the absence of human leaders. In both treatments the suggestions were non-binding for both the leader and his/her group members. We find statistically and economically significant differences between treatments. People follow leaders' suggestions, but when that same suggestion does not include a leader it is not followed. As a result, we found elected leaders giving good advice can obtain high levels of cooperation and achieve nearly efficient outcomes in groups. Our results also suggest, however, that bad leaders can create group outcomes inferior to having no leader at all. The reason is that group members treat a human leader's cooperation signal as an upper bound for their own cooperation decision.

Future research should investigate why a suggestion is followed more readily when it originates with an elected human leader. We noted above that part of the explanation likely involves reciprocity. For example, we saw that leaders generally followed their own suggestion, and group members might have expected this would be the case. Thus, our results are consistent with the view that an implicit “first move” might be critical, beyond its simple signaling value, in creating leadership effects. That is, our results support the view that it is important to lead by example. In addition, we noted a leader’s public communications might have a special influence on decisions (see e.g., Tyler, 1990). Such effects might be especially relevant in normative environments characterizing social dilemmas.

Leadership provides a partial explanation for the puzzle of cooperation in large-scale human societies. By focusing on the role of humans in this regard, this paper took a small step towards addressing the puzzle of leadership.

Appendix: Instructions

Thank you for coming! You've earned $5 for showing up on time, and the instructions explain how you make decisions to earn more money. So please read these instructions carefully! There is no talking at any time during this experiment. If you have a question, please raise your hand, and an experimenter will assist you.
The experiment is divided into two different stages. There will be 5 rounds in the first stage. The second stage will consist of 10 rounds. In all, the experiment will have 15 rounds. You will be randomly assigned to a group with 3 other participants. **The composition of each group will NOT change during the entire experiment.** You won't know the identities of your group members. During each round you will allocate a given endowment between two different accounts. One account will be an individual account and the other will be a group account. The rates of return will differ between the two accounts. More details about this will be given later.

At the end of the first stage (5 rounds), everyone in the group will have an opportunity to write a short message to the other members of the group. The group will then vote for one of the messages. **You will not be allowed to vote for your own message**. For completing this task you will earn an additional $2.

Message

At the end of the 5th round the experiment will be stopped. An experimenter will pass out carbon paper and a pen to everyone in the group. The carbon paper will have a number at the top that will correspond to your randomly assigned number in the group. You will then have 2 minutes to write a short message to the other members of your group. Please press firmly on the paper so that it can be clearly read through all sheets.

Election

At the end of the 2-minute writing period, an experimenter will collect your messages. This message will be distributed to the other members of the group along with a ballot. The ballot will have numbers on them corresponding to the numbers on the different messages. You will have five minutes to read the messages and vote for one of them. Remember you are not allowed to vote for your own message. If there is a tie, then a run-off election will be held.

After this election has taken place, the second stage of the experiment will begin. In this stage, at beginning of each round, an experimenter will pass out a sheet of paper with a message on it. (Human Leader Treatment Only: **This message is written by the person who wrote the message that won the group vote.)** (Random Treatment Only: **This message is determined randomly, and not by any of your group members.**) The experimenter will pass out a new message from that same person at the beginning of each round, and will collect the message at the end of each round.

All messages will have this form:

Let's contribute X E$ to the group account.

But X will be a number between 0 and 10, as chosen by the person who wrote the message that won the group vote.

The following instructions discuss the actions you must take to earn additional money from this experiment. At the beginning of each round each participant receives **10 E$**. In each round, you will decide how to allocate your E$s. At the end of the experiment the total number of E$ you have earned will be converted to dollars at the following rate:

15 E$ = $1

In each round, you will decide how to allocate your E$s.
At the beginning of each round, you decide how many of your 10 E$ to invest in the **Group Account(G)** and how many to invest in your **Individual Account (I)**. These two accounts are explained below.

<u>Individual Account (I)</u>

Every E$ you assign to the Individual account will return one E$ at the end of the round. For example, if you invested all 10E$ in your Individual account, you would earn 10E$ from the individual account at the end of the round. If you invested 5E$ in your Individual account, you would earn 5E$ from the individual account at the end of the round.

<u>Group Account (G)</u>

Your earnings from the Group Account depend on the number of E$ that **you and your other group members** invest in the Group Account. All E$s that you and your group members invest in the Group account are added together and form the group investment. The group investment generates a return of **2** E$ for every one E$ invested. These earnings are then divided **equally** among all group members. Your group has **4** members (including yourself). So, every E$ invested in the Group account will return **.5 E$** to each group member at the end of the round.

Some examples of returns to group investment are illustrated in the table below. The left column lists various amounts of group investment; the right column contains the corresponding personal earnings for each group member:

Total Group investment amount by your group (TG)	**Return to each group member (from Group investment)**
0	0
4	2
10	5
14	7
20	10
40	20

As you can see, it does not matter who invests E$s in the Group account. Everyone will get the same return from every E$ invested there-whether they invested E$ in the Group account or not.

Your earnings in each round

The total E$s you earn at the end of each round is the sum of your earnings from each of the two accounts:

1) E$s earned from your Individual account = amount of E$s you invest in the Individual account.(**I**)

2) E$s earned from the Group account = 0.5× the total invested E$s of all 4 Group members to this account.(**TG**)

So your earnings at the end of each round =

I + 0.5×**TG**

Example

Suppose that you invested 8 E$s in your Individual account and 2 E$s in the Group account, and the three other members invested a total of 18 E$s in the group account. This means there is a total of 20 E$s in the group account. Then your earnings from the Group account would be 20*0.5=10 E$. Each other subject in your group would also earn 10 E$s from the group account. Then your total E$s earned would be 8 (from your Individual account) + 10(from the group account) = 18 total E$s earned.

How to Make Your Decisions in Each Round

You will make decisions by entering numbers into boxes on your computer screen (If you want to see what the screen looks like, please click the button on the left corner and you will be able to return to the instructions by clicking "**Click for instructions**" button). The screen will also give you important messages and other information. It is important that you understand the information on the screen. If after reading these instructions you still do not understand your screen, then please raise your hand and an experimenter will assist you.

The round number appears in the top left corner of the screen. In this experiment there will be exactly 15 rounds. Remember that after the 5th round, the message and voting period will take place. Then, the experiment will continue for an additional 10 rounds, and you will receive a message at the beginning of each round. The screen will show you both the current round, and how many rounds there are in this experiment in total.

The upper left part of the screen also includes a box that shows your "endowment," which is the number of E$ that you are given each round. In this experiment your endowment is 10E$ each round. You have to decide on the number of E$ to place in both the Individual and in the Group accounts.

To invest in the Individual account, use the mouse to move your cursor to the box labeled "Individual Account", click on the box and enter the number of E$ you wish to allocate to this account. Do the same for the box labeled "Group Account" to make your group investment. Entries in the two boxes must be positive whole numbers that sum to your endowment (10 E$). To change any of your entries, use the mouse to select what you have previously typed in that box and simply overwrite. To submit your investment, click on the "Submit" button. Once you have done this, your decision can no longer be revised. You will then wait until everyone else has submitted his or her investment decisions

Seeing your results

Once every member of your group has entered a decision, the outcome of the round will be displayed directly below the boxes where you entered your investment amounts.

The other information box is labeled "**Outcome of This Round**" and will show you:
(1) how much each of your group members invested in the Group Account (IDs are NOT listed);
(2) your Individual investment(I) and Group investment(G);
(3) the difference between your investment in the group account, **G,** and the average investment amount of your other four group members(**OG**). This is listed in the column titled as **OG-G ;**
(4) your final earnings for this round.
You can move your mouse to the information box and it will extend to display all of this information.

The **History Record** on the left side of the window records the data from all of the rounds you've played. You can review previous rounds' outcomes at anytime. Again, you will need to move your mouse to the box to see the complete information. You may also have to scroll up to see all previous records. The right bottom box will show you the current status of the experiment. In addition, several important things to know about the experiment will be listed there for your easy reference.
After you finish reading the information, please click the "**Click when ready**" button. Once every subject clicks this button, you will begin the next round.
At the end of the experiment, your E$s earned in each period will be added together, and you will be paid privately at the rate 15E$ =$1.

Summary

Your tasks:

Decide how to invest your 10E$ in each of the 15 rounds.

Vote for a message after the fifth round.

Receive a message at the beginning of each of the final 10 rounds.

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Table 1: Proposed Platform from Leader Treatment*

Group	Platforms
1	— **Contribute at least a little bit to the group account; we would all be better off with a mutual donation to the group account.** — It would be optimal to each contribute all $10 to group. We'd all get $20 in return for each round. — PUT EVERYTHING INTO THE GROUP SO WE ALL GET MORE MONEY $40x.5=20 every round if we put all in — LETS DEPOSIT 10E$ EACH INTO THE GROUP ACCOUNT
2	— **I+(0.5*TG) 1st ex: 9 + (0.5*4)= 11$ everyone invests 9$ into "I" everyone invests 1$ into "G" 2nd ex: 1 + (.5*36)= 19$ 18$ per person The more the entire group contributes to the group, the greater the total earnings.** — Dump all your money into group account so we all make big profit! — I think that we are doing fine. — Keep putting high amounts in the Group Account. More beneficial for all of us.
3	— **For the next round we should all invest 10E$ giving us the highest rate of return collectively. We can do this for one trial run, and if after one round there is not 40 E$ then we can go back to individual Investments** — Put at least 6 E$ into group account. It would be better all is put in group account. — We should try putting in 4 E$ into the group account. — EVERYONE PUTS IN $10 THEN WE ALL GET $20 BACK
4	— **I know everyone is trying to figure out how to make the most amount of money as possible, so here's what I've figured out: If everyone contributes $10 into the group account then we will make as much money as possible $10*4 group members = $40 *2 = 80/4 members=$20each *10rounds = 200 15$E =$ 1 200/15 = 13.3 at the end of the experiment** — Put more money into group account than individual account. — WOW, I'm really hungry for french toast & fresh OJ. — Hi all, Good Contribution guys. But one of us is not contributing well (3,0,0,0,2). Come On Now! Let be team players and contribute generously. Hope to see higher group investment next rounds. By the way, nice easy way to earn money, huh… Enjoy AND CONTRIBUTE WELL
5	— **We should invest all $10E, we would all receive more earnings that way!** — Hey all what's wrong with half? — Let's all make a lot of money by putting more into the group account and less into the IA. I will follow through with my messages! — Hey, we are not getting any thing. It is better we spend everything and share the profit. Good Luck
6	— **Group, When we play stingey(in a selfish way) we make money But! Not more than the equivilant of one U.S. dollar. Lets trust our group and put in the same amount each time. That's the only way to have steady earnings coming back. I.e. everyone bets 6 that's 24*2 = 48/4=$12 plus your 4 in savings = $16 The higher we go as a group the more solid cash we get.** — Group I think we all should invest 4 in the group and 6 in our own. That way there's 16 in the group and you still have money in your account. We might make more money this way. Or we all can stay with 7(I) and 3(G), 8(I) and 2(G). One of these 3 combinations will make us money. — Let's contribute 6E$ to I and 4E$ to G total I = 6 E$ G= (4*4)1/2 = 8 earnings round = 14E$ — If we all put in 10 or close to it, we all walk away with more cash.

* Bolded messages are winning platforms

Table 2: Proposed Platform from Random Treatment*

Group	Platforms
1	— **If we all contribute largely to the group account then its better for all of us really in the end but it won't work unless we ALL do it.** — Invest more on the group account. It can bring a lot of earnings — Everyone invest 10E$ to group account & each person will earn 20E$ — All investing in group will create better profits.
2	— **No more $0 Group investments. If all $10's… we're guaranteed $20E. C'mon Guys!!** — I'm not really sure what I'm doing. Hopefully, we'll all get a good amount of money! — If everyone puts all 10 in group, we each get 20. That's a damn good profit for this exp and is better then other people fending for themselves. And by the looks of how things are going 20 E$ is a whole lot more than what we are all getting right now. — Stop being greedy – 10*4 = 40/2 = 20 each round to everyone Help me make money I'm broke PUT ALL 10 in group
3	— **If everyone puts all 10 E$'s in the Group account – Everyone will earn 20 E$'s after each round. (Instead of keeping your own $10E.) 10*4 = 40 in Group 40 * .5 = 20 E dollars per person * this is the most you can make** — I think we should evenly split each of our endownments 50/50. — The entire group makes more money if we all contribute to the group account. When one person stops, the entire group will stop and we all make less money 0 Individual => 10 Group — Everyone invest 10E$ into the group account.
4	— **The more we invest into the group account the more we'll make, so let's invest as much as we can each round.** — I <HEART> $... and need lots of it! P.S. Bush sucks! — If we all put more in we all get more. — Invest $7 into group account. The will pay the highest dividend to all of us.
5	— **If we give to the group investment $40 we will individually receive $20 i.e. E=I+.5*TG = 0+.5*40 E=$20 each lets try it this is more than the ten dollars we would get to ourselves** — This is confusing! — I suggest for round 6 that we all put 1$ individual +9 in group account, so that there is 36$ in the group account, and if all goes well, we will each earn 18$ (+ the one (I) dollar) for 19$ a piece. — Lets invest all money and make 20 dollars each time.
6	— **Invest all your 5 E$ into the group account ex. 0 + 0.5 *10 = $5 *4= $20 your group earning ex. 5 + .5*5= 7.5 group earning** — Fellow group members, let do first 5 rounds, everybody put all 10 E$ into the group account And own decision for the last 5 rounds. — Let's invest 2 E$ to individual account then 8 E$ to the group account to increase earnings, = $18 — Lets all put 10 in the group account please. As long as we put the same amount in then everyone wins. The higher that amount, the better.

* Bolded messages are winning platforms

Table 3: Group-level censored regression contribution analysis

	Dependent variable: Percent of endowment contributed by each group in each round
Independent variables	Coefficient
Leader (=1 if in human leader treatment; =0, o.w.)	41.214** (4.294)
Random (=1 if in random treatment; =0, o.w.)	32.153** (4.041)
Round • Leader	-1.821** (0.676)
Round • Random	-2.144** (0.649)
R^2=0.8413	

Note: numbers in parenthesis are standard errors. ** indicates p<0.01, two-tailed test.

Table 4: Group-level censored regression analysis of
absolute deviation of contribution from message

Independent variables	Dependent variable: Absolute deviation of group's average contribution from message Coefficient
Leader (=1 if in human leader treatment; =0, o.w.)	-3.896 (3.330)
Random (=1 if in random treatment; =0, o.w.)	9.681** (2.958)
Round • Leader	1.265** (0.516)
Round • Random	1.815** (0.476)
$R^2 = 0.9727$	

Note: numbers in parenthesis are standard errors. ** indicates p<0.01, two-tailed test.

Table 5: Individual-level random effect censored regression analysis of determinants of contributions

	Dependent variable: individual i's contribution at round t: g_{it}	
	Leader treatment	Random treatment
Lagged own contribution ($g_{i,t-1}$)	0.300** (0.058)	0.273** (0.089)
Lagged mean contribution of other group members ($\overline{g_{j,t-1}}$)	-0.030 (0.026)	0.043 (0.034)
Round *t*	-0.302** (0.058)	-.359** (0.080)
Round *t* suggestion if a member of a group that receives "bad" suggestions, and zero o.w.	0.531** (0.073)	-0.039 (0.100)
Round *t* suggestion if a member of a group that receives "good" suggestions, and zero o.w.	0.782** (0.078)	-0.216 (0.112)
Constant	2.950** (.948)	8.551** (1.649)
	R^2=0.5859	R^2=0.2440

Note: numbers in parenthesis are standard errors. ** indicates p<0.01, two-tailed test.

Table 6: Earnings ($) by treatment and type of suggestion

Treatment	Suggestion	Earnings		
		Min	Median	Max
Leader	Good	18.57	19.53	20.00
	Bad	14.4	15.38	16.13
Random	Good	13.73	14.15	15.88
	Bad	12.98	15.23	18.95

Figure 1: Mean contribution by treatment

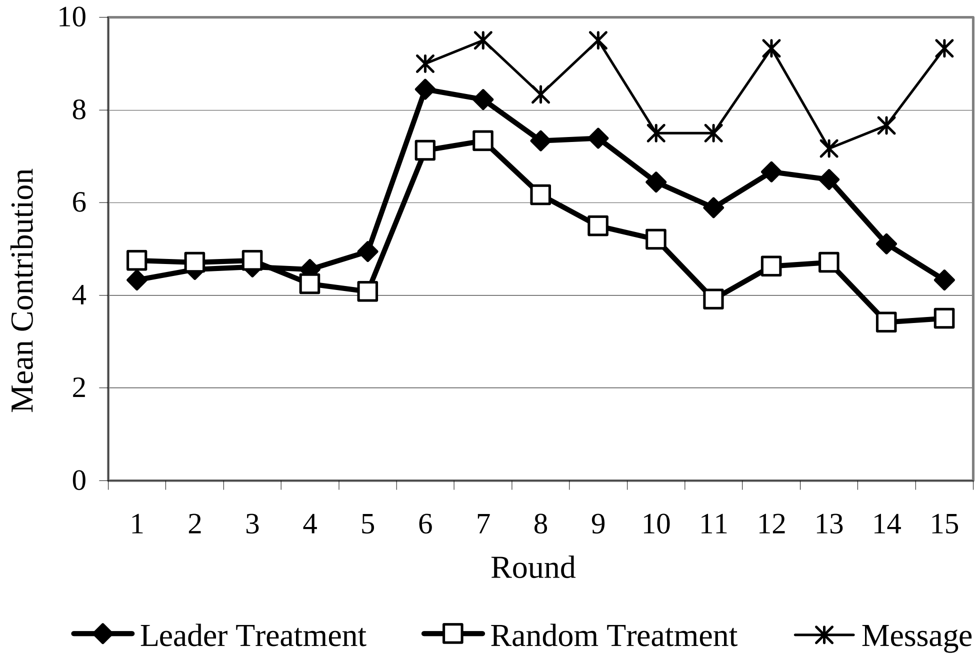

Figure 2: Mean contribution by group and treatment

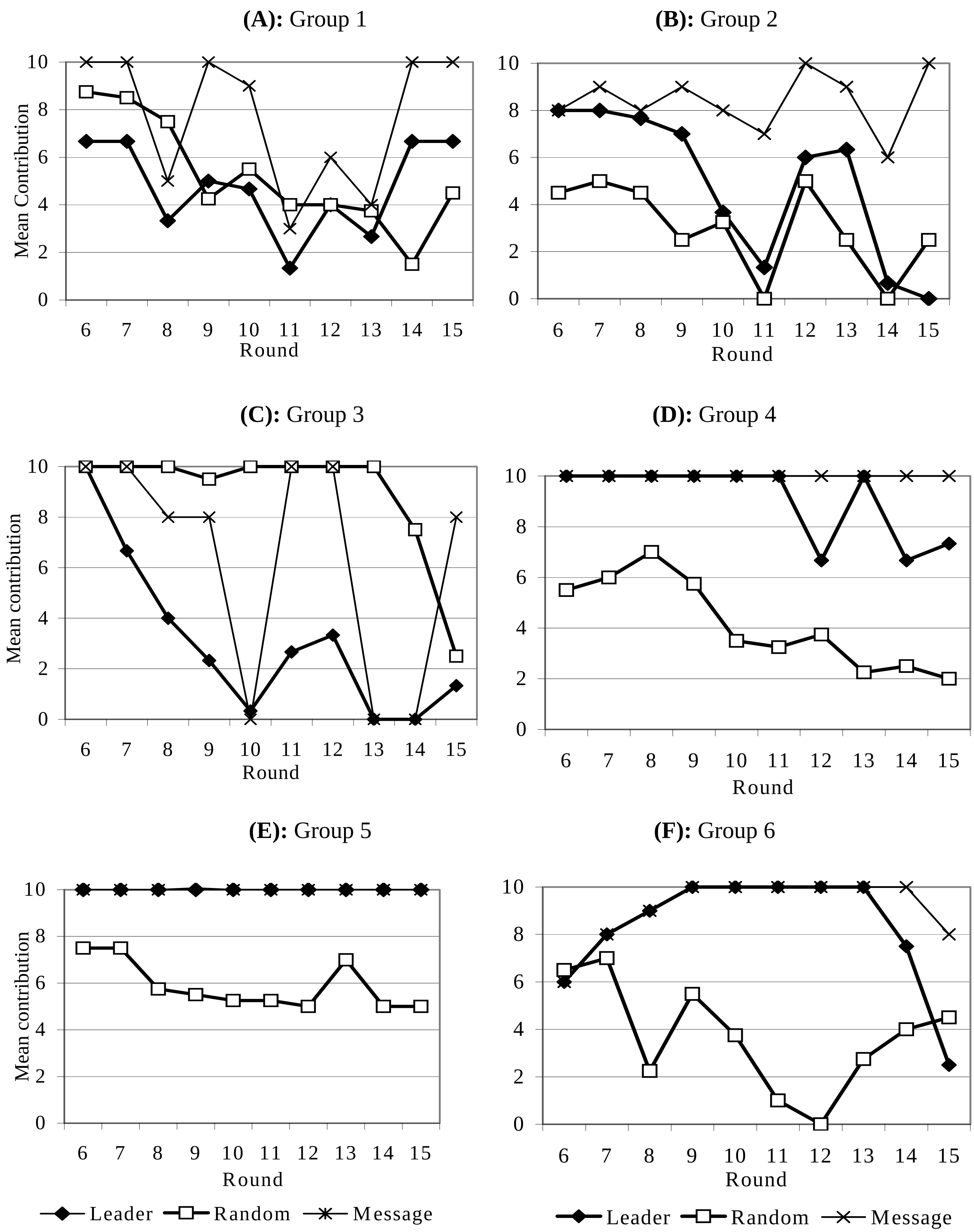

Figure 3: Mean absolute deviation from suggested contribution

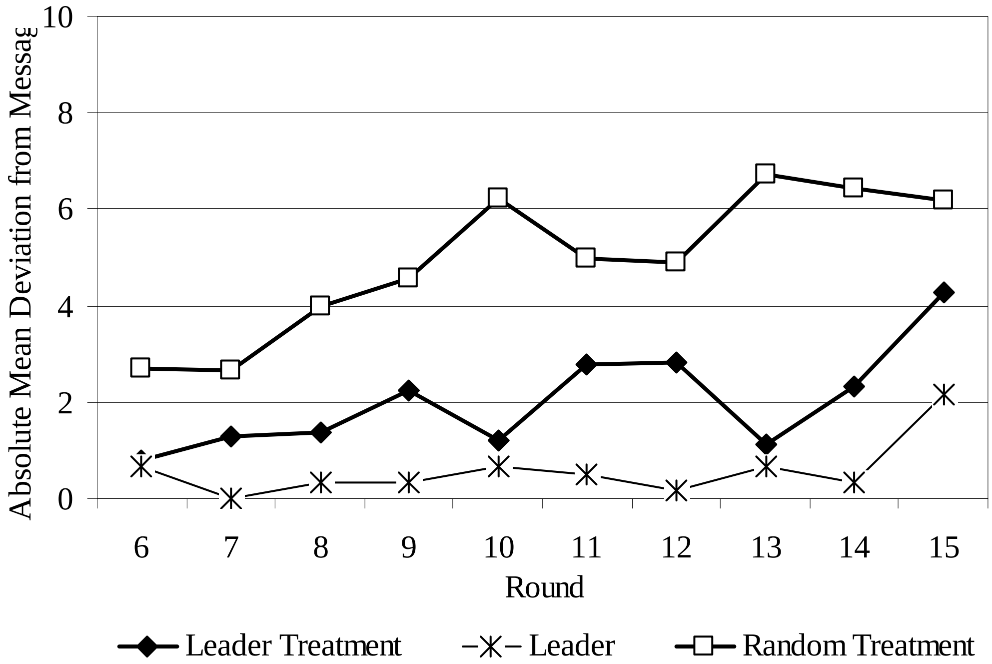

Figure 4. Distribution of Contribution Deviations from Messages

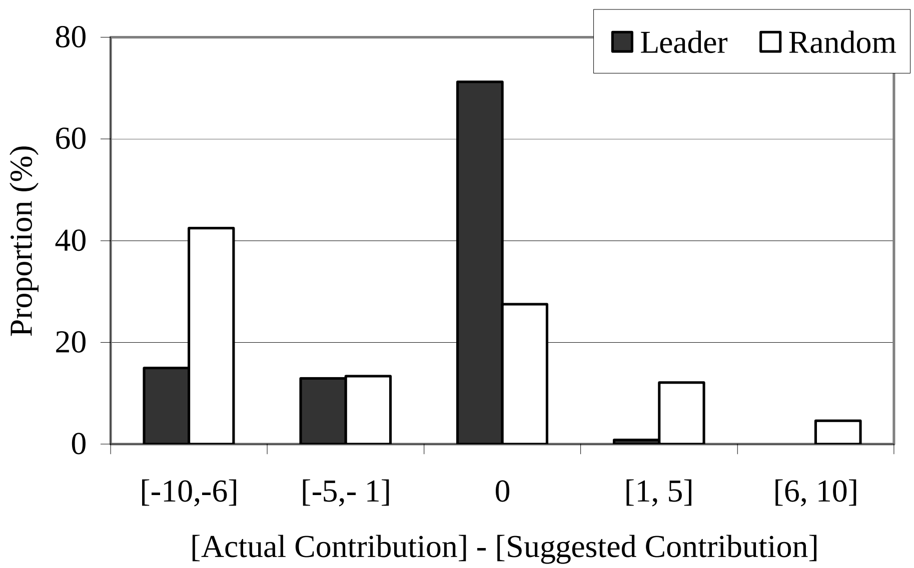

Figure 5: Mean Contribution by Treatment and Type of Suggestion